

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

BoS MEETING INVITATION

Date: 15/09/2022

By the direction of Dean Academics and Principal BITM Ballari, a meeting of Board of Studies is scheduled on **17/09/2022 at 10:30 AM** [On-line] to finalize the Scheme and Syllabus for the subjects of **B.E. III & IV Semester** Computer Science & Engineering and Artificial Intelligence & Machine Learning. The details about the Meeting link and draft syllabus is already shared to your official mail Id. Faculty members having more than **5 Years of Experience** are requested to make it convenient to attend the meeting.

Name of the Faculty	Signature	Name of the Faculty	Signature
Dr. B. M. Vidyavalk		Pratibha Mishra	
Dr. N. S. Ch. Reddy		Shwethashree A	
Dr. Rajeshwar V. Bihade		Sreenivasa M	
Dr. Muhibur Rahman		Sheetal J.	
DR. SURESH Y		Vedavyas J	
DR. GIRISH KUMAR		Sai Saira North	
A. VENKATESHWAR		SRIDHAR S.R.	
P. Parthasarathi			
C. K. Srinivas			
Usman S			
Sudhakar A.			
Dadappa			
M. D. Shafiq			
Vishwaksha Gowda			
Harekrishna			
V. Chandrasekhar			
KIRAN MUDARADDI			
Swathi D V			
Anita S. Patil			

Dr. R N Kulkarni
 Chairmen BoS
 CSE & AIML

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROCEEDINGS OF 2nd BOARD OF STUDY MEETING HELD ON 17/09/2022 @ 10:30 AM

Dated: 17/09/2022

Venue / Mode: ONLINE

Time: 10:30 AM

Members Present

S. No.	Name of the Member	Designation	Organization
1	Dr. R N Kulkarni	Chairman	Professor & Head CSE - B.I.T.M. Ballari
2	Faculty Members with different specializations	Members	CSE & AIML Departments
3	Dr. Rajan M A	Member	Research Scientist & CTO ISM Core Group, TCS Research, TCS
4	Dr. Umakanth Kulkarni	Member	Professor & Head, CSE Department, SDMCET, Dharwad
5	Dr. Bharati Harsoor	Member	Professor & Head, ISE Department, PDACE Kalburgi
6	Dr. Basavaraj S Anami	Member	Principal, KLE Institute of Technology, Hubballi
7	Mr. Vijay Kaggal	Member	Chief Strategy Officer, SLK Bengaluru
8	Mr. Sundar K S	Member	Associate Vice - President, IMS Academia, Infosys Ltd., Mysuru
9	Smt. K Triveni	Member	Manager, JSW Torangallu
10	Mr. Suneet Patil	Member	Conversational AI Lead, EVRY India,
11	All faculty of CSE / AI&ML departments	Members	Ballari Institute of Technology & Management, Ballari.

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

At the outset, the Chairman welcomed all the Honorable members for the 2nd meeting of Board of Studies (UG) for discussing and finalizing the Scheme and Syllabus for B.E. III & IV Sem. for year common to CSE & AI & ML Branches. The subjects proposed for BE III & IV Sem. are:

B.E. III Sem. CSE / AI & ML

S N	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	IPCC	21CS32	Object Oriented Programming using Java	Concerned Department	Concerned Department	3	0	2	4	3	50	50	100
02	PCC	21CS33	Data Structures and Applications	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
03	PCC	21CS34	Digital Systems Design and Computer Organization	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
04	PCC	21CSL35	Data Structures and Applications Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
05	PCC	21CSL36	Digital Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
06	AEC	21ACS38	Unix and Shell Programming	Concerned Department	Concerned Board	1	0	0	1	2	50	50	100

B.E. IV Sem. CSE / AI & ML

SN	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	IPCC	21CS42	Software Engineering	Concerned Department	Concerned Department	3	0	2	4	3	50	50	100
02	PCC	21CS43	Design And Analysis Of Algorithms	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
03	PCC	21CS44	Microcontroller And Embedded Systems	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
04	PCC	21CSL45	Design And Analysis Of Algorithms Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
05	PCC	21CSL46	Microcontroller and Embedded Systems Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
06	AEC	21ACS48 X	Biology for engineers / Department specific Ability Enhancement Course	Chemistry/ Physics/ Concerned Department	Concerned Board	0	0	2	1	2	50	50	100
						For AEC as lab course							
						1	0	0					
						For AEC as theory course							

Agenda I:

To consider and approve the Scheme and Syllabus for the following courses of B.E. III & IV Sem. CSE and AIML

BE III Sem. Courses

1. Object Oriented Programming using Java - 21CS32
2. Data Structures and Applications – 21CS33
3. Digital Systems Design and Computer Organization – 21CS34
4. Data Structures and Applications Lab – 21CSL35
5. Digital Lab – 21CSI36
6. Unix and Shell Programming – 21ACS38

Object Oriented Programming Using Java – 21CS32	Suggestions	<ul style="list-style-type: none"> • Suggested to change the Title of the course from Object Oriented Concepts to Object Oriented Programming Java • Implement the Concepts using Java or Python • Courses hosted on Infosys Spring Board may be considered as supplementary reference material • Demonstrate and Implement the Inheritance concepts using some real life examples
	Action Taken	<ul style="list-style-type: none"> • Course title is changed to Object Oriented Programming using Java. • Concepts are implemented using Java programming
Data Structures and Applications – 21CS33	Suggestions	<ul style="list-style-type: none"> • Working principles and applications of different data structures in Business scenarios need to be discussed • Design and development of programs based on Experiential Learning
	Action Taken	<ul style="list-style-type: none"> • Suggestions are to be incorporated during the delivery of the course contents. • Suggested to use Infosys Spring Board platform for Alternate Assessment.
Digital Systems Design and Computer Organization – 21CS34	Suggestions	<ul style="list-style-type: none"> • Shift Registers to be included • VHDL should be taught in Lab
	Action Taken	Suggestions are incorporated in the syllabus and the delivery methods
Data Structures and	Suggestions	<ul style="list-style-type: none"> • Design separate exercise for all the concepts
	Action Taken	Suggestions are incorporated and the contents are modified.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Applications Lab – 21CSL35		
Digital Lab – 21CSI36	Suggestions	<ul style="list-style-type: none"> No Suggestions
	Action Taken	--
Unix and Shell Programming – 21ACS38	Suggestions	<ul style="list-style-type: none"> Introduce a Lab component
	Action Taken	<ul style="list-style-type: none"> Suggestion is incorporated and the teaching methodology is changed.
<u>BE IV Sem. Courses</u>		
21ACS48X	Biology for engineers / Department specific Ability Enhancement Course	
Software Engineering – 21 CS42	Suggestions	<ul style="list-style-type: none"> Arrange workshop on Agile Methods Introduce tools for testing
	Action Taken	<ul style="list-style-type: none"> Suggestions will be incorporated
Design And Analysis Of Algorithms – 21CS43	Suggestions	<ul style="list-style-type: none"> Include some concepts from Art of Computer Programming Book Use optimization techniques
	Action Taken	<ul style="list-style-type: none"> Suggestions will be incorporated during the delivery of the syllabus
Microcontroller And Embedded Systems – 21CS44	Suggestions	No Suggestions
	Action Taken	--
Design And Analysis Of Algorithms Lab – 21CSL35	Suggestions	<ul style="list-style-type: none"> Identify appropriate technique for the given problem Perform priority Analysis
	Action Taken	Suggestions will be incorporated during the delivery of the Lab experiments
Microcontroller and Embedded Systems	Suggestions	No Suggestions
	Action Taken	--

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
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Lab 21CSL36		
Biology for engineers / Departmen t specific Ability Enhancem ent Course - 21ACS48X	Suggestions	No Suggestions
	Action Taken	--
Overall Suggestions		<p>The following points were suggested by the Members:</p> <ol style="list-style-type: none"> 1. To teach the subject in a Blended mode, preferably in the Lab. 2. Suggested to make changes in the Objectives and Course Outcomes.
Action Taken		<ul style="list-style-type: none"> • Objectives and Outcomes are appropriately modified as per the suggestions • Regarding teaching the course in a Blended mode, the contents will be discussed with the faculty and appropriate steps will be taken.

Signature of the Members

S. No.	Name of the Member	Designation	Signature
1	Dr. R N Kulkarni	Chairman	<i>[Signature]</i> 11/09/2022
2	Dr. Rajan M A	Member	ONLINE
3	Dr. Umakanth Kulkarni	Member	ONLINE
4	Dr. BharatiHarsoor	Member	ONLINE
5	Dr. Basavaraj S Anami	Member	ONLINE
6	Mr. Vijay Kaggal	Member	--
7	Mr. Sundar K S	Member	ONLINE
8	Smt. K Triveni	Member	ONLINE
9	Mr. SuneetPatil	Member	ONLINE

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

10			
11	D. Rajashree V. Bradau	Professors	Prinial
12	Dr. E. M. Vidhyavathi	Prin. & Head	(Vidya)
13	Dr. Anandhana D	Prof	Madha
14	Dr. Anita S. Patil	Assoc. Prof.	A
15	Dr. GIEISH. KUMAR	Assoc. Prof	gk
16	Usman S	Asst. Prof	(Usman)
17	Md. Shafiqulla	Asst. Prof.	Shafiq
18	Sa'saila Nath	Asst. Prof.	Sa'saila
19	C.K. Srinivas	Asst. Prof	Srinivas
20	A. Venkateshwar	Asst. Prof	Ven
21	Tr. HAYATH	Asst. Prof	HA
22	Sudhakar. A	Asst. Prof	Sudhakar
23	Vipraksha Gowda	Asst. Prof	Vipraksha
24	Prilibha Mishra	Asst. Prof	Mishra
25	Sreenivasa. M	Asst. Prof	Sreenivasa
26			
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Semester IV

SN	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks			
						L	T	P			CIE	SEE	Total	
01	BSC	21MCS41	Maths-4	Mathematics	Mathematics	3	0	0	3	3	50	50	100	
02	IPCC	21CS42	Software Engineering	Concerned Department	Concerned Department	3	0	2	4	3	50	50	100	
03	PCC	21CS43	Design And Analysis Of Algorithms	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100	
04	PCC	21CS44	Microcontroller And Embedded Systems	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100	
05	PCC	21CSL45	Design And Analysis Of Algorithms Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100	
06	PCC	21CSL46	Microcontroller and Embedded Systems Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100	
07	HS	21KSK37/47	Sanskrutika Kannada	HSMC	HSMC	1	0	0	1	-	100	-	100	
		21KBK37/47	Balake Kannada											
		OR	-											
	HS	21CIP37/47	Constitution of India, professional Ethics and Cyber Law							2	50	50		
08	AEC	21SSA480	Soft skills and basic aptitude	Humanities	Humanities	1	2	0	2	2	50	50	100	
09	AEC	21ACS48X	Biology for engineers / Department specific Ability Enhancement Course	Chemistry/ Physics/ Concerned Department	Concerned Board	0	0	2	1	2	50	50	100	
						For AEC as lab course								
						1	0	0						
For AEC as theory course														
10	UIV	21UHV490	Universal Human Values	Concerned Department	ANY DEPT.	1	0	0	1	2	50	50	100	
11	INT	21INT491	Internship - I	Evaluation By the appropriate authorities		Complete during the inter			2	---	100	-	100	
Total											22	600/650	500/50	1100
Course prescribed to lateral entry Diploma holders admitted to III semester B.E. Program														
12	NCM C	21MATDIP 41	Additional Mathematics - I	Mathematics	-	3	0	0	0	-	100	-	100	

Ability Enhancement Course

01	21ABE481	Biology for Engineers
02	21ACS482	R Programming
03	21ACS483	Web Designing

Internship - I (21INT491):

All the students admitted to engineering programmes shall have to undergo a mandatory internship-I of 03 weeks during the intervening vacation of II and III semesters. All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory internship-I of 03 weeks during the intervening period of III and IV semesters. Internship-I shall include Inter / Intra Institutional activities. A Viva-voce examination (Presentation followed by question-answer session) shall be conducted during IV semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent examinations after satisfying the internship requirements. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card.

Semester: III

Course Name: FOURIER TRANSFORM, NUMERICAL METHODS AND DISCRETE MATHEMATICAL STRUCTURES

Course Code	21MCS31	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Pre-requisite(s):

1. Integration by parts using Bernolli's rule.
2. First order Ordinary Differential Equations.
3. Propositions, construction of truth tables for different logical connectives.
4. Definition of set, operations on sets.
5. Definitions of different types of functions.

Module – 1

Infinite Fourier Transforms: Infinite Fourier transforms, definition, Fourier Sine and Cosine transforms. Inverse Fourier transforms, Inverse Fourier Cosine and Sine transforms and Problems.
Self-Study: Leibnitz rule for differentiation under Integral sign. 8 Hours

Module - 2

Numerical Solution of first-Order ODEs
 Taylor's series method, Modified Euler's method, Runge-Kutta method of order four, Milne's predictor and corrector formula, Adam's-Bashforth formula. (all methods without Derivations)
Self-Study: Solution of ODE using Picard's method. 8 Hours

Module – 3

Logical Connectives: Disjunction, Conjunction, Negation, Exclusive Disjunction. Conditional and Bi-conditional statements. Laws of logic, Tautologies and contradictions, Logical Equivalence, Duality, Converse, inverse and contra positive. Rules of inference, open statements and Quantifiers.
Self-Study: Logical gates. 8 Hours

Module – 4

Relations: Definition of a relation, Matrix of a relation, Diagraph of a relation. Union/intersection of relations. Complement of a relation. Connectivity relation, inverse of a relation, composition of a relation. Properties of relation. Equivalence relation (Theorems on Equivalence Relations). Partial ordered relation and poset. Least upper bound and greatest lower bound. Extremal elements of a poset, Hasse diagram.
Self-Study: Lattices. 8 Hours

Module – 5

Functions and Recurrence relations: Compositions of functions (Theorems on Composition functions), Invertible functions (Theorems on Invertible functions). Permutation functions. Recurrence relations. First order recurrence relation, Second order homogeneous recurrence relation, higher order linear homogeneous recurrence relation, Non-homogeneous recurrence relations.
Self-Study: Generating functions. 8 Hours

Course Outcomes:

Upon completion of this course, student will be able to:

1. Demonstrate the Fourier transform to study the behavior of periodic functions and their applications in system communications, Analysis and design of algorithms.
2. Solve first order ODE's arising in engineering problems using single step numerical methods.
3. Apply the concepts of logic for effective computation and relating problems in the Engineering domain.
4. Analyze the concepts of relations to various fields of Engineering.
5. Apply the concepts of functions and recurrence relations in the context of various fields of Computer Science Engineering, like, Database, finite Automata and formal languages, Compilers etc...

Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

bharati a jeergi <bharati_a@rediffmail.com>

Sat 24-Sep-22 2:20 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Dear Sir,

I have gone thru in detail the content of the syllabus, it is good and can be approved.

Thanks & Regards

Dr Bharati Harsoor

Professor, ISE Dept

PDA College of Engg, kalaburgi

From: "Dr. R N Kulkarni" <rnkulkarni@bitm.edu.in>

Sent: Sat, 24 Sep 2022 13:28:09

To: "Dept. of CSE" <csestaff@bitm.edu.in>, "anami_basu@hotmail.com" <anami_basu@hotmail.com>,

Sundar K S <sundarks@infosys.com>, "rajan.ma@tcs.com" <rajan.ma@tcs.com>, "Vijay C. Kaggal"

<vijay.kaggal@slkgroup.com>, "mailto:suneetpatil@gmail.com" <mailto:suneetpatil@gmail.com>,

Triveni Kakimani <triveni.kakimani@gmail.com>, "bharati_a@rediffmail.com"

<bharati_a@rediffmail.com>, "upkulkarni@yahoo.com" <upkulkarni@yahoo.com>

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Dear Sir / Madam,

As per the discussion held in the Second Board of Studies meeting of Computer Science & Engineering & Artificial Intelligence & Machine Learning Board on 17/09/2022 @10:00AM, I am herewith attaching the Final copy of the Syllabus after incorporating all the necessary suggestions. I request you to kindly go through the syllabus for both theory and lab and approve the same.

Kind Regards

Dr. R N Kulkarni

Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Rajan A <rajan.ma@tcs.com>

Mon 26-Sep-22 1:52 PM

To: Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

TCS Confidential

Approved.

Thanks & Regards

Dr. Rajan M A

Research Scientist and CTO ISM core Group,
TCS Research

Tata Consultancy Services

18, SJM Towers, Sheshadri Road,

Gandhinagar,

Bangalore - 560009, Karnataka

India

Ph:- 080 67247961

Buzz:- 4847961

Cell:- +91 9480319023

Mailto: rajan.ma@tcs.com

Website: <http://www.tcs.com>

From: Rajan A <rajan.ma@tcs.com>

Sent: Monday, September 26, 2022 1:25 PM

To: Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

Subject: Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Approved.

Thanks & Regards

Dr. Rajan M A

Research Scientist and CTO ISM core Group,
TCS Research

Tata Consultancy Services

18, SJM Towers, Sheshadri Road,

Gandhinagar,

Bangalore - 560009, Karnataka

India

Ph:- 080 67247961

Buzz:- 4847961

Cell:- +91 9480319023

Mailto: rajan.ma@tcs.com

Website: <http://www.tcs.com>



9/26/22, 3:54 PM

Mail - Dr. R N Kulkarni - Outlook

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Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

umakant kulkarni <upkulkarni@yahoo.com>

Mon 26-Sep-22 2:02 PM

To: Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; Rajan A <rajan.ma@tcs.com>

Approved

With Regards

Dr. Umakant P.Kulkarni

Professor, Department of CSE,

SDM College of Engineering and Technology,

Dhavalagiri, Dharwad-580 002.

Mob: 09448915301

On Monday, September 26, 2022 at 01:54:15 PM GMT+5:30, Rajan A <rajan.ma@tcs.com> wrote:

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Approved.

Thanks & Regards

Dr. Rajan M A

Research Scientist and CTO ISM core Group,

TCS Research

Tata Consultancy Services

18, SJM Towers, Sheshadri Road,

Gandhinagar,

Bangalore - 560009, Karnataka

India

Ph:- 080 67247961

Buzz:- 4847961

Cell.- +91 9480319023

Mailto: rajan.ma@tcs.com

Website: <http://www.tcs.com>

From: Rajan A <rajan.ma@tcs.com>

Sent: Monday, September 26, 2022 1:25 PM

To: Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>



Subject: Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Approved.

Thanks & Regards

Dr. Rajan M A

Research Scientist and CTO ISM core Group,

TCS Research

Tata Consultancy Services

18, SJM Towers, Sheshadri Road,

Gandhinagar,

Bangalore - 560009, Karnataka

India

Ph:- 080 67247961

Buzz:- 4847961

Cell:- +91 9480319023

Mailto: rajan.ma@tcs.com

Website: <http://www.tcs.com>

From: Sundar K S <sundarks@infosys.com>

Sent: Monday, September 26, 2022 12:47 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; Rajan A <rajan.ma@tcs.com>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

Subject: RE: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

"External email. Open with Caution"

Approved

Thanks and Regards,

Sundar KS

ETA, Infosys Mysore.

-----Original Message-----

From: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Sent: Monday, September 26, 2022 12:41 PM

To: rajan.ma@tcs.com; Sundar K S <sundarks@infosys.com>; upkulkarni@yahoo.com

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

[**EXTERNAL EMAIL**]

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

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I request you to kindly go through the syllabus for both theory and lab and approve the same.

9/26/22, 3:53 PM

Mail - Dr. R N Kulkarni - Outlook

Kind Regards

Dr. R N Kulkarni

TCS Confidential

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RE: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Sundar K S <sundarks@infosys.com>

Mon 26-Sep-22 12:47 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; rajan.ma@tcs.com <rajan.ma@tcs.com>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

Approved

Thanks and Regards,
Sundar KS
ETA, Infosys Mysore.

-----Original Message-----

From: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Sent: Monday, September 26, 2022 12:41 PM

To: rajan.ma@tcs.com; Sundar K S <sundarks@infosys.com>; upkulkarni@yahoo.com

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

[**EXTERNAL EMAIL**]

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Kind Regards

Dr. R N Kulkarni

Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Suneet Patil <mailto:suneetpatil@gmail.com>

Sat 24-Sep-22 1:41 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Hi Sir,

Syllabus looks good and approved from my side.

Note: I see last few emails I received is going spam so I missed it. Please check why it is going spam folders.

Thanks,
Suneet

On Sat, 24 Sep 2022 at 12:45 PM, Dr. R N Kulkarni <rnkulkarni@bitm.edu.in> wrote:

Dear Sir / Madam,

As per the discussion held in the Second Board of Studies meeting of Computer Science & Engineering & Artificial Intelligence & Machine Learning Board on 17/09/2022 @10:00AM, I am herewith attaching the Final copy of the Syllabus after incorporating all the necessary suggestions. I request you to kindly go through the syllabus for both theory and lab and approve the same.

Kind Regards

Dr. R N Kulkarni

Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Basavaraj Anami <anami_basu@hotmail.com>

Sat 24-Sep-22 5:39 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Dear Sir,

I hereby approve the syllabus. This is for your kind information.

with regards

Prof. Anami

From: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Sent: Saturday, September 24, 2022 7:15 AM

To: Dept. of CSE <csestaff@bitm.edu.in>; anami_basu@hotmail.com <anami_basu@hotmail.com>; Sundar K S <sundarks@infosys.com>; rajan.ma@tcs.com <rajan.ma@tcs.com>; Vijay C. Kaggal <vijay.kaggal@slkgroup.com>; mailtosuneetpatil@gmail.com <mailtosuneetpatil@gmail.com>; Triveni Kakimani <triveni.kakimani@gmail.com>; bharati_a@rediffmail.com <bharati_a@rediffmail.com>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Dear Sir / Madam,

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Dr. R N Kulkarni



Basavarajeswari Group of Institutions

ಬಳ್ಳಾರಿ ಇನ್‌ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಟೆಕ್ನಾಲಜಿ & ಮ್ಯಾನೇಜ್‌ಮೆಂಟ್, ಬಳ್ಳಾರಿ

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under Visvesvaraya Technological University, Belagavi
(Recognized by Govt. of Karnataka & AICTE, New Delhi)



"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)

**Scheme of Teaching and Evaluation for
B.E – III & IV Semester
Artificial Intelligence &
Machine Learning
(2022 Scheme)**



**B.E. in Artificial Intelligence & Machine Learning Scheme of Teaching and Examinations - 2022
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2023-24)**

III SEMESTER

SN	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination			Credits	
					Theory Lecture	Tutorial	Practical/ Drawing	Self Study	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P	S					
1	BSC	22MDA31	Graph theory and Discrete Mathematical Structures, Probability and Statistics	TD: Maths, PSB: Maths	3	0	0		03	50	50	100	3
2	IPCC	22AI32	Digital System Design and Computer Organization	TD & PSB: CSE /AIML /CS[AI],CS[DS]	3	0	2		03	50	50	100	4
3	IPCC	22AI33	Operating System	TD & PSB: CSE /AIML /CS[AI],CS[DS]	3	0	2		03	50	50	100	4
4	PCC	22AI34	Data Structures and Applications	TD & PSB: CSE /AIML /CS[AI],CS[DS]	3	0	0		03	50	50	100	3
5	PCCL	22AIL35	Data Structures Lab	TD & PSB: CSE /AIML /CS[AI],CS[DS]	0	0	2		03	50	50	100	1
6	ESC	22AI36	ESC/ETC/PLC Object Oriented Programming With JAVA	TD & PSB: CSE /AIML /CS[AI],CS[DS]	3	0	0		03	50	50	100	3
7	UHV	22SC37	Social Connect and Responsibility	Any Department	0	0	2		01	100	---	100	1
8	AEC/ SEC	22AI38X	Ability Enhancement Course / Skill Enhancement Course - III	TD & PSB: CSE /AIML /CS[AI],CS[DS]	If the course is a Theory				01	50	50	100	1
					1	0	0						
					If the course is a Laboratory				02				
9	MC	22NS39	National Service Scheme (NSS)	NSS coordinator									
		22PE39	Physical Education (PE) (Sports and Athletics)	Physical Education Director	0	0	2			100	---	100	0
		22YO39	Yoga	Yoga Teacher									
Total										550	350	900	20

Ability Enhancement Course – III

22AI381	Unix and Shell Programming	22AI382	Version Controller with Git
22AI383	R Programming		

ADDITIONAL MATHEMATICS for Lateral Entry Students

SN	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination			Credits	
				Theory Lecture	Tutorial	Practical/ Drawing	Self Study	Duration in hours	CIE Marks	SEE Marks		Total Marks
				L	T	P	S					
1	22MATDIP31	ADDITIONAL MATHEMATICS-I	MATHS	3	0	0		03	100	00	100	0

IV SEMESTER

SN	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	BSC	22BB41	Biology for Engineers	TD & PSB: CHEM	3	0	0		03	50	50	100	3
2	IPCC	22AI42	Principles of Artificial Intelligence	TD & PSB: CSE /AIML / CS[AI], CS[DS]	3	0	2		03	50	50	100	4
3	IPCC	22AI43	Database Management Systems	TD & PSB: CSE /AIML / CS[AI], CS[DS]	3	0	2		03	50	50	100	4
4	PCC	22AI44	Analysis and Design of Algorithms	TD & PSB: CSE /AIML / CS[AI], CS[DS]	3	0	0		03	50	50	100	3
5	PCCL	22AIL45	Algorithms Lab	TD & PSB: CSE /AIML / CS[AI], CS[DS]	0	0	2		03	50	50	100	1
6	ESC	22AI46X	ESC/ETC/PLC	TD & PSB: CSE /AIML / CS[AI], CS[DS]	3	0	0		03	50	50	100	3
7	AEC/ SEC	22PSW47	Professional Skills for the Work Place	TD & PSB: H & S	If the course is a Theory				01	50	50	100	1
					1	0	0						
					If the course is a Laboratory				02				
0	0	2											
8	UHV	22UH48	Universal human values course	Any Department	1	0	0		01	50	50	100	1
9	MC	22NS49	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		22PE49	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		22YO49	Yoga	Yoga Teacher									
Total										500	400	900	20

Engineering Science Course (ESC/ETC/PLC)

22AI461	System Software	22AI462	Object Oriented Programming with Python
22AI463	Introduction to Data Analytics		

ADDITIONAL MATHEMATICS for Lateral Entry Students

SN	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	S					
1	22MATDIP41	ADDITIONAL MATHEMATICS-II	MATHS	3	0	0		03	100	00	100	0



Basavarajeswari Group of Institutions

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Scheme of Teaching and Evaluation for B.E – III Semester Artificial Intelligence & Machine Learning (2022 Scheme)



Semester: III

Course Name: Graph theory and Discrete Mathematical Structures

Course Code	22MDA31	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites:

1. Definition of a set, operations on sets and definitions of different types of functions.
2. First order Ordinary Differential Equations.

Course objectives:

1. Students will achieve command of the fundamental definitions and concepts of graph theory.
2. Be able to formulate and prove central theorems about trees, connectivity, coloring, and planar graphs.
3. Be able to describe and apply some basic algorithms for graphs;
4. Understand an intense foundational introduction to fundamental concepts in discrete mathematics.
5. Interpret, identify, and solve the language associated with logical structure, sets, relations and functions, modular arithmetic.

Module – 1 Introduction to Graph Theory

08 Hours

Definition of degree, graph, incidence, Sub graphs, connected graphs, complete graph, Complement of a graph, and Graph Homorphism and Isomorphism. Bipartite graphs, Walks, cycles and paths, Hamiltonian and Euler Circuits. Planar graphs, Euler's formula with proof, Dual of a planar graph.

Self-Study: The Konigsberg bridge problem.

Applications: Internet field. Google maps, webpage searching.

Module – 2 Trees

08 Hours

Definitions of a tree, Properties of trees, connected trees, Minimally connected graphs. Theorems on Trees (with proof) such as "A tree with n vertices has (n-1) edges". "Any connected graph with n vertices and (n-1) edges is a tree". "A connected graph is a tree if and only if it is minimally connected" and Examples, Routed trees, Weighted Trees and Prefix Codes.

Self-Study: Sorting technique.

Applications: Representing hierarchical data, and providing efficient algorithms for operations such as insertion, deletion, and searching.

Module – 3 Spanning trees and Algorithms:

08 Hours

Definition of a spanning tree. Minimal Spanning Trees – Kruskal's and Prim's algorithms, cut sets and capacity of cuts.

Transport Networks – Max-flow, Min-cut Theorem (without proof).Problems.

Self-Study: Matching theory. Dijkstra's algorithm Shortest Path.

Applications: Sorting, processing and machine learning.

Module – 4 Relations and Functions

08 Hours

Definition of a relation, Matrix of a relation, Diagraph of a relation. Properties of relation. Equivalence relation (Theorems on Equivalence Relations). Partial ordered relation and poset. Least upper bound and greatest lower bound, Hasse diagram.

Compositions of functions (Theorems on Composition functions), The pigeon hole principle. Permutation functions.

Self-Study: Invertible functions.

Applications: Writing a computer programme and coding.

Module – 5 Recurrence Relations

08 Hours

Definition of a recurrence relation, First Order Linear Recurrence Relation, applications of linear recurrence relations. The Second Order Linear Homogeneous Recurrence Relation, Non-homogeneous Recurrence Relation. Self-Study: Generating Functions.
Applications: To express the runtime complexity of an algorithm in a concise and mathematical form.

Course Outcomes:

- CO 1: Apply the basic concepts of graph theory and judge the planar graphs.
- CO 2: Analyze the significance of graph theory in different engineering disciplines
- CO 3: Apply algorithms used in interdisciplinary engineering domains.
- CO 4: Analyze the concepts of relations to various fields of Engineering.
- CO 5: Apply the concepts of functions and recurrence relations in the context of various fields of Computer Science & Engineering, like, finite Automata and formal languages, Compilers etc.

S N	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	"Graph Theory: With Application to Engineering and Computer Science",	Narsingh Deo,	Prentice Hall of India,	16 th Edition.2003.
2	"Graph Theory Applications"	L.R.Foulds,	Springer	10 th Edn.2016
3	Foundation of Discrete Mathematics	K D Joshi	New Age Publishers, Ltd	10 th Edition, 2014
4	Discrete and Combinatorial Mathematics	Ralph P. Grimaldi	Pearson Education.Inc.	5 th Edition, 2011.
Reference Books				
1	Discrete Mathematical structures and Graph theory	Dr D.S.Chandrasekharaiah.	Prism Books Pvt Ltd	6 th Edition, 2019.
2	Discrete Mathematics and its applications	Kenneth H. Rosen	Tata Mcgraw-Hill,	7 th Edition,2012
3..	Discrete Mathematical Structures: Theory and Applications	D. S. Malik, M. K. Sen	Thomson Course Technology.	1 st Edition, 2004.
4.	"Discrete Mathematics and Its Applications",	Kenneth H. Rosen,	McGraw Hill	6 th Edition, 2007.

e-Resources:

- <http://nptel.ac.in/courses/111106050/13>.
- <https://www.youtube.com/watch?v=u71Up-m5NBQ>.
- <https://www.youtube.com/watch?v=oU60TuGHxe0&list=PL0862D1A947252D20&index=11>.
- https://www.youtube.com/watch?v=_BIKq9Xo_5A&list=PL0862D1A947252D20&index=13.
- <https://www.youtube.com/watch?v=7cTWea9YAJE&list=PL0862D1A947252D20&index=24>.
- <https://www.youtube.com/watch?v=695iAm935cY&list=PL0862D1A947252D20&index=25>.
- <https://www.youtube.com/watch?v=X0sGo7X2xHw>.
- <https://www.youtube.com/watch?v=7FJ08NILBuA>

Semester: III

Course Name: DIGITAL SYSTEM DESIGN AND COMPUTER ORGANIZATION

Course Code	22AI32	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40 + 20	Total Marks	100
Credits	04	Exam Hours	03

Pre-requisites:

1. Basic Electronics
2. Basic Structure of Computer.

Course Objectives:

1. Illustrate different simplifying techniques in the design of combinational circuits.
2. Design various combinational and sequential digital circuits.
3. Design various counters using Flip-Flops.
4. Demonstrate the fundamentals of computer organization with machine instructions.
5. Elaborate the communication of input/output devices with computer system and solve arithmetic Operations using various techniques.

Module – 1

08 Hours

Karnaugh Maps: minimum forms of switching functions, two and three variable Karnaugh maps, four variable Karnaugh maps, determination of minimum expressions using essential prime implicants, Quine- McCuskey Method: determination of prime implicants, the prime implicant chart, simplification using map-entered variables

Module - 2

08 Hours

Multiplexers, Decoders and Programmable Logic Devices: Multiplexers, three state buffers, decoders and encoders, Programmable Logic devices.

Latches and Flip-Flops: Set Reset Latch, Gated Latches, Edge-Triggered D Flip Flop, SR Flip Flop, J K Flip Flop, T Flip Flop.

Module – 3

08 Hours

Register and Counters: Register and register transfers, Shift registers

Counters: design of Binary counters, counters for other sequences, counter design using SR and J K Flip Flops. Sequential parity checker

Module – 4

08 Hours

Basic Structure of Computers: Basic Operational Concepts, Bus Structures, Performance–Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement.

Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes

Module – 5

08 Hours

Input/output Organization: Accessing I/O Devices, Interrupts, Direct Memory Access, Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-Operand Multiplication: Booth algorithm.

PRACTICAL COMPONENT

20 Hours

SN	List of Experiments
1	a) Realize 3-Variable and 4-variable Boolean expressions, simplify it using K-map and Implement using basic gates. b) Simulate and verify the working of above expressions using VHDL
2	a) Design and implement Half adder and Full Adder using basic gates. b) Simulate and verify the working of Half adder and Full Adder using VHDL
3	a) Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer. b) Simulate and verify the working of 8:1 multiplexer using VHDL
4	a) Design and implement the Binary to Gray Code converter using basic gates. b) Simulate and verify the working of Binary to Gray Code converter using VHDL
5	a) Design and implement the Truth Table of a 3-bit Parity Generator and 4-bit Parity Checker with an even parity bit using basic Gates.
6	a) Realize a J-K Master / Slave Flip-Flop using NAND gates and verify its truth table. b) Simulate and verify the working of D Flip-Flop with positive edge triggering using VHDL.
7	a) Design and implement a mod-n ($n < 8$) synchronous up counter using J-K Flip-flop ICs b) Simulate and verify the working of mod-8 up counter using VHDL.
8	a) Design and implement an asynchronous counter using decade counter IC to count up from 0 to n ($n \leq 9$) and demonstrate on 7-segment display (using IC7447). b) Simulate and verify the working of Switched tail counter using VHDL

Course Outcomes:

1. Apply different simplifying techniques in the design of combinational circuits.
2. Design various combinational and sequential digital circuits.
3. Design various counters using Flip-Flops.
4. Describe the fundamentals of computer organization with machine instructions.
5. Elaborate the communication of input/output devices with computer system and solve arithmetic Operations using various techniques.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Analog and Digital Electronics	Charles H Roth and Larry L Kinney	Cengage Learning	2019
2	Computer Organization	Carl Hamacher, Zvonko Vranesic, Safwat Zaky	Tata McGraw Hill	5 th Edition 2002
Reference Books				
1	Digital Principles and Applications,	Donald P Leach, Albert Paul Malvino & Goutam Saha	Tata McGraw Hill,	8 th Edition 2015
2	Computer Organization & Architecture, Pearson	William Stallings		9 th Edition

e-Resources: <http://lms.vtu.ac.in/econtent/CSE.php>

Semester: III
Course Name: OPERATING SYSTEM

Course Code	22AI33	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40 + 20	Exam Hours	3
Credits	4	Total Marks	100

Pre-requisites: The students should have the knowledge of:

1. Basics of computer system and its applications
2. Basics of computer programming

Course objectives:

1. To introduce operating system, OS responsibilities, and OS services.
2. To discuss process concept, process scheduling techniques, and multi-threading concepts.
3. To demonstrate deadlock condition in the computer system, and usage of main memory.
4. To introduce virtual memory management concepts and file system.
5. To explain about secondary storage system and Linux OS as a case study.

Module – 1

08 Hours

Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems;
Operating System Services: User - Operating system interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating system structure; Virtual machines; System boot.

Module - 2

08 Hours

Process Management Process concept; Process scheduling; Operations on processes; Inter process communication.
Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; thread scheduling.
Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; threading issues.

Module – 3

08 Hours

Deadlocks: Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.
Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.

Module – 4

08 Hours

Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.
File System, Implementation of File System: File system: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.

Module – 5

08 Hours

Secondary Storage Structures, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management.

Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.

PRACTICAL COMPONENT

20 Hours

SN	List of Experiments
1	Install an operating system on a physical or logical (virtual) machine.
2	Design, develop and implement program to simulate the working of Shortest Remaining Time First scheduling algorithm. Experiment with different length jobs.
3	Design, develop and implement program to simulate the working of Round Robin (RR) scheduling algorithms. Experiment with different quantum sizes for RR algorithm.
4	Design, develop and implement a Banker's algorithm. Assume suitable input required to demonstrate the results.
5	Design, develop and implement page replacement using FIFO algorithms. Assume suitable input required to demonstrate the results.
6	Design, develop and implement page replacement using LRU algorithms. Assume suitable input required to demonstrate the results.
7	Design, develop and implement optimal page replacement algorithms. Assume suitable input required to demonstrate the results.

Course Outcomes: At the end of the course students will be able to

1. Analyze the need, responsibilities, and services of OS.
2. Compare different process scheduling techniques.
3. Examine deadlock situation, prevention, avoidance and recovery.
4. Implement virtual memory management concept and file system.
5. Demonstrate the structure of secondary storage and design of Linux OS.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Operating System Principles	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Wiley-India	7th edition,, 2006
Reference Books				
1	Operating Systems: A Concept Based Approach	D.M Dhamdhare	McGraw- Hill	3rd Ed., 2013.
2	An Introduction to Operating Systems: Concepts and Practice	P.C.P. Bhatt	PHI(EEE)	4th Edition, 2014

E-Resources:

- <https://www.operating-system.org/>
- https://blog.feedspot.com/operating_system_blogs/
- <https://www.youtube.com/playlist?list=PLhqPDA2HoaAZLws7PFYW14MnzCyHf8do->
- <https://medium.com/javarevisited/6-best-operating-system-courses-for-beginners-to-learn-7d727882d267>

Semester: III

Course Name: DATA STRUCTURES AND APPLICATIONS

Course Code	22AI34	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

1. Explain the fundamentals of data structures and their applications to solve real life problems.
2. Demonstrate the working of linear and nonlinear data structures.
3. Write solutions to problems using linear data structures and nonlinear data structures.
4. Apply different data structures to solve given problem.
5. Develop skills to apply appropriate data structures in problem solving.

Module – 1

08 Hours

Review of C Language: Arrays, Structures & Unions, Pointers and Dynamic memory allocation
Introduction to Data Structures: Classifications of Data Structures, Data structure operations: Traversing, inserting, deleting, searching and sorting.
Applications: Representation of Polynomials and Sparse Matrices

Module - 2

08 Hours

Stacks: Stack Operations, Array Representation of Stacks, Different types of expression: Infix, Postfix and Prefix.
Stack Applications: Infix to postfix conversion, Infix to prefix conversion, Evaluation of postfix expression, Recursion.
Queues: Array Representation of Queues, Queue Operations, Circular Queues, Queues and Circular queues using Dynamic arrays, Dequeues, Priority Queues.

Module – 3

08 Hours

Linked Lists: Classification of linked lists. Representation of different types of linked lists in Memory. Traversing, Insertion, Deletion, Searching, Sorting and Concatenation Operations on Singly linked list. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues.
Applications of Linked lists – Polynomials, Sparse matrix representation.

Module – 4

08 Hours

Trees 1: Terminologies, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder;
Threaded binary trees
Binary Search Trees: Binary Search Trees, Insertion, Deletion, Traversal and Searching operations on Binary search tree. Application of Trees: - Evaluation of Expression.

Module – 5

08 Hours

Graphs: Terminologies, Matrix and Adjacency List Representation of Graphs, Traversal methods: Breadth First Search and Depth First Search.
Hashing: Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.

Course Outcomes:

1. Identify types of data structures and use them to solve problems
2. Demonstrate the applications of various data structures
3. Apply the data structures to solve problems.
4. Compare solutions of a given problem using different data structures
5. Choose appropriate data structures to solve real world problems

Suggested Learning Resources:

S N	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Data Structures: A Pseudo-code approach with C	Gilberg and Forouzan	Cengage Learning	2 nd Ed, 2014
2	Fundamentals of Data Structures in C	Ellis Horowitz and SartajSahni	Universities Press	2 nd Ed, 2014
Reference Books				
1	Data Structures using C	ReemaThareja	Oxford press	3 rd Ed 2012
2	Data Structures using C	A M Tenenbaum	PHI	2001

Semester: III

Course Name: DATA STRUCTURES AND APPLICATIONS LAB

Course Code	22AIL35	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	1	Exam Hours	03

List of Experiments:

Course Objectives:

1. Illustrate implementation of basic operations on data structures.
2. Interpret Applications of different data structures.
3. Demonstrate data structures and their variants.
4. Illustrate various searching techniques using trees and graphs.
5. Develop skills to identify appropriate data structures to solve a given problem.

Identify the functional requirements, then Design and Develop solutions to the problems related to the data structures

1. Stacks and Queues
2. Linked list
3. Trees
4. Graphs
5. Hashing techniques

Course outcomes:

1. Design programs to implement basic operations on data structures.
2. Apply different data structures to solve problems.
3. Develop programs to demonstrate variants of queues and linked list
4. Implement various Searching techniques using trees and graphs.
5. Choose appropriate data structures to solve a given problem.

Semester: III

Course Name: OBJECT ORIENTED PROGRAMMING WITH JAVA

Course Code	22AI36	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3

Pre-requisites:

Students should know the basic knowledge on:

- C Programming
- C++

Course objectives:

1. Learn fundamental features of object-oriented language and JAVA.
2. Learn object-oriented concepts using programming examples.
3. Study the concepts of importing packages, exception handling mechanism and multithreading.
4. Introduce event handling mechanism.
5. Create Graphical User Interface (GUI) applications using swings.

Module – 1

08 Hours

Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays.

Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The? Operator, Operator Precedence, Using Parentheses.

Control Statements: Java's Selection Statements, Iteration Statements

Module - 2

08 Hours

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, "This" Keyword, Garbage Collection.

A Closer Look at Methods and Classes: Overloading Methods.

Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

Module – 3

08 Hours

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces.

Exception Handling: Exception- Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions.

Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using is Alive() and join(), Thread Priorities.

Module – 4

08 Hours

Event Handling: Two Event Handling Mechanisms, The Delegation Event Model; Event Classes, Sources of Events, Event Listener Interfaces, Using the Delegation Event Model, Adapter Classes, Inner Classes.

Module – 5

08 Hours

Introducing Swings: The Origins of Swing, Two Key Swing Features, Components and Containers, The Swing Packages; A Simple Swing Application, Create a Swing Applet.

Exploring Swings: JLabel and Image Icon, J Text Field, The Swing Buttons, J Tabbed pane, JList, JCombo Box, J Table.

Course Outcomes:

1. Identify classes, objects, members of a class and relationship among them needed for a specific problem.
2. Implement reusability Programs in JAVA using inheritance.
3. Develop JAVA Programs of error handling techniques using exception handling.
4. Apply the concepts of event handling to develop GUI programs.
5. Apply the concepts of Java Swings to develop robust programs.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Java The Complete Reference	Herbert Schildt	The McGraw Hill	8thEdition,2015
Reference Books				
1	Programming with Java	Mahesh Bhav and Sunil Patekar	Pearson Education	1 st Edition,2008
2	Programming with Java A primer	E Balagurusamy	Tata McGraw Hill	3 rd Edition,2007

e-Resources:

Howtoinstalljava: -<https://youtu.be/IJ-PJbvJBGs>

JavaSwings: -<https://youtu.be/TwMXA1S38qg>

JavaQuiz: -https://www.w3schools.com/java/java_quiz.asp

JavaConcepts: -<https://www.javatpoint.com/java-tutorial>

ProgrammingExercises: -<https://www.programiz.com/java-programming/examples>

Semester: III

Course Name: SOCIAL CONNECT & RESPONSIBILITY

Course Code	22SC37	CIE Marks	100
Teaching Hours / Week (L:T:P: S)	0:0:2	SEE Marks	--
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning	Total Marks	100
Examination nature (No SEE – Only CIE)	For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept. / Any Dept.		
Credits	01 – Credit		

Course objectives:

The course will enable the students to:

1. Provide a formal platform for students to communicate and connect to the surrounding.
2. Create a responsible connection with the society.
3. Understand the community in general in which they work.
4. Identify the needs and problems of the community and involve them in problem –solving.
5. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

Contents:

- The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.
- The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-long activities conducted by faculty mentors.

In the following a set of activities planned for the course have been listed:

Contents
Part I: Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of BE / B.Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature -- Objectives, Visit, case study, report, outcomes.
Part II : Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms - Objectives, Visit, Case Study, Report, Outcomes.
Part III : Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus
Objectives, Visit, Case Study, Report, Outcomes.
Part IV: Water conservation: Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices – Objectives, Visit, case study, report, outcomes.

Part V :

Food walk:

City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes.

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

- CO1: Communicate and connect to the surrounding.
- CO2: Create a responsible connection with the society.
- CO3: Involve in the community in general in which they work.
- CO4: Notice the needs and problems of the community and involve them in problem –solving.
- CO5: Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
- CO6: Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

Activities:

Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

PEDAGOGY:

The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs / social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?

COURSE TOPICS:

The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversational will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.

DURATION:

A total of 40 - 50 hours engagement per semester is required for the 3rd semester of the B.E. / B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic, and poetry) Faculty mentors has to design the evaluation system as per VTU guidelines of scheme & syllabus.

Guideline for Assessment Process:

Continuous Internal Evaluation (CIE):

After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor / s to indicate what he has observed and learned in the social connect period. The report should be signed by the mentor. The report shall be evaluated on the basis of the following criteria and / or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50. Planning and scheduling the social connect Information / Data collected during the social connect Analysis of the information / data and report writing Considering all above points allotting the marks as mentioned below

Excellent:	80 to 100
Good:	60 to 79
Satisfactory:	40 to 59
Unsatisfactory and fail :	<39

Special Note:

NO SEE – Semester End Exam – Completely Practical and activities based evaluation

Pedagogy – Guidelines:

It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

SN	Topic	Group size	Location	Activity Execution	Reporting	Evaluation Of the Topic
1.	Plantation and adoption of a tree:	May be individual or team	Farmers land / parks / Villages / roadside / community area / College campus etc.	Site Selection / Proper Consultation / Continuous Monitoring / Information Board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
2.	Heritage walk and crafts corner:	May be individual or team	Temples / monumental places / Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.	Site Selection / Proper Consultation / Continuous Monitoring / Information Board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
3.	Organic farming and waste management:	May be individual or team	Farmers land / parks / Villages visits / roadside / community area / College campus etc.	Group Selection / Proper Consultation / Continuous Monitoring / Information Board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
4.	Water conservation: & conservation techniques	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.	Site Selection / Proper Consultation / Continuous Monitoring / Information Board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
5.	Food walk: Practices in society	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.	Group Selection / Proper Consultation / A/ Continuous Monitoring / Information Board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty

Plan of Action (Execution of Activities)

SN	Practice Session Description
1	Lecture session in field to start activities
2	Students Presentation on Ideas
3	Commencement of activity and its progress
4	Execution of Activity
5	Execution of Activity
6	Execution of Activity
7	Execution of Activity
8	Case study based Assessment, Individual performance
9	Sector / Team wise study and its consolidation
10	Video based seminar for 10 minutes by each student At the end of semester with Report.

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities, compiled report should be submitted as per the instructions and scheme.

Semester: III

Course Name: UNIX AND SHELL PROGRAMMING

Course Code	22AI381	CIE Marks	50
Teaching Hours/Week (L: T :P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01

Pre-requisites:

Knowledge of DOS and Windows

Module – 1

03 Hours

Introduction, Brief history, Unix Architecture, Features of Unix, locating commands, Command structure, Internal and External commands, man command, Understanding the man documentation, Basic commands such as cal, date, echo, printf, passwd, who, wc, ls.

Module - 2

03 Hours

Unix files: Basic file types, Parent-child relationship, the home directory, PATH variable. Relative and absolute pathnames.
Directory commands – pwd, cd, mkdir, rmdir commands,
File related commands – cat, cp, rm, mv.

Module – 3

03 Hours

File Types & Permission:

The ls -l command, -d options, File ownership, File permissions, chmod, Directory permissions, changing File ownership.

The vi editor: Different modes of vi, Input mode commands, Command mode commands, ex-mode commands, Repeat command, Pattern searching, Search and Replace command.

Module – 4

03 Hours

The shells interpretive cycle: Wild cards, Escaping and Quoting, Three standard files and redirection, Pipe, tee, Command substitution.

Shell programming: Ordinary and environment variables, read command, Command line arguments, exit and exit status of a command, Logical operators for conditional execution, test command and its shortcut, if, expr, while, for, and case-control statements, set and shift commands, positional parameters.

Module – 5

03 Hours

Process: Basics, Mechanism of process creation, Parent and child process, The ps command with its options, Signals, Job control.

File Links: Hard link and soft link, umask, head, tail, cut, paste, sort and grep commands.

Course Outcomes:

1. Demonstrate the architecture and salient features of UNIX OS.
2. Understand UNIX Commands, Shell basic, and shell environments.
3. Create a file with vi editor and Apply changes in the file permission and ownership.
4. Design and develop shell programs using loops, and control statements.
5. Create UNIX Processes and a simple filter.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Unix Concepts and Applications	Sumitabha Das	Tata McGraw Hill	4 th Edition

Semester: III

Course Name: Version Controller with GiT

Course Code	22AI382	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01

Pre-requisites:

- Basic knowledge of computer hardware and software
- Basic knowledge of programming

Course objectives:

1. To demonstrate the installation Git, set up their initial configuration, and comprehend the advantages and disadvantages of using Git for version control.
2. To illustrate the concept of creating and managing Git repositories
3. To implement branching concepts of Git including creating, merging, and switching branches, enabling them to effectively manage parallel development efforts
4. To illustrate setting up Git on a server, allowing them to facilitate collaborative development
5. To experiment with hosting repositories on GitHub, managing project issues there, and collaborating with others.

Module – 1

03 Hours

Getting Started: Version Control Basics, What Is Git?, Advantages Of Git, Disadvantages Of Git. The Basics: Installing Git, First Time Git Set Up, Tips And Troubleshooting

Module - 2

03 Hours

Working with Repositories: What Are Git Repositories?, Recording Changes To Repos, Working With Remotes, Git Aliases, Tagging

Module – 3

03 Hours

Working with Branches: What Are Branches?, Branching And Merging, Branch Workflows, Remote Branches

Module – 4

03 Hours

Working with Servers: Getting Git On Server, Server Setup, Distributed Git And Projects

Module – 5

03 Hours

GitHub: What Is Github?, History Of Github, How To Use Github, Different Types Of Accounts

Course Outcomes:

1. Install Git, set up their initial configuration, and comprehend the advantages and disadvantages of using Git for version control.
2. Gain proficiency in creating and managing Git repositories
3. Implement branching concepts of Git including creating, merging, and switching branches, enabling them to effectively manage parallel development efforts
4. Set up Git on a server, allowing them to facilitate collaborative development
5. Use GitHub as a platform for hosting repositories, tracking project issues, and collaborating with others

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Mastering Git: A Beginner's Guide	Sumanna Kaul, Shahryar Raz, and Divya Sachdeva	CRC Press	2022
Reference Books				
1	Learning Git	Anna Skoulikari	O'Reilly Media	2023
2	Git Repository Management in 30 Days: Learn to manage code repositories like a pro	Sumit Jaiswal	BPB Publications	2023
3	Pro Git	Scott Chacon	Apress	2023

e-Resources: <https://pdfdrive.to/filedownload/mastering-git-a-beginners-guide-mastering-computer-science>

Semester: III
Course Name: R Programming

Course Code	22AI383	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01

Pre-requisites: Knowledge of basic computer hardware, Software and any programming language

Course objectives:

1. Explore and understand how R and R Studio interactive environment.
2. To learn and practice programming techniques using R programming.
3. Read Structured Data into R from various sources.
4. Understand the different data Structures, data types in R.
5. To develop small applications using R Programming.

Module – 1 **03 Hours**

Numeric, Arithmetic, Assignment, and Vectors: R for Basic Math, Arithmetic, Variables, Functions, Vectors, Expressions and assignments Logical expressions.

Module - 2 **03 Hours**

Matrices: Defining a Matrix, Sub-setting, Matrix Operations
Conditions and Looping: if statements, looping with for, looping with while, vector based programming.

Module – 3 **03 Hours**

Lists and Data Frames: Data Frames, Lists: Special values, The apply family.

Module – 4 **03 Hours**

Programming with Functions -1: Functions, scope and its consequences, Arguments.

Module – 5 **03 Hours**

Programming with Functions-2: Vector Based programming using functions, Recursive Programming, Debugging functions

Course Outcomes:

1. Apply the fundamentals of R Programming to solve basic mathematical functions.
2. Design and Develop R programs using branching and iterative statements.
3. Apply critical programming concepts to solve real life problems.
4. Demonstrate R programs using functions.
5. Develop simple applications using Vector Based Programming.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Introduction to Scientific Programming and Simulation Using R. Chapman & Hall/CRC	Jones, O., Maillardet. R. and Robinson.A	The R Series.	2014
Reference Books				
1	Statistics: An Introduction using R	Michael J. Crawley	Wiley	Second edition, 2015

e-Resources:

Wickham, H. & Golemund, G. (2018). for Data Science. O'Reilly: New York. Available for free at <http://r4ds.had.co.nz>.
R programming for Beginners: <https://www.youtube.com/watch?v=fDRa82lxzaU>

Semester: III

Course Name: NATIONAL SERVICE SCHEME (NSS) - (3rd to 6th)

Course Code	22NS39	CIE Marks	100
Teaching Hours / Week (L:T:P)	0:0:3	SEE Marks	-
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning	Total Marks	100
Examination nature (SEE)	Activities Report Evaluation by College NSS Officer at the end of every semester (3 rd to 6 th Semester)		
Credits	NCMC – Non Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)		

Course objectives:

National Service Scheme (NSS) will enable the students to:

1. Understand the community in general in which they work.
2. Identify the needs and problems of the community and involve them in problem –solving.
3. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
4. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
5. Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

General Instructions - Pedagogy:

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
2. State the need for NSS activities and its present relevance in the society and Provide real-life examples.
3. Support and guide the students for self-planned activities.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
5. Encourage the students for group work to improve their creative and analytical skills.

National Service Scheme (NSS) – Contents:

1. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
2. Waste management– Public, Private and Govt organization, 5 R's.
3. Setting of the information imparting club for women leading to contribution in social and economic issues.
4. Water conservation techniques – Role of different stakeholders– Implementation.
5. Preparing an actionable business proposal for enhancing the village income and approach for implementation.
6. Helping local schools to achieve good results and enhance their enrolment in Higher / technical / vocational education.
7. Developing Sustainable Water management system for rural areas and implementation approaches.
8. Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swatch Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.,
9. Spreading public awareness under rural outreach programs.(minimum5 programs).
10. Social connect and responsibilities.
11. Plantation and adoption of plants. Know your plants.
12. Organize National integration and social harmony events / workshops / seminars. (Minimum 02 programs).
13. Govt. school Rejuvenation and helping them to achieve good infrastructure.

NOTE:

- Student / s in individual or in a group should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.
- At the end of every semester, activity report should be submitted for evaluation.

Semester wise from 3rd to 6th semester
Course Name: DISTRIBUTION OF ACTIVITIES

Semester	Topics / Activities to be Covered
3 rd Sem.	<ol style="list-style-type: none"> 1. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing. 2. Waste management– Public, Private and Govt organization, 5 R's. 3. Setting of the information imparting club for women leading to contribution in social and economic issues.
4 th Sem.	<ol style="list-style-type: none"> 4. Water conservation techniques – Role of different stakeholders– Implementation.5 5. Preparing an actionable business proposal for enhancing the village income and approach for implementation. 6. Helping local schools to achieve good results and enhance their enrolment in Higher / technical / vocational education.
5 th Sem.	<ol style="list-style-type: none"> 7. Developing Sustainable Water management system for rural areas and implementation approaches. 8. Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc., 9. Spreading public awareness under rural outreach programs.(minimum5 programs). 10. Social connect and responsibilities.
6 th Sem.	<ol style="list-style-type: none"> 11. Plantation and adoption of plants. Know your plants. 12. Organize National integration and social harmony events / workshops / seminars. (Minimum 02 programs). 13. Govt. school Rejuvenation and helping them to achieve good infrastructure.

Pedagogy – Guidelines, it may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

SN	Topic	Group size	Location	Activity execution	Reporting	Evaluation Of the Topic
1.	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmers Land / Villages / Roadside / Community Area / College Campus Etc.,	Site selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
2.	Waste management– Public, Private and Govt. organization, 5 R's.	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc., ,	Site selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
3.	Setting of the information imparting club for women leading to contribution in social and economic issues.	May be individual or team	Women Empowerment Groups / Consulting NGOs & Govt. Teams / College Campus Etc.,	Group selection / pro per consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
4.	Water conservation techniques – Role of different stakeholders– Implementation.	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc.,	site selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
5.	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc.,	Group selection / pro per consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
6.	Helping local schools to achieve good results and enhance their enrolment in Higher / technical / vocational education.	May be individual or team	Local Government / Private / Aided Schools / Government Schemes Officers / Etc.,	School selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
7.	Developing Sustainable Water management system for rural areas and implementation approaches.	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc.,	site selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer

8.	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.,	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc.,	Group selection / pro per consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
9.	Spreading public awareness under rural outreach programs (minimum 5 programs) / Social connect and responsibilities.	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc.,	Group selection / pro per consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
10.	Plantation and adoption of plants. Know your plants.	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc.,	Place selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
11.	Organize National integration and social harmony events / workshops / seminars. (Minimum 02 programs).	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government Schemes Officers / Campus Etc.,	Place selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
12.	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages / City Areas / Grama Panchayat / Public Associations / Government/ Schemes Officers / Campus Etc.,	Place selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer

Plan of Action (Execution of Activities for Each Semester)

SN	Practice Session Description
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

- In every semester from 3rd semester to 6th semester, Each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

- CO1: Understand the importance of his / her responsibilities towards society.
- CO2: Analyse the environmental and societal problems / issues and will be able to design solutions for the same.
- CO3: Evaluate the existing system and to propose practical solutions for the same for sustainable development.
- CO4: Implement government or self-driven projects effectively in the field.
- CO5: Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

SUGGESTED LEARNING RESOURCES:

Books:

- NSS Course Manual, Published by NSS Cell, VTU Belagavi.
- Government of Karnataka, NSS cell, activities reports and its manual.
- Government of India, NSS cell, Activities reports and its manual.

Semester: III

Course Name: PHYSICAL EDUCATION (SPORTS & ATHLETICS) – I

Course Code	22PE39	CIE	100 Marks
Credits: L:T:P	0:0:2		
Total Hours	30 P		

Course Outcomes:

At the end of the course, the student will be able to

1. Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
2. Familiarization of health-related Exercises, Sports for overall growth and development
3. Create a foundation for the professionals in Physical Education and Sports
4. Participate in the competition at regional / state / national / international levels.
5. Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

Module I: Orientation

05 Hours

- a. Lifestyle
- b. Fitness
- c. Food & Nutrition
- d. Health & Wellness
- e. Pre-Fitness test.

Module II: General Fitness & Components of Fitness

15 Hours

- a. Warming up (Free Hand exercises)
- b. Strength – Push-up / Pull-ups
- c. Speed – 30 Mtr Dash
- d. Agility – Shuttle Run
- e. Flexibility – Sit and Reach
- f. Cardiovascular Endurance – Harvard step Test

Module III: Recreational Activities

10 Hours

- a. Postural deformities.
- b. Stress management.
- c. Aerobics.
- d. Traditional Games.

Semester III

Course Name: YOGA FOR A BETTER LIFE (3rd to 6th)

Course Code	22YO39	CIE Marks	100 / Sem.
Teaching Hours / Week (L:T:P)	0:0:2	SEE Marks	---
Total Hours of Pedagogy per semester	24 - 28 hours (Theory + practical)	Total Marks	100 / Sem.
Examination nature (SEE):	Objective type Theory / Practical / Viva-Voce		

Course objectives:

1. To enable the student to have good health.
2. To practice mental hygiene.
3. To possess emotional stability.
4. To integrate moral values.
5. To attain higher level of consciousness.

The Health Benefits of Yoga

The benefits of various yoga techniques have been supposed to improve

- body flexibility,
- performance,
- [stress](#) reduction,
- attainment of inner peace, and
- self-realization.

The system has been advocated as a complementary treatment to aid the healing of several ailments such as

- coronary [heart disease](#),
- [depression](#),
- anxiety disorders,
- [asthma](#), and
- extensive rehabilitation for disorders including musculoskeletal problems and traumatic [brain injury](#).

The system has also been suggested as behavioral therapy for [smoking cessation](#) and substance abuse (including [alcohol abuse](#)).

If you practice yoga, you may receive these physical, mental, and spiritual benefits:

- **Physical**
 1. Improved body flexibility and balance
 2. Improved cardiovascular endurance (stronger heart)
 3. Improved digestion
 4. Improved abdominal strength
 5. Enhanced overall muscular strength
 6. Relaxation of muscular [strains](#)
 7. Weight control
 8. Increased energy levels
 9. Enhanced immune system
- **Mental**
 1. Relief of [stress](#) resulting from the control of emotions
 2. Prevention and relief from stress-related disorders
 3. Intellectual enhancement, leading to improved decision-making skills
- **Spiritual**
 1. Life with meaning, purpose, and direction
 2. Inner peace and tranquility
 3. Contentment

Semester III

Course Name: YOGA SYLLABUS

Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, Aim and Objectives of yoga, importance of prayer Yogic practices for common man to promote positive health

Rules to be followed during yogic practices by practitioner Yoga its misconceptions,

Difference between yogic and non-yogic practices

Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar 12 count, 2 rounds.

Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana

Different types of Asanas

- Sitting: 1. Padmasana, 2. Vajrasana
- Standing: 1. Vrikshana, 2. Trikonasana
- Prone line: 1. Bhujangasana, 2. Shalabhasana
- Supine line: 1. Utthitadvipadasana, 2. Ardhalasana

Semester IV

Patanjali's Ashtanga Yoga, its need and importance.

Yama: Ahimsa, Satya, Asteya, Brahmacharya, Aparigraha

Niyama: Shoucha, Santosh, Tapa, Svaadhyaya, Eshvarapranidhan, Suryanamaskar 12 Count- 4 Rounds of Practice

Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana

Different types of Asanas

- Sitting: 1. Sukhasana, 2. Paschimottanasana
- Standing: 1. Ardhakati Chakrasana, 2. Parshva Chakrasana
- Prone line: 1. Dhanurasana,
- Supine line: 1. Halasana, 2. Karna Peedasana

Meaning, importance and benefits of Kapalabhati. 40 strokes / min 3 rounds

Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama

Pranayama: 1. Suryanuloma –Viloma 2. Chandranuloma-Viloma 3. Suryabhedana, 4. Chandra Bhedana 5. Nadishodhana

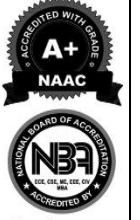


Basavarajeswari Group of Institutions

ಬಳ್ಳಾರಿ ಇನ್‌ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಟೆಕ್ನಾಲಜಿ & ಮ್ಯಾನೇಜ್‌ಮೆಂಟ್, ಬಳ್ಳಾರಿ

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under Visvesvaraya Technological University, Belagavi
(Recognized by Govt. of Karnataka & AICTE, New Delhi)



"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)

Scheme of Teaching and Evaluation for B.E – IV Semester Artificial Intelligence & Machine Learning (2022 Scheme)



Semester: IV
Course Name: BIOLOGY FOR ENGINEERS

Course Code	22BB41	CIE Marks	50
Teaching Hours / Week (L:T:P: S)	3:0:0:	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination type (SEE)	Theory		

Course objectives:

- To familiarize the students with the basic biological concepts and their engineering applications.
- To enable the students with an understanding of biodesign principles to create novel devices and structures.
- To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
- To motivate the students to develop interdisciplinary vision of biological engineering.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Explanation via real life problem, situation modelling, and deliberation of solutions, hands-on sessions, reflective and questioning / inquiry-based teaching.
2. Instructions with interactions in classroom lectures (physical / hybrid).
3. Use of ICT tools, including YouTube videos, related MOOCs, AR / VR / MR tools.
4. Flipped classroom sessions (~10% of the classes).
5. Industrial visits, Guests talks and competitions for learning beyond the syllabus.
6. Students' participation through audio-video based content creation for the syllabus (as assignments).
7. Use of gamification tools (in both physical / hybrid classes) for creative learning outcomes.
8. Students' seminars (in solo or group) / oral presentations.

Module-1

08 Hours

INTRODUCTION TO BIOLOGY:

The cell: the basic unit of life, Structure and functions of a cell. The Plant Cell and animal cell, Prokaryotic and Eukaryotic cell, Stem cells and their application. Biomolecules: Properties and functions of Carbohydrates, Nucleic acids, proteins, lipids. Importance of special biomolecules; Enzymes (Classification (with one example each), Properties and functions), vitamins and hormones.

Module-2

08 Hours

BIOMOLECULES AND THEIR APPLICATIONS (QUALITATIVE):

Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (DNA Vaccine for Rabies and RNA vaccines for Covid19, Forensics – DNA fingerprinting), Proteins (Proteins as food – whey protein and meat analogs, Plant based proteins), lipids (biodiesel, cleaning agents / detergents), Enzymes (glucose-oxidase in biosensors, lignolytic enzyme in bio-bleaching).

Module-3

08 Hours

HUMAN ORGAN SYSTEMS AND BIO DESIGNS (QUALITATIVE):

Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics. Engineering solutions for Parkinson's disease). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signalling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators). Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems).

Module-4

08 Hours

NATURE-BIOINSPIRED MATERIALS AND MECHANISMS (QUALITATIVE):

Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).

Module-5

08 Hours

TRENDS IN BIOENGINEERING (QUALITATIVE):

Muscular and Skeletal Systems as scaffolds (architecture, mechanisms, bioengineering solutions for muscular dystrophy and osteoporosis), scaffolds and tissue engineering, Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis. Self-healing Bioconcrete (based on bacillus spores, calcium lactate nutrients and biomineralization processes) and Bioremediation and Biomining via microbial surface adsorption (removal of heavy metals like Lead, Cadmium, Mercury, Arsenic).

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Elucidate the basic biological concepts via relevant industrial applications and case studies.
2. Evaluate the principles of design and development, for exploring novel bioengineering projects.
3. Corroborate the concepts of biomimetics for specific requirements.
4. Think critically towards exploring innovative biobased solutions for socially relevant problems.

Suggested Learning Resources:

Books

- Biology for Engineers, Rajendra Singh C and Rathnakar Rao N, Rajendra Singh C and Rathnakar Rao N Publishing, Bengaluru, 2023.
- Human Physiology, Stuart Fox, Krista Rompolski, McGraw-Hill eBook. 16th Edition, 2022
- Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
- Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
- Biomedical Instrumentation, Leslie Cromwell, Prentice Hall 2011.
- Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
- Biomimetics: Nature-Based Innovation, Yoseph Bar-Cohen, 1st edition, 2012, CRC Press.
- Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies, D. Floreano and C. Mattiussi, MIT Press, 2008.
- Bioremediation of heavy metals: bacterial participation, by C R Sunilkumar, N Geetha A C Udayashankar Lambert Academic Publishing, 2019.
- 3D Bioprinting: Fundamentals, Principles and Applications by Ibrahim Ozbolat, Academic Press, 2016.
- Electronic Noses and Tongues in Food Science, Maria Rodriguez Mende, Academic Press, 2016

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/121106008>
- <https://freevideolectures.com/course/4877/nptel-biology-engineers-other-non-biologists>
- <https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-design-spring-2009>
- <https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring-2006>
- <https://www.coursera.org/courses?query=biology>
- https://onlinecourses.nptel.ac.in/noc19_ge31/preview
- <https://www.classcentral.com/subject/biology>
- <https://www.futurelearn.com/courses/biology-basic-concepts>

Activity Based Learning (Suggested Activities in Class)/Practical Based learning

- Group Discussion of Case studies
- Model Making and seminar/poster presentations
- Design of novel device/equipment like Cellulose-based water filters, Filtration system

Semester: IV

Course Name: PRINCIPLES OF ARTIFICIAL INTELLIGENCE

Course Code	22AI42	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	3
Total Hours of Pedagogy	40 + 20	Total Marks	100

Pre-requisites:

- Knowledge of a programming language and Mathematical knowledge.

Course objectives:

1. Gain a historical perspective of AI and its foundations.
2. Become familiar with basic principles of AI toward problem solving.
3. Get to know approaches of inference, perception, Uncertain Knowledge and Reasoning.
4. Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
5. Experiment with a machine learning model for simulation and analysis.

Module – 1

08 Hours

Introduction: What is AI? Foundations and History of AI

Intelligent Agents: Agents and environment, Concept of Rationality, The nature of environment, The structure of agents.

Module - 2

08 Hours

Problem-solving: Problem-solving agents, Example problems, Searching for Solutions Uninformed Search Strategies: Breadth First search, Depth First Search, Iterative deepening depth first search;

Module – 3

08 Hours

Informed Search Strategies: Heuristic functions, Greedy best first search, A*search. Heuristic Functions

Logical Agents: Knowledge-based agents, The Wumpus world, Logic, Propositional logic, Reasoning patterns in Propositional Logic.

Module – 4

08 Hours

First Order Logic: Representation Revisited, Syntax and Semantics of First Order logic, Using First Order logic.

Inference in First Order Logic: Propositional Versus First Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution

Module – 5

08 Hours

Uncertain Knowledge and Reasoning: Quantifying Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference using Full Joint Distributions, Independence, Baye's Rule and its use. Wumpus World Revisited.

List of Experiments:

Part A

Practicing Problems in Python (Students can be encouraged to practice good number of practice problems, some practice problems are listed here)

1. (a) Write a python program to print the multiplication table for the given number
(b) Write a python program to check whether the given number is prime or not?
(c) Write a python program to find factorial of the given number?
2. (a) Write a python program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing)
(b) Write a python program to implement List methods (Add, Append, and Extend& Delete).
3. Write a python program to implement simple Chatbot with minimum 10 conversations
4. Write a python program to Illustrate Different Set Operations
5. (a) Write a python program to implement a function that counts the number of times a string (s1) occurs in another string(s2)
(b) Write a program to illustrate Dictionary operations ([], in, traversal) and methods: keys (),values(),items()

Part B

AI Problems to be implemented in Python

1. Implement and Demonstrate Depth First Search Algorithm on Water Jug Problem
2. Implement and Demonstrate Best First Search Algorithm on any AI problem
3. Implement AO* Search algorithm.
4. Solve 8-Queens Problem with suitable assumptions
5. Implementation of TSP using heuristic approach
6. Implementation of the problem solving strategies: either using Forward Chaining or Backward Chaining
7. Implement resolution principle on FOPL related problems
8. Implement any Game and demonstrate the Game playing strategies

Course Outcomes:

At the end of the course the student will be able to:

1. Apply knowledge of agent architecture, searching and reasoning techniques for different applications.
2. Analyse Searching and Inferencing Techniques.
3. Develop knowledge base sentences using propositional logic and first order logic
4. Demonstrating agents, searching and inferencing
5. Illustrate the application of probability in uncertain reasoning

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Artificial Intelligence	Stuart J. Russell and Peter Norvig	Pearson	3 rd Edition,2015
Reference Books				
1	Introduction to Machine Learning	Elaine Rich, Kevin Knight	Tata McGraw Hill	3 RD Edition 2013
2	Artificial Intelligence Structure and strategies for complex	George F Lugar	Pearson Education	5 th Edition 2011

Semester: IV

Course Name: DATABASE MANAGEMENT SYSTEMS

Course Code	22AI43	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40 + 20	Total Marks	100
Credits	04	Exam Hours	03

Pre-requisites:

- Knowledge of programming
- Data structures

Course objectives:

1. Learn and practice data modeling using entity relationship and developing database design
2. Practice SQL programming through a variety of database problems.
3. Apply normalization techniques to normalize the database
4. Demonstrate the use of concurrency and transactions in database
5. Design and build database applications for real world problems.

Module – 1

08 Hours

Introduction to Databases: Introduction, Characteristics of database approach, Actors on the Scene, Workers behind the Scene, Advantages of using the DBMS approach, History of database applications. When Not to Use a DBMS.

Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment, Centralized and Client/Server Architectures for DBMSs, Classification of Database Management Systems, Oracle and MySQL database architecture.

Module - 2

08 Hours

Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER Diagrams, Naming Conventions, and Design Issues, Example of Other Notation: UML Class Diagrams Mapping conceptual design into a logical design: Relational database design using ER to relational mapping

Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations.

Module – 3

08 Hours

SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database. No SQL and difference between SQL and NOSQL.

Advanced Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. Advanced Aggregation Features: Ranking – dense rank, partition by

Module – 4

08 Hours

SQL Programming Techniques: Overview of Database Programming Techniques and Issues, Embedded SQL, Dynamic SQL, and SQLJ, JDBC: SQL Class Library for Java Programming, Database Stored Procedures.

Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Examples on normal forms.

Module – 5

08 Hours

Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, characterizing schedules based on recoverability, characterizing schedules based on Serializability, Transaction support in SQL.

Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking.

PRACTICAL COMPONENT

20 Hours

List of Experiments

1. Draw an E-R diagram and map it to relation table for a given scenario. (Order Database, Cricket Database, Movie Database, College Database, Voter Database, etc)
2. Normalize the tables.
3. Perform the following:
Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
4. Perform the following:
Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.
5. For a given set of relation schemes, create tables and perform the following
 - i. Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions
 - ii. Join Queries- Inner Join, Outer Join
 - iii. Subqueries- With IN clause, With EXISTS and NOT EXISTS clause
6. For a given set of relation tables perform the following
Creating Views (with and without check option), Dropping views, Selecting from a view
7. Demonstrate the core concepts on table like procedure and trigger queries and also rank() function.

Reference:

- <https://www.youtube.com/watch?v=AA-KL1jbMeY>
https://www.youtube.com/watch?v=7S_tz1z_5bA
<https://www.youtube.com/watch?v=IBpSMeQjNqQ>
<https://www.youtube.com/watch?v=yog7h4BokQ>
<https://www.youtube.com/watch?v=hSiCUNVKJao>
<https://www.youtube.com/watch?v=IqQhPIJP64k>
<https://www.youtube.com/watch?v=horURQewW9c>
<https://www.youtube.com/watch?v=P7-wKbKrAhk>
<https://www.youtube.com/watch?v=MSbzErdcb6g>
<https://www.youtube.com/watch?v=QFj-hZi8MKk>

Course Outcomes:

1. Demonstrate the basic elements of a relational database management system.
2. Design ER and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
3. Create, populate and manage relational databases in SQL.
4. Extend normalization for the development of application software.
5. Analyze and implement transaction processing, concurrency control, and database recovery protocols in database.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Fundamentals of Database Systems	Ramez Elmasri and Shamkant B. Navathe	Pearson	7 th Edition, 2017
2	Database System Concepts	Abraham Silberschatz, Henry F. Korth and S. Sudarshan	Tata Mcgraw Hill Education Private Limited	6 th Edition
Reference Books				
1	Database management systems	Ramakrishnan, and Gehrke	McGraw Hill	3 rd Edition, 2014
2	An Introduction to Database Systems	Christopher J. Date, S. Swamynathan and A. Kannan	Pearson Education	8 th Edition

E-Resources:

- <https://www.youtube.com/watch?v=wOD02sezmx8>
<https://www.youtube.com/watch?v=hlGoQC332VM>
https://www.youtube.com/watch?v=NNpFHQI_GT0
https://www.youtube.com/watch?v=EGEwkad_IIA
<https://www.youtube.com/watch?v=t5hsV9IC1rU>

Semester: IV

Course Name: ANALYSIS AND DESIGN OF ALGORITHMS

Course Code	22AI44	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Course Objectives

1. Describe basic concepts, notations, methods used in design and analysis of algorithms
2. Explain various algorithm design techniques.
3. Design and analyze the efficiency of a given problem using various design techniques.
4. Differentiate efficiency of different algorithm design techniques for a given problem.
5. Apply the suitable algorithm design technique for a given problem.

Module – 1

08 Hours

Introduction:

Fundamentals of Algorithmic Problem Solving, Fundamentals of the Analysis of Algorithm Efficiency: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithm, Mathematical Analysis of Recursive Algorithms.

Module - 2

08 Hours

Brute Force and Exhaustive Search: Selection Sort and Bubble Sort, Exhaustive Search.

Decrease-and-Conquer: Insertion Sort, Topological Sorting, Algorithms for Generating Combinatorial Objects, Decrease by- a-Constant-Factor Algorithms: Binary Search, Variable-Size-Decrease Algorithm: Euclids Algorithm

Module – 3

08 Hours

Divide-and-Conquer: Recurrence equation for divide and conquer, Master Theorem, Finding the maximum and minimum, Mergesort, Quicksort, Binary Search, Strassen's Matrix Multiplication.

Transform-and-Conquer: Presorting, Heaps and Heapsort, Problem Reduction Computing the Least Common Multiple.

Module – 4

08 Hours

Greedy Method: General method, Knapsack Problem, Job sequencing with deadlines, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm

Dynamic Programming: The Knapsack Problem, Warshall's and Floyd's Algorithms. Bellman-Ford Algorithm, Travelling Sales Person problem.

Module – 5

08 Hours

Backtracking: n -Queens Problem, Subset-Sum Problem, Graph coloring, Hamiltonian cycles.

Branch-and-Bound: Knapsack Problem, Traveling Salesman Problem, Job Assignment Problem.

NP-Complete and NP-Hard problems: Basic concepts, non-deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.

Course Outcomes:

1. Apply the basic knowledge of mathematical fundamentals for finding time complexity of recursive and non-recursive algorithms.
2. Describe various algorithm design techniques to solve a given problem.
3. Apply various design techniques to find the time complexity of a given problem
4. Compare efficiency of different algorithm design techniques for a given problem
5. Choose the appropriate algorithm design techniques for a given problem.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Introduction to the Design and Analysis of Algorithms	Anany Levitin	Pearson	2 nd Edition, 2009
2	Computer Algorithms/C++	Ellis Horowitz, Satraj Sahni and Rajasekaran	Universities Press	2 nd Edition, 2014
Reference Books				
1	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein	PHI	3 rd Edition, 2009
2	Design and Analysis of Algorithms	S. Sridhar	Oxford, Higher Education	2014

Semester: IV**Course Name: ALGORITHMS LAB**

Course Code	22AIL45	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	03

Course Objectives:

1. Demonstrate the basics concepts of Java Programming.
2. Illustrate Different Sorting Algorithm design techniques.
3. Solve Graph Applications using various design techniques.
4. Interpret combinatorial problems using Backtracking technique.
5. Develop skills to identify suitable algorithm design technique to solve a given problem

List of Experiments:

Identify the functional requirements, then Design and Develop solutions to the problems related to the following Algorithm design techniques

1. Brute Force technique
2. Decrease-and-Conquer method
3. Divide-and-Conquer technique
4. Transform-and-Conquer technique
5. Greedy Method
6. Dynamic Programming
7. Backtracking

Course outcomes:

1. Design programs to implement basic concepts of java programs.
2. Apply various algorithm design techniques to solve sorting problems.
3. Implement graph Applications using various design techniques.
4. Execute programs on combinatorial problems using Backtracking technique.
5. Choose appropriate design technique to solve a given problem.

Semester: IV

Course Name: SYSTEM SOFTWARE

Course Code	22AI461	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	3
Total Hours of Pedagogy	40	Total Marks	100

Pre-requisites:

1. Basic Computer organization and architecture
2. Basic concepts of Operating System
3. Good programming skills in C and data structures

Course objectives:

1. Distinguish between system software and application software
2. Categorize the instruction formats and addressing modes of SIC and SIC/XE machine.
3. Write the object code for SIC and SIC/XE machine programs
4. List the steps involved to design a Bootstrap loader
5. Apply regular expressions to develop programs using LEX and YACC tools.

Module – 1

08 Hours

Machine Architecture: Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples. Assemblers -1: Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation.

Module – 2

08 Hours

Assemblers -2: Machine Independent Assembler Features – Literals, Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking, Assembler Design Operations – 1 Pass Assembler, Multi-Pass Assembler, Implementation Examples - MASM Assembler.

Module – 3

08 Hours

Loaders and Linkers: Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader; Machine-Independent Loader Features - Automatic Library Search, Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders, Implementation Examples - MS-DOS Linker.

Module – 4

08 Hours

Macro Processor: Basic Macro Processor Functions - Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Machine Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Keyword Macro Parameters, Macro Processor Design Options - Recursive Macro Expansion, General-Purpose Macro Processors, Macro Processing Within Language Translators, Implementation Examples - MASM Macro Processor, ANSI C Macro Processor.

Module – 5

08 Hours

Lex and Yacc - The Simplest Lex Program, Recognizing Words with LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section, Running 43 LEX and YACC, LEX and Hand- Written Lexers, Using LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line.

Using YACC – Grammars, Recursive Rules, Shift/Reduce Parsing, What YACC Cannot Parse, A YACC Parser - The Definition Section, The Rules Section, Symbol Values and Actions, The LEXER, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity, Variables and Typed Tokens.

Course outcomes:

- Design programs to implement basic concepts of java programs.
- Apply various algorithm design techniques to solve sorting problems.
- Implement graph Applications using various design techniques.
- Execute programs on combinatorial problems using Backtracking technique.
- Choose appropriate design technique to solve a given problem.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	System Software	Leland L.Beck D Manjula	Pearson Education	3rd Ed, 2012
2	Lex and Yacc	John R. Levine, Tony Mason and Doug Brown	O'Reilly	2012
Reference Books				
1	System Programming and Operating Systems	D.M. Dhamdhere,	Tata McGraw - Hill	3rd Ed, 2013.
2	Systems programming	Srimanta Pal	Oxford university press	2016

Semester: IV

Course Name: OBJECT ORIENTED PROGRAMMING WITH PYTHON

Course Code	22AI462	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3

Pre-requisites:

- Basic Knowledge of Programming
- Basic Knowledge of MS word, Excel and PDF

Course objectives:

1. Learn the syntax and semantics of Python programming language.
2. Illustrate the process of structuring the data using lists, tuples and dictionaries.
3. Demonstrate the use of built-in functions of file system.
4. Implement the Object Oriented Programming concepts in Python.
5. Appraise the need for working with various documents like Excel, PDF, Word and Others.

Module – 1

08 Hours

Python Basics, Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, **Flow control**, Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), **Functions**, def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number

Module - 2

08 Hours

Lists, The List Data Type, working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References, **Dictionaries and Structuring Data**, The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, **Manipulating Strings**, Working with Strings, Useful String Methods

Module – 3

08 Hours

Reading and Writing Files, Files and File Paths, The os path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the pprint. pformat() Function, Project: Generating Random Quiz Files, Project: Multi clipboard, **Organizing Files**, The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File, **Debugging**, Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE"s Debugger.

Module – 4

08 Hours

Classes and objects, Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying, **Classes and functions**, Time, Pure functions, Modifiers, Prototyping versus planning, **Classes and methods**, Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The str method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation, **Inheritance**, Card objects, Class attributes, Comparing cards, Decks, Printing the deck, Add, remove, shuffle and sort, Inheritance, Class diagrams, Data encapsulation

Module – 5

Working with Excel Spreadsheets, Excel Documents, Installing the openpyxl Module, Reading Excel Documents, Project: Reading Data from a Spreadsheet, Writing Excel Documents, Project: Updating a Spreadsheet, Setting the Font Style of Cells, Font Objects, Formulas, Adjusting Rows and Columns, Charts, **Working with PDF and Word Documents**, PDF Documents, Project: Combining Select Pages from Many PDFs, Word Documents, **Working with CSV files and JSON data, The csv Module**

Course Outcomes:

1. Demonstrate proficiency in handling of loops and creation of functions.
2. Identify the methods to create and manipulate lists, tuples and dictionaries.
3. Utilize built-in functions to navigate the file system.
4. Apply the concepts of Object-Oriented Programming to different applications
5. Develop proficiency in working with Excel spreadsheets, PDF and Word documents, CSV files, and JSON data

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Automate the Boring Stuff with Python	Al Sweigart	No Starch Press,	1 st Edition,2015
2	Think Python: How to Think Like a Computer Scientist”,	Allen B. Downey	Green Tea Press	2 nd Edition, 2015.
Reference Books				
1	Introduction to Python Programming	Gowrishankar S, Veena A	CRC Press /Taylor & Francis	1 st Edition,2018

e-Resources:

<https://automatetheboringstuff.com>

<http://greenteapress.com/thinkpython2/thinkpython2.pdf>

Semester: IV

Course Name: INTRODUCTION TO DATA ANALYTICS

Course Code	22AI463	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	3
Total Hours of Pedagogy	40	Total Marks	100

Pre-requisites:

- Basic Knowledge of DBMS
- Basic Knowledge of Microsoft Excel

Course objectives:

1. To learn various concepts and technologies of Data Analytics
2. To discuss the various OLTP system characteristics
3. To discuss the various aspects related to the Data lake and Data warehouse
4. To present the data using various Visualization tools

Module – 1

08 Hours

Introduction, Business Intelligence, Pattern Recognition, Data Processing Chain.
Business Intelligence Concepts and Applications: Introduction, BI for better decisions, decision types, BI tools, BI skills, BI applications.

Module - 2

08 Hours

Structure, objectives, introduction, online transaction processing, OLTP system characteristics, OLTP merits and demerits, need of data warehouse, characteristics of DW, main components of data warehouse, approaches for constructing a data warehouse, dimensional modeling used in DW design-facts, dimensions and attributes, types of schemas, ETI and other tools sets available in market.

Module – 3

08 Hours

Structure, objectives, business intelligence, BI characteristics, data quality: a real challenge, data quality best practices, structured versus unstructured, differences between structured and unstructured data, data lake, data lake versus data warehouse, main components of a data lake, modern business intelligence system, benefits and use cases of modern BI.
8 Hours

Module – 4

08 Hours

Structure, objectives, presenting data visualization, aims of data visualization, history at a glance, importance of data visualization, types of data visualization-hierarchical, tree diagram, tree map, ring chart, dendogram, temporal, bar chart, line graph, stacked graph, Gantt chart, scatter plot, stacked area chart, Sparkline, network, word cloud, matrix chart, node link diagram, multi-dimensional, pie chart, histogram.

Module – 5

08 Hours

Introduction, decision tree problem, decision tree construction, decision tree algorithms.
Advanced data visualization- structure, objective, types of advanced data visualization-bubble chart, word cloud, geospatial heat map/ hot spot mapping, data visualization trends, introducing data visualization tools, data visualization best practices.

Course Outcomes:

At the end of the course the student will be able to:

1. Apply the BI concepts to solve real life problems.
2. Design OLTP techniques to provide business solutions
3. Apply BI techniques to design a data lake.
4. Analyze data using various data visualization techniques.
5. Analyze trends using advanced data visualization techniques.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Data Analytics	Anil Maheshwari	McGraw Hill Education	2018
2	Data Analytics: Principles, Tools, and Practices	Dr.Gaurav Aroraa Chitra Lele Dr.Munish Jindal	BPB Publications	1 st Edition, 2022

Semester: IV

Course Name: PROFESSIONAL SKILLS FOR THE WORK PLACE

Course Code	22PSW47	CIE Marks	50
Teaching Hours / Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	30	Total Marks	100
Credits	01	Exam Hours	01

Pre-requisites:

1. Basic Conversational English
2. Fundamentals of Mathematics
3. Basic Knowledge of Reasoning

Module – 1

06 Hours

Communication Skills

Basic Tools of Communication, Listening Skills, Body Language, Voice, Verbal Language, Conversations in Professional Setting

Module – 2

06 Hours

Presentation Skills

Zero Presentation, Individual Presentations, Feedback, Types of Introductions, Captivating the Audience, Interaction Methods, Signing off.

Module – 3

06 Hours

Verbal & Numerical Ability

Vocabulary is Fun, Root Words, Sentence Structures, Bouncing, Similar and Opposite Words, Common Errors, Number System, Factors and Multiples.

Module – 4

06 Hours

English Language

Phonetic and Non-phonetic Languages, sounds in English, IPA, Syllables, Word Stress, Stress patterns in Indian languages vs English, Pausing and Rhythm in English, Sentence Structures, Bouncing, Common Errors.

Module – 5

06 Hours

Verbal Ability and Verbal Reasoning

Similar and Opposite words, Number and Alphabet Series, Human Relations, Direction Tests, Coding Decoding, Clocks and Calendars

Course Outcomes:

1. Demonstrate communicative ability in a professional environment
2. Articulate one's ideas and demonstrate them to an audience
3. Transform one's English Vocabulary and Language Structure
4. Interpret international phonetic symbols, stress patterns, and enhance English speech
5. Identify patterns, determine the problem-solving process & validate solutions

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Reasoning N ^o Reasoning - Verbal & Non-verbal Reasoning	Dr. Ravi Chopra	Galgotia	1994
2	Magical Book on Quicker Math	M. Tyra	BSC	I Edition, 2018
3	Communicate With Confidence	Diana Booher	Mc-Graw-Hill	Nov 2011
Reference Books				
1	Cambridge Advanced Learner's Dictionary	Cambridge University Press	CBS	IV Edition, 2013
2	A Modern Approach to Verbal and Non-verbal Reasoning	R S Agarwal	S Chand	II Edition, 2018
3	Word Power Made Easy	Norman Lewis	Goyal Publishers	IV Edition, 2014
4	Speak With Confidence	Diana Booher	Mc-Graw-Hill	I Edition, 2002

Semester: IV

Course Name: UNIVERSAL HUMAN VALUES (UHV)

Course Code	22UH48	CIE Marks	50
Teaching Hours / Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15 hour Theory Session +15 hour Self study	Total Marks	100
Credits	01	Exam Hours	01 Hour
Examination type (SEE)	SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions).		

Course objectives:

This course is intended to:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
4. This course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied skills.
3. State the need for UHV activities and its present relevance in the society and Provide real-life examples.
4. Support and guide the students for self-study activities.
5. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
6. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evaluation.
7. Encourage the students for group work to improve their creative and analytical skills.

Module-1

03 hours

Introduction to Value Education:

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations

Module-2

03 hours

Harmony in the Human Being :

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

Module-3

03 hours

Harmony in the Family and Society :

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to- Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order

Module-4

03 hours

Harmony in the Nature / Existence:

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

Module-5

03 hours

Implications of the Holistic Understanding – a Look at Professional Ethics:

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

Course Outcome (Course Skill Set)

At the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature);

- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Expected to positively impact common graduate attributes like:

- Ethical human conduct
- Socially responsible behaviour
- Holistic vision of life
- Environmentally responsible work
- Having Competence and Capabilities for Maintaining Health and Hygiene

Appreciation and aspiration for excellence (merit) and gratitude for all

Suggested Learning Resources:

Books for READING:

Text Book and Teachers Manual

- The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034- 47-1
- The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G

Reference Books:

- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- The Story of Stuff (Book).
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
- Small is Beautiful - E. F Schumacher.
- Slow is Beautiful - Cecile Andrews

Semester: IV

Course Name: PHYSICAL EDUCATION (SPORTS & ATHLETICS) – II

Course Code	22PE49	CIE	100 Marks
Credits: L:T:P	0:0:2		
Total Hours	30 P		

Course Outcomes:

At the end of the course, the student will be able to

1. Understand the ethics and moral values in sports and athletics
2. Perform in the selected sports or athletics of student's choice.
3. Understand the roles and responsibilities of organization and administration of sports and games.

Module IV: Ethics and Moral Values

5 Hours

Ethics in Sports Moral Values in Sports and Games
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Module V: Specific Games (Any one to be selected by the student)

20 Hours

Volleyball – Attack, Block, Service, Upper Hand Pass and Lower hand Pass. Throw ball – Service, Receive, Spin attack, Net Drop & Jump throw. Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up. Table Tennis – Service (Fore Hand & Back Hand), Receive (Fore Hand & Back Hand), Smash. Athletics (Track / Field Events) – Any event as per availability of Ground.

Module VI: Role of Organization and Administration

05 Hours

Semester: III
**Course Name: ADDITIONAL MATHEMATICS-I
 (For Lateral Entry Students)**

Course Code	22MATDIP31	CIE Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	-
Total Hours of Pedagogy	40	Total Marks	100
Credits	00	Exam Hours	-

Pre-requisites:

1. Algebraic formulae
2. Differentiation
3. Integration
4. Trigonometric formulae

Module – 1
08 Hours
Linear Algebra

Introduction-Rank of matrix by elementary row operations- Echelon form. Consistency of system of linear equations, Solution of linear equations-Gauss elimination method. Eigen values and Eigen vectors of a square matrix. Problems.

Self-Study: Gauss Jordan Method

Module - 2
08 Hours
Differential Calculus:

Review of successive differentiation-Illustrative examples. Maclaurin's series expansions-Illustrative examples. Partial Differentiation: Euler's theorem-problems on first order derivatives only. Total derivatives-differentiation of composite functions. Jacobian of order two-problems.

Self-Study: Taylor's series expansion.

Module – 3
08 Hours
Vector Differentiation:

Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and Vector point functions. Gradient, Divergence and Curl- Simple problems. Solenoidal and irrotational vector fields-Problems.

Self-Study: Angle between two surfaces[RBT Levels: L1, L2,L3]

Module – 4
08 Hours
Integral Calculus:

Review of elementary integral calculus. Reduction formulae for $\sin^n x$, $\cos^n x$ (with proof) and $\sin^m x \cos^n x$ (without proof) and evaluation of these with standard limits- Examples. Double and triple integrals-Simple problems.

Self-Study: Change of Order of Integration.

Module – 5
08 Hours
Ordinary Differential Equations:

Introduction-Solutions of first order and first degree differential equation: exact, Equation reducible to exact. Linear differential equations and Bernoulli's equation.

Self-Study: Homogeneous differential equations

Course outcomes:

1. Upon Completion of this course, student will be able to,
2. Make use of matrix theory for solving system of linear equations and compute eigen values and Eigen vectors.
3. Learn the notion of partial differentiation to calculate the rate of change of multivariate functions and solve problems related to composite functions and Jacobians
4. Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors
5. Apply the concept of integration and variables to evaluate multiple integrals and their usage in computing the area and the volumes.
6. Solve first order linear differential equations analytically using standard methods.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	John Willy & Sons	10 th Ed. (Reprint). 2016
3	Additional Mathematics-1	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed., 2019.
Reference Books				
1	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	11 th Edition.2010

Semester: IV
Course Name: ADDITIONAL MATHEMATICS-II
(For Lateral Entry Students)

Course Code	22MATDIP41	CIE Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	-
Total Hours of Pedagogy	40	Total Marks	100
Credits	0	Exam Hours	-

Pre-requisites:

1. Differentiation
2. Integration
3. Trigonometric formulae
4. Differential equations

Module – 1
08 Hours
Higher Order ODE's

Linear Differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators.[Particular integral restricted to $\phi(x) = e^{ax}, \sin ax, \cos ax$ for $f(D)y = \phi(x)$

Self-Study: Finding particular Integral for $\phi(x) = x^m$

Module – 2
08 Hours
Partial Differential Equations (PDE's):

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDE involving derivative with respect to one independent variable only.

Self-Study: Method of separation of variables

Module – 3
08 Hours
Laplace Transform:

Definition, Laplace transforms of elementary functions. Laplace transform of $e^{at}f(t), t^n f(t)$ (without proof). Laplace transform of Periodic functions (statement only) and Unit-step function- problems.

Inverse Laplace Transform: Definition, Inverse Laplace Transform of standard functions. Inverse transform by Partial Fraction Method. Apply the concepts of Laplace Transforms to find the solution of linear differential equations.

Self-Study: Convolution Theorem.

Module – 4
08 Hours
Numerical Methods:

Solution of algebraic and transcendental equations by Newton-Raphson method and Secant method.

Interpolation: Newton's Forward and Backward Interpolation formulae, Newton's divided difference formula, Lagrange's Interpolation formula without proof problems.

Numerical Integration: Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule (without proof) - problems.

Self-Study: Weddle's Rule

Module – 5
08 Hours
Probability:

Introduction, sample space and events. Axioms of probability. Addition & multiplication theorems. Conditional probability, Bayes' theorem. Problems.

Self-Study: Applications of Bayes' theorem

Course outcomes:

1. Upon completion of this course, student will be able to,
2. Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
3. Construct a variety of partial differential equations and solution by various methods.
4. Use Laplace Transform and inverse Laplace Transform in solving differential /integral equation arising in network analysis, control systems and other fields of engineering
5. Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
6. Use the concepts of probability in different probability distribution.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint) 2016
3	Additional Mathematics-2	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed., 2019.
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11 th Edition.2010

SUGGESTED TEACHING LEARNING PROCESS

The faculty members are suggested to use appropriately the following Teaching Learning methods:

1. Active Learning
2. Chalk and Board for Numerical
3. Demonstration using simulator
4. Laboratory Demonstrations
5. Power Point Presentations
6. Problem based learning
7. Video Lecturers

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Assessment Details

1. Integrated professional Core Courses (IPCC):

CIE for the Theory component of IPCC: 30 Marks

	Components	Number	Weightage	Max. Marks
1	Tests (A)	3	60%	18
2	Alternate Assessment Tools(AAT) (B)	3	40%	12
X	Total Marks for theory component A+B			30

CIE for the LAB component of IPCC: 20 Marks

	Components	Weightage	Max. Marks
1	Lab Work: Conduction of Experiments (A)	40%	08
2	Lab Journal Writing & Submission (B)	10%	02
3	Lab Test (C)	30%	06
4	Open-Ended Experiments / Course Projects (D)	20%	04
Y	Total Marks		20

Final Marks for IPCC Courses = X + Y = 30 + 20 = 50

SEE for IPCC Theory for 3 hours duration

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module. The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component)
- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

2. Professional Core / Basic Science /ESC/ETC/PLC courses (Theory):

Continuous Internal Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B) = 30 + 20 = 50

Semester End Examination (SEE)

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE.
- Marks secured will be scaled down to 50.

3. Professional Core Course (PCC) Lab/Ability Enhancement course (Lab):

Continuous Internal Evaluation (CIE):

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments (D)	20%	10
Total Marks: A+B+C+D			50

Semester End Evaluation (SEE):

1. All laboratory experiments are to be included for practical examination
2. Students can pick one experiment from the lot with equal choice to all the students in a batch.
3. Change of experiment is allowed only once and 15% marks allotted to the procedure part to be made zero.
4. Marks distribution: Procedure (15%) + Execution (70%) + Viva Voce (15%)

4. Ability Enhancement Course (AEC)/Skill Enhancement course (SEC) (Theory), Universal human values Course (22UH48):

Assessment Details of CIE

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools (AAT) (B)	3	40%	20
Total Marks				50

Final CIE Marks = (A) + (B)

SEE Guidelines for the Courses

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure a minimum of 35% of the maximum marks meant for SEE.

Suggested Alternate Assessment Tools for PCC, IPCC and AEC Courses:


1. Quiz
2. Assignments
3. Seminars / Presentations
4. Paper Publications
5. Mini Projects
6. MOOCs
7. Industrial Visits and Report Writing
8. Self-learning with Certifications and
9. Cooperative and problem based learning.

No SEE for the courses: Social Connect and Responsibility (22SC37), NSS, YOGA, Sports and Athletics.

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**Board of Examiners (BoE)**Department of Civil Engineering

Sl. No.	Name of the Member with Designation, Affiliation, Email ID and Mobile Number	Role
1	Dr. D. Manikanta Associate Professor and Head, Department of Civil Engineering, BITM, Ballari dr.manikanta@bitm.edu.in , Mobile no. 8072162546	Chairman
2	Mr. B. Basavaraj Assistant Professor, Department of Civil Engineering, BITM, Ballari. basavaraj.civil@bitm.edu.in Mobile No. 9742921642	Internal Member -1 & Co-Ordinator
3	Mr. Md. Khalid S Assistant Professor, Department of Civil Engineering, BITM, Ballari. khalid.s@bitm.edu.in Mobile No. 9008659505	Internal Member -2
4	Mr. Praveen Ashok M Assistant Professor, Department of Civil Engineering, BITM, Ballari. praveenashok.m@bitm.edu.in Mobile No. 9986674757	Internal Member -3
5	Dr. Veeresh B. Karikatti, Associate Professor, Department of Civil Engineering, K. L. E. Institute of Technology, Opposite to Airport, Gokul Road, Hubballi. Mob: 9481813470 Email : veeresh.karikatti@gmail.com	External Member -1
6	Dr Naveen G M Head of the Department Government Enginnering college Kushalnagar-571234 Mob no:-9986145359 Email ID: naveengm.gowda@gmail.com	External Member -2


30/1/24**Signature of BoE Chairman**
Head of the Department
Dept of Civil Engineering
BITM BALLARI



BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(An ISO 9001:2015 Certified Institution)

NAAC A+ ACCREDITED & Autonomous Institution

DEPARTMENT OF CIVIL ENGINEERING

DATE: 01/09/2023

BOS MEETING HELD ON 01-09-23 (10:00AM – 01:00PM, BLENDED MODE)

Members participated in the meeting.

INTERNAL MEMBERS

1. Dr. D Manikanta
2. Mr. Basavaraj B
3. Mr. Md Khalid S
4. Mr. Anil Kumar H M
5. Mr. Ravichandra H
6. Mr. Sivakumar K

EXTERNAL MEMBERS

1. Dr. S V Dinesh
2. Dr. D.L. Venkatesh Babu
3. Dr. Adarsh Chatra
4. Dr. R T Srinivas
5. Mr. Ram Mohan Desai
6. Mr. Vinayak B
7. Mr. Irshad Ali

AGENDA

1. Approval of credits allocation for four-year degree program.
2. Approval of 2021 Scheme & Syllabus (i.e. for V & VI Semester) and 2022 Scheme & Syllabus (i.e. for III & IV Semester) for the academic year 2023-2024.

MINUTES OF THE MEETING

1. Total credits (160) proposed for four-year civil engineering program is been discussed and finalized the same by all members.
2. 2021 Scheme & Syllabus (i.e. for V & VI Semester) and 2022 Scheme & Syllabus (i.e. for III & IV Semester) for the academic year 2023-2024 and is discussed by all the committee members.



BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(An ISO 9001:2015 Certified Institution)

NAAC A+ ACCREDITED & Autonomous Institution

DEPARTMENT OF CIVIL ENGINEERING

Following are the key suggestions given by BOS members with respect to 2021 and 2022 schemes respectively:

- As per the BOS member suggestion in the subject Code 21CV51, the classification of introduction to working stress and limit state design is differentiated. The codes references of IS Codes and American Codes are incorporated. Also, the serviceability is mentioned in the suggested learning resources, also the important codes references books are presented.
- In Structural Analysis for the course code 21CV52, Module 4 and Module 5 title has been modified as Matrix Method of Analysis (Flexibility Matrix) & Matrix Method of Analysis (Stiffness Matrix).
- For course code 21CV53 as per BOS Modules suggestion the title Basic Geotechnical Engineering is renamed as Geotechnical Engineering. In Module 1, the BIS Classification is incorporated. Furthermore, in suggested learning resources, the reference books are modified as per the directions of BOS members.
- In course code 21CV541, In Module 4, the contents have been altered in the chronological order i.e. reservoir and canal has been altered. In suggested learning resources, the references books have been modified.
- For course code 21CV543, In Module-1, the introduction to handling and erection stresses in prefabricated structures is added.
- Course code 21CV544 i.e. Disaster Management and Mitigation is transferred to open elective and 21CV551 i.e. Railways Harbors Tunnel & Airports is transferred to professional elective as per the direction of BOS members.
- In course code 21CVL56 i.e. Environmental Engg Lab, the word demonstration used for few experiments is been removed.
- In course code 21CV63, for the suggested learning resources, the references books have been modified.
- In course code 21CV642, the reference books have been modified.
- In course code 21AEC690, the title of Civil Software Lab is modified to Q – GIS and Civil Software Lab.
- In course code 22BCV405D, (Emerging Science Course) the water Shed Management subject is been replaced with Alternate Building Materials.

CONCLUSIONS

The meeting concluded with the above proposed suggestions and addressed the revisions of 2021 and 2022 schemes/syllabus and further submitted the same for final approval by the BOS committee members.


HOD SIGNATURE

Re: REVISED SCHEMES AND SYLLABUS AFTER THE BOS MEETING SCHEDULED ON 01.09.2023 FOR APPROVAL

VENKATESH BABU D.L. <drdlvbabu@gmail.com>

Fri 9/8/2023 4:38 PM

To: Dr. D Manikanta <dr.manikanta@bitm.edu.in>

Cc: Dinesh S. Viswanathaiah <dineshsv2004@gmail.com>; Irshadali <irshadaliklbg@gmail.com>; Adarsh chatra <adarshchatra@gmail.com>; Srinivasrao Raydurg <srinivasrao.raydurg@jsw.in>; Vinayaka Naik <swathicivilconsultancy@gmail.com>; Ram Mohan Desai <rmdesai@dpcpl.com>; DEAN ACADEMIC <dean_academics@bitm.edu.in>

Sir

I have approved the changes / suggestions made by BoS members are updated in Scheme and Details Syllabus of all the years .

Thank you

Regards

On Thu, Sep 7, 2023, 4:12 PM Dr. D Manikanta <dr.manikanta@bitm.edu.in> wrote:

Dear Respected BOS Members

Hope your doing well

Herewith reference to our Board of studies meeting conducted on September 1st , 2023.

The suggestions given by the BOS members have been addressed and incorporated in the revised scheme & syllabus for your kind perusal.

In this purview, I hereby request you to refer the corrected suggestions incorporated and approve the 2021 (i.e. for V/VI semester) and 2022 (i.e. for III/IV semester) scheme & syllabus for your information. Kindly send me an approval email for the same.

Thanking you

Best Regards,

Dr. D. Manikanta

Associate Professor & Head

Department of Civil Engineering

Ballari Institute of Technology & Management (BITM, Autonomous), Ballari.

manikanta299@gmail.com/dr.manikanta@bitm.edu.in

Mob: +91-8072162546

About approval of syllabus

Irshadali <irshadaliklbg@gmail.com>

Fri 9/8/2023 7:13 PM

To: Dr. D Manikanta <dr.manikanta@bitm.edu.in>

Hello Sir,

I have approved the syllabus for V and VI sem 2021 and III and IV sem 2022 with all the changes suggested by the BoS members.

Regarding

Irshadali



BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under VTU, Belagavi

Recognized by Govt. of Karnataka, Approved by AICTE, New Delhi

**"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura,
Ballari-583 104 (Karnataka)**

Civil Engineering Program

3rd Semester Scheme
(Effective from the academic year 2021-22)

DEPARTMENT OF CIVIL ENGG.**Scheme of Teaching and Evaluation for B.E Programs****With effect from the academic year 2021-22****Total Credits for B.E.: 160****Credits Distribution as per NEP 2020**

SEM	HS	BS	ES	PC	PE	AEC	OE	PW	INT	SE	UHV	TOTAL
1	2	7	10	-	-	1	-	-	-	-	-	20
2	2	7	10	-	-	1	-	-	-	-	-	20
3	1	3	-	12	-	2	-	-	-	-	-	18
4	1	3	-	12	-	3	-	-	2	-	1	22
5	1	-	-	11	3	2	3	-	-	-	-	20
6	3	-	-	8	3	1	3	2	2	-	-	22
7	-	-	-	7	3	-	3	8	-	-	-	21
8	-	-	-	3	-	-	-	-	13	1	-	17
TOTAL	10	20	20	53	9	10	9	10	17	1	1	160

SN	Category
1	HS: Humanities and Social Sciences including Management courses
2	BS: Basic Science courses
3	ES: Engineering Science courses
4	IPCC: Integrated Professional core courses
5	PC: Professional core courses
6	PE: Professional Elective courses relevant to chosen specialization/branch
7	OE: Open Elective subjects offered by other departments
8	AEC: Ability Enhancement Courses
9	PW: Project work
10	SE: Seminar
11	INT: Internship in industry
12	UHV: Universal Human Values

Semester: III

SN	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks			
						L	T	P			CIE	SEE	Total	
01	BSC	21MCM31	Integral Transforms & Numerical Methods	Mathematics	Mathematics	3	0	0	3	3	50	50	100	
02	IPCC	21CV32	Geodetic Engineering Survey	Civil	Civil	3	0	2	4	3	50	50	100	
03	PCC	21CV33	Strength of materials	Civil	Civil	3	0	0	3	3	50	50	100	
04	PCC	21CV34	Engg Geology	Civil	Civil	3	0	0	3	3	50	50	100	
05	PCC	21CVL35	Building material Testing LAB	Civil	Civil	0	0	2	1	3	50	50	100	
06	PCC	21CVL36	Computer Aided Drawing LAB	Civil	Civil	0	0	2	1	3	50	50	100	
07	HS	21KSK37/4 7	Sanskritika Kannada	Humanities	Humanities	1	0	0	1	-	100	----	100	
		21KBK37/4 7	Balake Kannada											
	OR													
	HS	21CIP37/ 47	Constitution of India and Professional Ethics							1	50	50		
08	AEC	21ACV381	Building materials & constructions	Civil	Civil	0	0	2	1	2	50	50	100	
						For AEC as lab course								
						1	0	0						1
			For AEC as theory course											
09	AEC	21DTI39	Ability Enhancement Course (Design Thinking and social innovation)	Concerned Department	Concerned Board	1	0	0	1	2	50	50	100	
Total									18		500/ 450	400/ 450	900	
Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs														
10	NCM C	21MATDIP 31	Additional Mathematics-I	Mathematics	-	3	0	0	0	-	100	-	100	

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credits for IPCC are 04 and its Teaching-Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE

Semester: IV

SL	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	BSC	21MCM41	Complex Analysis, Probability & Statistical Methods	Mathematics	Mathematics	3	0	0	3	3	50	50	100
02	IPCC	21CV42	Fluid mechanics & hydraulics	Civil	Civil	3	0	2	4	3	50	50	100
03	PCC	21CV43	Public Health Engineering	Civil	Civil	3	0	0	3	3	50	50	100
04	PCC	21CV44	Structural analysis-I	Civil	Civil	3	0	0	3	3	50	50	100
05	PCC	21CVL45	Total Station Lab	Civil	Civil	0	0	2	1	3	50	50	100
06	PCC	21CVL46	Geology LAB	Civil	Civil	0	0	2	1	3	50	50	100
07	HS	21KSK37/47	Samskrutika Kannada	HSMC	HSMC	1	0	0	1	-	100	-	100
		21KBK37/47	Balake Kannada										
	OR												
	HS	21CIP37/47	Constitution of India and Professional Ethics							2	50	50	
08	AEC	21SSA480	Soft skills and basic aptitude	Humanities	Humanities	1	2	0	2	2	50	50	100
09	AEC	21AEC481/2	Ability enhancement course-II	Chemistry/ Physics/ civil	Chemistry/ Physics/ civil	0	0	2	1	2	50	50	100
						For AEC as lab course							
						1	0	0					
						For AEC as theory course							
10	UHV	21UHV490	Universal Human Values	Concerned Department	Concerned Board	1	0	0	1	2	50	50	100
11	INT	21INT491	Summer Internship-I	Evaluation By the appropriate authorities		Completed during the intervening period of II and III semesters. Lateral entry students have to attend the internship during the intervening period of III and IV semesters			2	-	100	-	100
Total									22		600/650	500/450	1100
Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs													
12	NCMC	21MATDIP41	Additional Mathematics-I	Mathematics	-	3	0	0	0	-	100	-	100

Ability Enhancement Course

01	21ABE481	Biology for Engineers
02	21ACV482	Concrete Technology

Internship-I (21INT491): All the students admitted to engineering programmes shall have to undergo a mandatory internship-I of 03 weeks during the intervening vacation of II and III semesters. All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory internship-I of 03 weeks during the intervening period of III and IV semesters. Internship-I shall include Inter / Intra Institutional activities. A Viva-voce examination (Presentation followed by question-answer session) shall be conducted during IV semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent examinations after satisfying the internship requirements. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card.

**Semester: III
(COMMON TO ME & CIVIL)**

Course Name: Integral Transforms & Numerical Methods

Course Code	21MCM31	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites:

- Basic formulae of differentiation, partial differentiation, Integration.
- Differential equations
- Periodic function

Module-1

Fourier Series

Introduction to infinite series, Periodic functions, Dirichlet's conditions. Fourier series of periodic functions with period 2π . Fourier series of even and odd functions. Fourier series of arbitrary period $2l$. Half range Fourier series. Practical harmonic analysis.

Self-Study: Convergence and Divergence of series.

8 Hours

Module-2

Infinite Fourier Transforms

Infinite Fourier transforms, definition, Fourier Sine and Cosine transforms. Inverse Fourier transforms, Inverse Fourier Cosine and Sine transforms. Problems.

Self-Study: Leibnitz rule for differentiation under integral sign.

8 Hours

Module-3

Numerical Solution of first-Order ODEs

Taylor's series method, Modified Euler's method, Runge-Kutta method of order four, Milne's predictor and corrector formula, Adam's-Bashforth formula (No derivations only formulae).

Self-Study: Solution of ODE using Picard's method

8 Hours

Module-4

Numerical Solution of Simultaneous and Second-Order ODEs

Simultaneous differential equations: Picard's method, Runge-Kutta method. (No derivations only formulae).

Second-order differential equations: Runge-Kutta method and Milne's Predictor and Corrector method. (No derivations only formulae).

Self-Study: Solution of ODE by analytical method.

8 Hours

Module-5

Z-Transforms and Calculus of Variations

Z-Transform's definition, Z-transforms of standard functions. Damping and shifting rules, Problems. Inverse Z-transforms and applications to solve difference equations.

Calculus of Variations

Variation of a function, functional, Euler's equation. Standard variational problems. Applications of Calculus of Variations, Geodesics, Hanging cable (chain) problem.

Self-Study: Initial and final value theorem.

8 Hours

Teaching-Learning Process: Chalk and talk method/power point presentation

Course Outcomes:

Upon completion of this course, student will be able to:

- Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
- Use Fourier transforms to analyze problems involving continuous-time signals
- Solve first order ODE arising in engineering problems using single step numerical methods.
- Solve second order ODE arising in engineering problems using single step numerical methods.
- apply Z-Transform techniques to solve difference equations, Determine the extremals of functional using calculus of variations to solve problems arising in dynamics of rigid bodies and vibrational analysis.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks:				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	John Willy & Sons	10 th Ed. (Reprint).2016
Reference Books:				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11 th Edition.2010
2	Calculus	George. B. Thomas	Pearsons edn.Inc	13 th Edition.2014
3	A Text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	Latest Edition

Semester: III

Course Name: Geodetic Engineering Survey

Course Code	21CV32	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40(T)+20(P)	Total Marks	100
Credits	04	Exam Hours	03

Module-1

Introduction to Surveying: Importance of surveying in Civil Engineering, Concepts of plane and geodetic surveying Principles of surveying-Plans and maps-Surveying equipments.

Compass Surveying: Meridians, Bearings, Dip, Declination, Prismatic and surveyor's compasses, temporary adjustments, Calculation of bearings and included angles, Local attraction. **8 Hours**

Module-2

Levelling-Principles and basic definitions-Types of Levels-Types of adjustments and objectives-Types of levelling-Simple, Differential, Fly, Reciprocal, Profile, Cross sectioning-Booking of levels-Rise & fall and H. I methods (Numerical)

Areas and Volumes: Measurement of area-by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpsons one third rule, area from co-ordinates, introduction to planimeter, digital planimeter. Measurement of volumes-trapezoidal and prismatic formula. **8 Hours**

Module-3

Theodolite Surveying: Theodolite and types, fundamental axes and parts of theodolite, temporary adjustments of transit theodolite, Horizontal and Vertical angle measurements by repetition and reiteration.

Trigonometric Levelling: Single and Double plane for finding elevation of objects, Computation of distances and elevations using Tacheometric method (Numerical). **8 Hours**

Module-4

Curve Surveying: Curves-Necessity-Types, Simple curves, Elements, Designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine's deflection angle method (numerical problems).

Compound Curves: Elements, Design of compound curves, Setting out of compound curves (numerical problems). Reverse curve between two parallel straights (numerical problems on Equal radius and unequal radius). Transition curves Characteristics, numerical problems on Length of Transition curve, Vertical curves-Types-(theory). **8 Hours**

Module-5

Photogrammetry and Aerial Survey: Introduction, definitions, basics principles, methods, importance of scale, height, applications.

Remote Sensing: Introduction, Principle of Remote sensing, EMR, types, resolutions, types of satellites, type of sensors, LIDAR, visual and digital image processing and its applications.

Introduction to GPS and GIS: Introduction and principle of GPS. Geographical Information System: Introduction and principle of Geographical Information System, components of GIS, applications

Advanced Instrumentation in Surveying: classification, measuring principles, Electronic theodolite, EDM, Total Station, Drones. **8 Hours**

PRACTICAL COMPONENT GEODETIC ENGINEERING SURVEY

SN	Experiment
1	Study of various instruments used for surveying, namely chain, tape, Compass, Dumpy level, Auto-level, Theodolite, Tacheometer, Total station and GPS.
2	To set regular geometric figures (Hexagon and Pentagon) using chain tape and accessories.
3	To set regular geometric figures (Hexagon and Pentagon) using prismatic compass, given the bearing of one line.
4	Study of use of Dumpy level and to determine the difference in elevation between two points by differential levelling using Dumpy level
5	To find the true difference in elevation between two points situated far apart by using Reciprocal levelling.
6	Trigonometrical levelling: Single plane method and Double plane method
7	Measurement of horizontal angle using theodolite by: i) Method of Repetition and ii) Reiteration method.
8	Setting simple circular curve-Instrumental method,
9	Setting compound curve using theodolite

10	Demo: Total station, GPS
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Course Outcomes:

1. Execute survey using compass and plane table
2. Find the level of ground surface and Calculation of area and volumes
3. Operate theodolite for field execution
4. Estimate the capacity of reservoir
5. Interpret satellite imageries

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Surveying & levelling Vol. I ,II & III	B. C. Punmia	Laxmi Publications	17 th Edition (2016)
2	Surveying Vol.I& II	S. K. Duggal	McGraw Hill Education	4 th Edition (2017)
3	Surveying and Levelling	R. Subramanian	Oxford University Press	2 nd Edition (2012)
Reference Books				
1	Advanced Surveying: Total Station, GPS, GIS & Remote Sensing	Gopi Satheesh, R.Sathikumar, N. Madhu	Pearson	1 st Edition (2017)
2	Surveying	A Banister, S Raymond, R Baker	Pearson	7 th Edition

Semester: III
Course Name: Strength of Materials

Course Code:	21CV33	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Module-1

Simple Stresses and Strain: Introduction, Definition and concept and of stress and strain. Hooke's law, Stress-Strain diagrams for ferrous and non-ferrous materials, factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self-weight. Saint Venant's principle, Compound bars, Temperature stresses, Compound section subjected to temperature stresses, state of simple shear, Elastic constants and their relationship. **8 Hours**

Module-2

Bending moment and shear force diagrams in beams: Definition of shear force and bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, development of Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) with salient values for cantilever, simply supported and overhanging beams for point loads, UDL (Uniformly Distributed Load), UVL (Uniformly Varying Load) and Couple. **8 Hours**

Module-3

Bending Stress in Beams: Introduction-Bending stress in beam, Pure bending, Assumptions in simple bending theory, derivation of Simple bending equation (Bernoulli's equation), modulus of rupture, section modulus, Flexural rigidity, Problems Shear stress in beams: Derivation of Shear stress intensity equations, Derivation of Expressions of the shear stress intensity for rectangular, triangular and circular cross sections of the beams. Problems on calculation of the shear stress intensities at various critical levels of T, I and Hollow rectangular cross sections of the beam. **8 Hours**

Module-4

Torsion: Twisting moment in shafts, simple torque theory, derivation of torsion equation, torsional rigidity, polar modulus, shear stress variation across solid circular and hollow circular sections.
Compound stresses: Introduction, Stress components on inclined planes, General twodimensional stress system, Principal planes and stresses, maximum shear stresses and their planes (shear planes). Compound stress using Mohr's circle method **8 Hours**

Module-5

Elastic stability of columns: Introduction-Short and long columns, Euler's theory on columns, Effective length, slenderness ratio, radii of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different boundary conditions, Limitations of Euler's theory, Rankine's formula and related problems.
Deflection of determinate Beams: Introduction, Elastic curve-Derivation of differential equation of flexure, Sign convention, Slope and deflection using Macaulay's method for statically determinate beams subjected to various vertical loads, moment, couple and their combinations. Numerical problems. **8 Hours**

Course Outcomes:

1. Evaluate the behaviour when a solid material is subjected to various types of forces (namely Compressive, Tensile, Thermal, Shear, flexure, Torque, internal fluid pressure) and estimate stresses and corresponding strain developed. (L3)
2. Estimate the forces developed and draw schematic diagram for stresses, forces, moments for simple beams with different types of support and are subjected to various types of loads (L3).
3. Evaluate the behaviour when a solid material is subjected to Torque and internal fluid pressure and estimate stresses and corresponding strain developed. (L3)
4. Distinguish the behaviour of short and long column and calculate load at failure & explain the behaviour of spring to estimate deflection and stiffness (L3)
5. Examine and Evaluate the mechanical properties of various materials under different loading conditions

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1.	Strength of Materials	S S Bhavikatti	Vikas Publishing house	3 rd Edition
2.	Strength of Materials	Dr.R.K.Bansal	Laxmi Publications, New Delhi 2014.	5 th Edition
3.	Strength of Materials	Beer & Johnston	TATA McGraw Hill New Delhi 2006.	3 rd Edition
Reference Books				
1	Elements of Strength of Materials	Timoshenko and Young	East West Press	5 th Edition 2003
2	Strength of Materials	R. Subramanyam	Oxford University Press	3 rd Edition-2016
3	Strength of Materials	B.C Punmia Ashok Jain, Arun Jain	Laxmi Publications	8 th Edition-2018.

Semester: III
Course Name: Engineering Geology

Course Code	21CV34	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites:

- Rocks and mineral samples
- Physical properties of minerals and rocks
- Toposheets and Geological maps

Course objectives:

This course (21CV34) will enable the students to

1. Understand the basics of geology that are relevant to take the important decisions in Civil Engineering.
2. Identify the physical characteristics of the rocks and Minerals for its suitable application.
3. Use of rocks as building materials and selection of ideal sites for important Civil Engineering structures.
4. Know about ground water exploration, natural hazards and their impact on environment.
5. Apply the modern tools and techniques in Civil Engineering Projects.

Module-1

Introduction: Introduction to Geology and its importance in Civil Engineering Practices, Internal structure and composition of the earth.

Mineralogy: Definition, Classification, Physical properties, Composition and their use in the manufacture of construction materials. **8 Hours**

Module-2

Petrology: Introduction, Classification of rocks, Formation, Texture, Structure, Description and engineering usage of important rocks. Selection of rocks as materials for construction as a foundation, decorative, flooring, and roofing, concrete aggregate, road Metal, railway ballast with examples.

Geomorphology: Weathering of rocks, Soil formation and soil profile, Landforms. **8 Hours**

Module-3

Structural Geology: Basic definitions-outcrop, inlier, outlier, dip and strike; Study of important Geological structures Faults, Folds, Joints and Unconformities-definition, classification, recognition in the field and its consideration in Civil Engineering projects; Selection of sites for civil engineering projects-dams, reservoirs and tunnels. **8 Hours**

Module-4

Hydrogeology: Hydrological cycle, Vertical distribution of ground water, Water bearing properties of rocks and soils, Aquifer and its types, Groundwater exploration by geophysical method, Artificial recharge of groundwater, Seawater intrusion in coastal areas and remedies. **8 Hours**

Module-5

Geodynamics: Earth quake-Types, causes and effects, Seismic zones of India, Tsunami-causes and effects, Landslides-Types, causes, effects and preventive measures, Volcanic eruptions-types, causes and effects, Cyclone-causes and effects. Impact of mining, quarrying and reservoirs on environment.

Geodesy: Toposheets, Remote sensing-Basic concepts and applications in civil engineering, Application of GIS and GPS in Civil Engineering. **8 Hours**

Course Outcomes:

1. Apply geological knowledge in different civil engineering practice.
2. Choose the rock as construction material based on its properties and mineralogical composition.
3. Analyse the situation for the safety, stability, economy and life of the structures that they construct.
4. Solve various issues related to ground water exploration and recharge the ground water.
5. Describe various geological maps and suggest suitable remedies and preventive measures for natural disasters.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Text book of Engineering and General Geology	Parbin Singh	S. K. Kataria & Sons	8 th Revised Edn, 2008
2	A Text book of Geology	P. K. Mukerjee	The World Press	11 th revision Edition, 1990
3	Engineering Geology	Vasudev Kanithi	Universities Press (India) Pvt. Ltd	2018
Reference Books				
1	Theory of Structural Geology	N.W. Gokhale	CBS Publishers & Distributors	2 nd Edn. 2003
2	Principles of Petrology	G.W. Tyrrel	BI Publications Pvt Ltd	Delhi 1 st Edn 1987
3	Engineering Geology	S.K. Duggal, H.K. Pandey, N. Rawal	Mc Graw Hill Education publications	2017

Name of the Laboratory: BUILDING MATERIALS TESTING LABORATORY

Course Code:	21CVL35	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	03

List of Experiments:

SN	Experiments
1	Tension test on mild steel and HYSD bars.
2	Compression test on mild steel, cast iron and wood.
3	Torsion test on mild steel circular sections
4	Bending Test on Wood Under two point loading
5	Shear Test on Mild steel-single and double shear
6	Impact test on Mild Steel (Charpy & Izod)
7	Hardness tests on ferrous and non-ferrous metals-Brinell's, Rockwell and Vicker's
8	Tests on Bricks: Dimensionality of bricks, Water absorption, Initial rate of absorption and compressive strength.
9	Tests on Fine aggregates-Moisture content, Specific gravity, Bulk density, Sieve analysis and Bulking
10	Tests on Coarse aggregates-Absorption, Moisture content, specific gravity, Bulk density and Sieve analysis.

Course Outcomes:

1. Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
2. Identify, formulate and solve engineering problems of structural elements subjected to flexure.
3. Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.
4. Evaluate the basic properties of aggregates such as specific gravity, fineness modulus and bulk density.
5. Select the suitable materials such as wood, brick and mild steel by testing as building material.

Reference Books:

1. Davis, Troxell and Hawk, "Testing of Engineering Materials", International Student Edition-McGraw Hill Book Co. New Delhi.
2. M L Gambhir and Neha Jamwal, "Building and construction materials-Testing and quality control", McGraw Hill education(India)Pvt. Ltd., 2014
3. Fenner, " Mechanical Testing of Materials", George Newnes Ltd. London.
4. Holes K A, "Experimental Strength of Materials", English Universities Press Ltd. London.
5. Suryanarayana A K, "Testing of Metallic Materials", Prentice Hall of India Pvt. Ltd. New Delhi.
6. Kukreja C B, Kishore K. and Ravi Chawla "Material Testing Laboratory Manual", Standard Publishers & Distributors 1996.
7. Relevant latest IS Codes

Semester: III

Name of the Laboratory: COMPUTER AIDED BUILDING PLANNING AND DRAWING

Course Code	21CVL36	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	03

MODULE-1

Introduction to AutoCAD

SN	Experiments
01	Drawing Tools: Lines Circle, Arc, Polyline, Multiline, Polygon, Rectangle, Spline, Ellipse,
02	Modify Tools: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet,
03	Using Text: Single line text, Multiline text, Spelling, Edit text.
04	Special Features: View tools, Layers concept, Dimension tools, Hatching, Customizing Toolbars, Working with multiple drawings.
05	Drawing Basics: Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS:962.
06	Basic concepts of Plan, Elevation & Cross-sectional Elevation.
07	Introduction to RCC detailing: Main bars, Distribution bars, Bent up bars, Curtailment bars, Types of Stirrups, Reinforcement cover.
08	Principles of planning, building byelaws, notations and symbols used in drawings, Types of buildings-Residential (load bearing and framed), public buildings, design aspects for different public buildings. Recommendations of NBC.

MODULE-2

Drawings of different Building Elements

SN	Experiments
01	Cross section of Foundation
02	Cross section of Masonry wall
03	Plan, Cross Section & Elevation of RCC column with footings. a. Isolated footing. b. Combined footing.
04	Cross section of Lintel with chejja.
05	Plan and Cross-section of RCC Slabs. a. One-way slab. b. Two-way slab.
06	Cross-section & Longitudinal section of RCC Beams. a. Singly Reinforced Beam. b. Doubly Reinforced Beam. c. Cantilever Beam.
07	Plan, Cross-sectional Elevation of different types of staircase. a. Dog legged staircase. b. Open newel staircase.

Note: Students should sketch to dimension the above in a sketchbook before doing the computer drawing.

MODULE-3

SN	Experiments
01	Residential Buildings Preparation of Plan, elevation, cross section and schedule of openings for load bearing and framed structures- ground floor, first floor and two storey buildings (framed only) using AUTOCAD for the following buildings. a. Single story residential building. b. Multistory Residential building.
02	Public Buildings Preparation of Plan, elevation, cross section and schedule of openings for public buildings like a. School Building b. Hostel Building c. Hospital Building
03	Building Services Preparing a building plan showing building services like a. Water supply & sanitation. b. Electrical services for prepared plans of residences and public buildings using AUTOCAD

Note:

- Students should sketch to dimension the above in a sketchbook before doing the computer drawing.
- Single line diagrams to be given in the examination.

Course outcomes:

1. Use of different commands of AUTO CAD Software.
2. Create layout plan, sanction drawings, working drawing using concept of layers.
3. Select the tools in AUTO CAD software to draw the various building components.
4. Plan and design of residential or public building as per the given requirement.
5. Preparing the drawings and detailing of RCC structural elements and other civil related drawing.

Reference Books:

MGShah, CM Kale, SYPatki, "Building drawing with an integrated approach to Built Environment Drawing", Tata McGraw Hill Publishing co. Ltd, New Delhi.
Gurucharan Singh, "Building Construction", Standard Publishers, & distributors, New Delhi.
Malik R SandaMeo GS, "Civil Engineering Drawing", Asian Publishers/ Computech Publication Pvt. Ltd.

BE-III / IV Semester-Common to All
ಬಳಕೆ ಕನ್ನಡ—baLake Kannada (Kannada for Usage)

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ—(Prescribed Textbook to Learn Kannada)

ವಿಷಯ ಸಂಕೇತ (Course Code)	21KSK37/47	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಅಂಕಗಳು (Continuous Internal Evaluation Marks)	100
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / Week (L:T:P: S))	1-0-0		
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	15 ಗಂಟೆಗಳು	ಒಟ್ಟು ಅಂಕಗಳು (Total Marks)	100
ಕ್ರೆಡಿಟ್ಸ್ (Credits)	01	ಪರೀಕ್ಷೆಯ ಅವಧಿ (Exam Hours)	02 ಗಂಟೆ

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು: (Course Learning Objectives):

- To create the awareness regarding the necessity of learning local language for comfortable and healthy life.
- To enable learners to Listen and understand the Kannada language properly.
- To speak, read and write Kannada language as per requirement.
- To train the learners for correct and polite conversation.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process-General Instructions) :

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಷಯ ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕಗಳನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
1. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚಿಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪರಿಚಯ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
2. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module-1

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities
3. Key to Transcription.
4. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು—Personal Pronouns, Possessive Forms, Interrogative words

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-2

1. ನಾಮಪದಗಳು ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು—Possessive forms of nouns, dubitative question and Relative nouns
2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals
3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು—ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ—(ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-3

1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು-Dative Cases and Numerals
2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು-Ordinal Numerals and Plural markers.
3. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು-Defective / Negative Verbs and Colour Adjectives.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-4

1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, Encouraging and Urging words (Imperative words and sentences).
2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication.
3. “ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯ ಪದಗಳು.-Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs.
4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ. Comparative, Relationship, Identification and Negation Words

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-5

1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು-different types of forms of Tense, Time and Verbs
2. ದ್,-ತ್,-ತು,-ಇತು,-ಆಗಿ,-ಅಲ್ಲ,-ಗ್,-ಕ್, ಇದೆ, ಕ್ರಿಯ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ Formation of Past, Future and Present Tense Sentences with Verb Forms
3. Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು-Kannada Words in Conversation

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

Skill Set: At the end of the Course, The Students will be able

1. To understand the necessity of learning of local language for comfortable life.
2. To Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To communicate (converse) in Kannada language in their daily life with Kannada speakers.
5. To speak in polite conversation.

Textbook:

ಬಳಕೆ ಕನ್ನಡ

ಲೇಖಕರು: ಡಾ. ಎಲ್.ತಿಮ್ಮೇಶ

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

**BE-III / IV Semester-Common to all
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**

ವಿಷಯ ಸಂಕೇತ (Course Code)	21KSK37/47	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಅಂಕಗಳು	100
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / Week (L:T:P:S))	1-0-0		
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	15 ಗಂಟೆಗಳು	ಒಟ್ಟು ಅಂಕಗಳು	100
ಕ್ರೆಡಿಟ್ಸ್ (Credits)	01	ಪರೀಕ್ಷೆಯ ಅವಧಿ	02 ಗಂಟೆ

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
4. ಕನ್ನಡ ಶಬ್ದ ಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಳಕೆ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ

(Teaching-Learning Process-General Instructions) :

These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು-ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಪಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ-1 ಲೇಖನಗಳು

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ-ಹಂಪ ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ-ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ-ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ.ಕೇಶವಮೂರ್ತಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ

1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ,
2. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ-ಪುರಂದರದಾಸರು
ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ-ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು-ಶಿಶುನಾಳ ಶರೀಫ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ

1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದು ಕೆಲವು ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ
3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ

1. ಡಾ. ಸರ್.ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ-ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ-ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-5 ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

1. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ
2. ಮೇಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು: (Course Outcomes):

1. ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.
4. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.

ಪಠ್ಯಪುಸ್ತಕ:

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್.ತಿಮ್ಮೇಶ
ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

Semester: III

Course Name: CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW

Course Code	21CIP37/47	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	02

Module-1

Introduction to Indian Constitution

The Making of the Constitution, The Role of the Constituent Assembly-Preamble and Salient features of the Constitution of India. Fundamental Rights. Directive Principles of State Policy (DPSP). Fundamental Duties.

3 Hours

Module-2

Union Executive and State Executive:

Parliamentary System, Federal System, Union Executive-President, Prime Minister, Union Cabinet, Parliament-Union Legislature, Lok Sabha and Rajya Sabha types of bills. Union judiciary Supreme Court of India.

3 Hours

Module-3

Elections, Amendments and Emergency Provisions

Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments-Methods in Constitutional Amendments. Important Constitutional Amendments. Amendments-7, 9, 10, 12, 42, 44, 61, 73, 74, 75, 86, and 91, 94, 95, 100, 101, 118. Emergency Provisions, types of Emergencies and its consequences. Special Provisions (Articles 370,371,371J) for some States

3 Hours

Module-4

Professional / Engineering Ethics:

Scope & Aims of Engineering & Professional Ethics-Business Ethics, Corporate Ethics, Personal Ethics. Role morality. What is profession characteristic of profession? The NSPE board of Professional ethics. Engineering ethics as preventive ethics. Responsible Engineer. Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. What is conflict of interest? Honesty integrity and reliability. IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.

3 Hours

Module-5

Internet Laws, Cyber Crimes and Cyber Laws:

Internet and Need for Cyber Laws, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000. Cybercrimes and enforcement agencies.

3 Hours

Course Outcomes:

1. Have constitutional knowledge and legal literacy.
2. Understand Engineering and Professional ethics and responsibilities of Engineers
3. Understand the cybercrimes and cyber laws for cyber safety measures

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Constitution of India, Professional Ethics and Human Rights	Shubham Singles, Charles E. Haries, and et al	Cengage Learning India	2018
2	Cyber Security and Cyber Laws	Alfred Basta and et al	Cengage Learning India	2018
3	Introduction to the Constitution of India	Durga Das Basu	Prentice-Hall	2008
4	Engineering Ethics	M. Govindarajan, S. Natarajan, V. S. Senthikumar	Prentice-Hall	2004

Semester: III
Course Name: BUILDING MATERIALS & CONSTRUCTION

Course Code	21ACV381	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	03

Module-1

Stone as building material; Requirement of good building stones, Dressing of stones, Deterioration and Preservation of stone work. Bricks; Classification, Manufacturing of clay bricks, Requirement of good bricks. Field and laboratory tests on bricks. **3 Hours**

Module-2

Masonry: Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond. Stone Masonry-Requirements of good stone masonry, Classification, characteristics of stone masonry. Types of walls; load bearing, partition walls, cavity walls. **3 Hours**

Module-3

Lintels and Arches: Definition, function and classification of lintels. Definition & functions of Balcony, chejja and canopy. Arches-Definition & Elements of an arch.

Floors: Definition, Requirement of good floor. **Roof:** definition, Requirement of good roof. **3 Hours**

Module-4

Doors & Windows: Definition & technical terms.

Stairs: Definitions, technical terms and types of stairs.

Formwork: Introduction to form work, scaffolding, shoring, under pinning. **3 Hours**

Module-5

Plastering and Pointing: Plastering-Definition, Purpose, materials and methods of plastering, Stucco plastering, defects in plastering. Pointing-definition and types of pointing.

Damp proofing-causes, effects& methods of damp proofing.

Paints: Definition, Purpose &Ingredients of paint. **3 Hours**

Course Outcomes:

At the end of the Course the Students will be able to:

1. Choose suitable building materials and tests to be conducted.
2. Identify different bonds in brick work & also know types of masonry
3. Classify the different Construction methods for building elements.
4. Develop knowledge about stairs also knowing about the doors, windows and formwork requirements.
5. Relate the various materials required for building finishes.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Building Materials and construction	Sushil Kumar	Standard Publishers	20 th Edition, reprint 2015
2	Engineering Materials	Rangawala S. C	Charter Publishing House, Anand, India.	-
3	Building Construction	Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications (P) Ltd., New Delhi	-
Reference Books				
1	Building Materials	P C Vergese	PHI Learning Pvt. Ltd	
2	Building Materials	S. K. Dugga	New Age International (P) Limited	(4 th Edition) 2016
3	Alternative Building Materials Technology"	Jagadish. K.S	New Age International.	2007.

Semester: III
Course Name: DESIGN THINKING & INNOVATION

Course Code	21DTI39	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	02

Module-1

PROCESS OF DESIGN

Understanding Design thinking
 Shared model in team-based design-Theory and practice in Design thinking-Explore presentation signers across globe-MVP or Prototyping **3 Hours**

Teaching-Learning Process:

1. Introduction about the design thinking: Chalk and Talk method
2. Theory and practice through presentation
3. MVP and Prototyping through live examples and videos

Module-2

Tools for Design Thinking

Real-Time design interaction capture and analysis-Enabling efficient collaboration in digital space-Empathy for design-Collaboration in distributed Design **3 Hours**

Teaching-Learning Process:

1. Case studies on design thinking for real-time interaction and analysis
2. Simulation exercises for collaborated enabled design thinking
3. Live examples on the success of collaborated design thinking.

Module-3

Design Thinking in IT

Design Thinking to Business Process modelling-Agile in Virtual collaboration environment-Scenario based Prototyping **3 Hours**

Teaching-Learning Process:

1. Case studies on design thinking and business acceptance of the design
2. Simulation on the role of virtual eco-system for collaborated prototyping
3. Chalk and Talk are used for Problem Solving.

Module-4

DT For strategic innovations

Growth-Story telling representation-Strategic Foresight-Change-Sense Making-Maintenance Relevance-Value redefinition-Extreme Competition-experience design-Standardization-Humanization-Creative Culture-Rapid prototyping, Strategy and Organization-Business Model **3 Hours**

Teaching-Learning Process:

1. Business model examples of successful designs.
2. Presentation by the students on the success of design.
3. Live project on design thinking in a group of 4 students.

Module-5

Design thinking workshop

Design Thinking Workshop Empathize, Design, Ideate, Prototype and Test **3 Hours**

Teaching-Learning Process:

1. Design thinking workshop from the expert and then presentation by the students on the learning from the workshop

Course Outcomes:

At the end of the course the student will be able to,
 C01:1. Identify the methods, processes, and tools of Design Thinking
 C02: Apply the Design Thinking approach and model to real world situations
 C03: Propose design ideas through different Technique
 C04: Develop technical drawings for design ideas
 C05: Execute innovation driven projects using design thinking principles

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Design	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson	Cengage learning	2 nd Edition, 2013
2	The Design of Business	Roger Martin	Harvard Business Press	2009
3	Design Thinking: Understand- Improve -Apply	Hasso Plattner, Christoph Meinel and Larry Leifer	Springer	2011
Reference Books				
1	Design Thinking for Strategic Innovation	Idris Mootee	John Wiley & Sons	2 nd Edition, 2011
2	Engineering Design Process	Yousef Haik and Tamer M.Shahin	CengageLearning	1 st Edition, 2012

Semester: III
Course Name: Additional Mathematics-I

Course Code	21MATDIP31	CIE Marks	100
Teaching Hours/Week (L:T:P)	03:00:00	SEE Marks	--
Total Hours of Pedagogy	15	Total Marks	100
Credits	00	Exam Hours	00

Pre-requisites:

- Algebraic formulae
- Differentiation
- Integration
- Trigonometric formulae

Module-1

Linear Algebra

Introduction-Rank of matrix by elementary row operations-Echelon form. Consistency of system of linear equations, Solution of linear equations-Gauss elimination method. Eigen values and Eigen vectors of a square matrix. Problems.

Self-Study: Gauss Jordon Method

8 Hours

Module-2

Differential Calculus:

Review of successive differentiation-Illustrative examples. Maclaurin's series expansions-Illustrative examples. Partial Differentiation: Euler's theorem-problems on first order derivatives only. Total derivatives-differentiation of composite functions. Jacobian of order two-problems.

Self-Study: Taylor's series expansion.

8 Hours

Module-3

Vector Differentiation:

Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and Vector point functions. Gradient, Divergence and Curl-Simple problems. Solenoidal and irrotational vector fields-Problems.

Self-Study: Angle between two surfaces

8 Hours

Module-4

Integral Calculus:

Review of elementary integral calculus. Reduction formulae for $\sin^n x$, $\cos^n x$ (with proof) and $\sin^m x \cos^n x$ (without proof) and evaluation of these with standard limits-Examples. Double and triple integrals-Simple problems.

Self-Study: Change of Order of Integration.

8 Hours

Module-5

Ordinary Differential Equations:

Introduction-Solutions of first order and first degree differential equation: exact, Equation reducible to exact. Linear differential equations and Bernoulli's equation.

Self-Study: Homogeneous differential equations

8 Hours

Teaching-Learning Process:

Chalk and talk method/power point presentation

Course outcomes:

1. Upon Completion of this course, student will be able to,
2. Make use of matrix theory for solving system of linear equations and compute eigen values and eigen vectors.
3. Learn the notion of partial differentiation to calculate the rate of change of multivariate functions and solve problems related to composite functions and Jacobians
4. Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors
5. Apply the concept of integration and variables to evaluate multiple integrals and their usage in computing the area and the volumes.
6. Solve first order linear differential equations analytically using standard methods.

Assessment Details:**Continuous Internal Examination/ Evaluation (CIE) :**

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	60
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	40
	Total Marks			100

Final CIE Marks = (A) + (B)

The Alternate Assessment Tools are Assignments, Quiz and Seminar

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint).2016
3	Additional Mathematics-1	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed., 2019.
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11th Edition.2010



Civil Engineering Program

4th Semester Scheme
(Effective from the academic year 2021-22)

**Semester: IV
(COMMON TO CIVIL & ME)**

Course Name: COMPLEX ANALYSIS, PROBABILITY & STATISTICAL METHODS

Course Code	21MCM41	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Number of Pedagogy Hours	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites:

- Basic formulae of differentiation, partial differentiation, Integration.
- Complex numbers.
- Statistics and probability.

Module-1

Complex Analysis

Review of a function of a complex variable, limits, continuity and differentiability. Analytic function, Cauchy-Riemann equations in Cartesian and polar forms and consequences. Construction of analytic functions by Milne-Thompson method, problems. Conformal Transformation-Introduction, Bilinear transformation.

Complex Integration

Line integral of a complex function, Cauchy's theorem and Cauchy's integral formula and problems.

Self-Study: Conformal Transformation: Discussion of transformations: $w = e^z, w = z^2, w = z + 1/z (z \neq 0)$.

8 Hours

Module-2

Optimization: Basic concepts, classification of optimization problems. Linear programming problem (LPP). Formation of LPP. Graphical method and Simplex method to solve linear LPP.

Self-Study: Duality Theory.

8 Hours

Module-3

Statistical Methods: Correlation and regression, Karl Pearson's coefficient of correlation and rank correlation, problems. Regression analysis, lines of regression, problems.

Curve Fitting: Curve fitting by the method of least squares, fitting the curves of the forms

$$y = ax + b, y = ax^b \text{ and } y = ax^2 + bx + c.$$

Self-Study: Angle between two regression lines, problems.

8 Hours

Module-4

Probability Distributions: Random Variables (discrete and continuous), probability mass and density functions, problems. Binomial, Poisson and normal distributions, problems (derivations for mean and standard deviation for Binomial and Poisson distributions only)-Illustrative examples.

Self-Study: Exponential distribution.

8 Hours

Module-5

Joint Probability Distributions: Joint Probability distribution for two discrete random variables, expectation, covariance and correlation.

Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, Student's t-distribution and Chi-square distribution as a test of goodness of fit.

Self-Study: Point estimation and interval estimation.

8 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Explain the idea of analyticity, potential fields, residues and poles of complex potentials in Field Theory and Electromagnetic theory.
CO2	Apply the graphical and simplex method to solve the LPP.
CO3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO4	Applying discrete and continuous probability distributions in analysing the probability models arising in engineering field.
CO5	Construct joint probability distributions and demonstrate the validity of testing hypothesis.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	John willy & Sons	10 th Ed. (Reprint) 2016
3	Operations Research	S.D.Sharma	Kedarnath & Ramanath	17 th Edition
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11 th Edition.2010
2	Calculus	George. B. Thomas	Pearsons edn. Inc	13 th Edition.2014
3	A Text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	Latest Edition

Semester: IV
Course Name: FLUID MECHANICS AND HYDRAULICS (21CV42)

Course Code	21CV42	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Number of Pedagogy Hours	40 (T) + 20 (P)	Total Marks	100
Credits	04	Exam Hours	03

Module-1

Fluids and their properties: Introduction, Concept of fluid, Definition of Mass Density, Specific weight, Specific Gravity, Viscosity, Surface Tension, Capillarity, Cohesion, Adhesion, Newton's law of viscosity, Classification of fluids. (No problems)

Fluid Pressure and its Measurements: Introduction, Types of Pressures, Pressure at a point-Pascal Law-Proof, Hydrostatic law-statement and proof, Measurement of pressure using simple and Differential manometers. Problems on Manometers only

Hydrostatic forces on surfaces: Introduction, Total pressure and center of pressure on vertical and Inclined plane surfaces. (No problems) **8 Hours**

Module-2

Kinematics: Introduction, Types of fluid flow, Continuity equation in 3D Cartesian coordinates, Flow nets. (No problems)

Dynamics: Introduction, Euler's equation of motion, Bernoulli's equation (No problems)

Applications: Venturimeter, Orifice meter, Pitot Tube , problems only on application **8 Hours**

Module-3

Orifices and Mouth Pieces: Introduction, Classification, Hydraulic Coefficients (No problems)

Notches: Introduction, Discharge over Rectangular, Triangular and trapezoidal Notches, problems

Flow Through Pipes: Introduction, Major and Minor losses, Darcy-Weisbach equation for head loss due to friction, Pipes in series, pipes in parallel, problems on frictional losses in pipes-concepts of water hammer and Surge Tank [No Derivation, No Problems] **8 Hours**

Module-4

Open Channel Hydraulics: Introduction, Classification of flow through channels (Uniform and Non-Uniform flows) (No problems) – Chezy's, Manning's Equation.

Most Economical Channel Sections: Rectangular, Triangular, Trapezoidal, problems

Non-Uniform Flow: Equation for Hydraulic jump, Gradually varied flow equation, Specific energy, Specific energy curve No Problems **8 Hours**

Module-5

Impact of jet on curved vanes: Introduction, Momentum equation, Impact of jet on Stationary and moving curved vanes-problems.

Turbines: Introduction, Pelton wheel and its components, Velocity triangle (No problems)

Reaction Turbines: Francis turbine and its components, Working Proportions (No problems)

Centrifugal Pumps: Components, work done and efficiency, Multi stage pumps (No Problems) **8 Hours**

PRACTICAL COMPONENT OF IPCC

SN	Experiments
1	Verification of Bernoulli's equation
2	Determination of Cd for Venturimeter or Orificemeter
3	Determination of Hydraulic coefficients of small vertical orifice
4	Calibration of Triangular notch or Rectangular notch
5	Determination of Major or minor losses in pipes
6	Determination of Cd for ogee or broad crested weir
7	Determination of force exerted by a jet on flat vane
8	Determination of efficiency of centrifugal pump
9	Determination of efficiency of Kaplan or Francis turbine
10	Determination of efficiency of Pelton wheel turbine

Course Outcomes:

1. Possess a sound knowledge of fundamental properties of fluids and its pressure measurements.
2. Compute and solve problems on Hydrostatics, including practical applications also discharge through various devices.
3. Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications.
4. Design the open channel of various sections including economical channel sections.
5. Design the turbines for the given data and to know their operation characteristics for different conditions

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Hydraulics and Fluid Mechanics,	P.N.Modi and S.M.Seth-	standard Book House, New Delhi	
2	Fluid Mechanics and Hydraulic Machines	K Subramanya	Tata McGraw-Hill, New Delhi	
3	A text book of Fluid Mechanics and Hydraulic Machines-	R.K. Bansal	Laxmi Publications, New Delhi	
Reference Books				
1	Fluid Mechanics	Victor L. Streeter, Benjamin Wyle E and Keith W. Bedford	Tata McGraw Hill publishing Co Ltd, New Delhi	
2	Fluid Mechanics	J.F.Douglas,J. M. Gasoreik, John Warfield ,Lynne Jack	Pearson, Fifth Edition.	
3	Fluid Mechanics and Hydraulic Machines, Problems and Solutions,	K.Subramanya	Tata McGraw-Hill, New Delhi	

Semester: IV
COURSE NAME: PUBLIC HEALTH ENGINEERING

COURSE CODE	21CV43	CIE MARKS	50
TEACHING HOURS/WEEK (L:T:P)	3:0:0	SEE MARKS	50
Number of Pedagogy Hours	40	Total Marks	100
CREDITS	03	EXAM HOURS	03

Pre-requisites:

- *Basic knowledge of environmental studies*
- *Basic knowledge of chemistry and biological studies*

Module-1

Introduction: Water: Need for protected water supply, Demand of Water: Types of water demands-domestic demand, industrial, institutional and commercial demand, public use and fire demand estimation, factors affecting per capita demand, Variations in demand of water, Peak factor.
Design period and factors governing design period. Methods of population forecasting and numerical problems. Physico-chemical characteristics of water (Analysis to be conducted in laboratory session). Sampling. **8 Hours**

Module-2

Water Treatment: Objectives, Unit flow diagrams-significance of each unit, Aeration process-Limitations and types. Sedimentation-Theory, settling tanks, types and design with numerical, Coagulation and flocculation, types of coagulants,(Optimization of coagulant to be carried out in the laboratory),
Filtration: mechanism, theory of filtration, types of filters: slow sand, rapid sand and pressure filters. Operation and cleaning. Design of slow and rapid sand filter without under drainage system (numerical). Disinfection: Methods of disinfection with merits and demerits. Breakpoint of chlorination (Analysis to be conducted in laboratory session) Softening: Lime soda and Zeolite process. **8 Hours**

Module-3

Introduction: Need for sanitation, methods of sewage disposal, types of sewerage systems.
Treatment of municipal waste water: Waste water characteristics (Analysis to be conducted in laboratory session): sampling, significance and techniques, physical, chemical and biological characteristics, Numerical on BOD **8 Hours**

Module-4

Treatment Process: Flow diagram for municipal waste water Treatment unit operations and process Screens: types, disposal. Grit chamber, oil and grease removal. Primary and secondary settling tanks (no numerical), Suspended growth system-conventional activated sludge process and its modifications. **8 Hours**

Module-5

Attached growth system-trickling filter, numerical on Trickling filters, bio-towers and rotating Biological contactors. Principle of stabilization ponds, oxidation ditch, Sludge digesters (aerobic and anaerobic), Equalization, thickeners and drying beds. **8 Hours**

Teaching-Learning Process:

1. Black Board & PPT: Black Board & PPT
2. Regular review of students by asking questions based on topics covered in the class
3. Seminar given to students as activity based learning

Course Outcomes:

1. Estimate average and peak water demand for a community.
2. Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
3. Design the different units of water treatment plant
4. Understand and design the various units of wastewater treatment plant
5. Acquire capability to conduct experiments and estimate the concentration of different parameters and compare the obtained results with the concerned guidelines and regulations.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	“Environmental Engineering Vol-I, Water supply Engineering.	S. K. Garg	Khanna Publishers, New Delhi 2010.	10 th Edition ,2010
2	, “Environmental Engineering Vol-II, Water supply Engineering”	S.K.Garg	Khanna Publishers, New Delhi	28 th Edition ,2017
3	“Environmental Engineering I- Water Supply Engineering”. [4]	B.C. Punmia and Ashok Jain	Laxmi Publications (P) Ltd., New Delhi	2010
4	“Environmental Engineering Vol-II”	B C Punmia	Laxmi Publications	2 nd Edition, 2016
Reference Books				
1	“Wastewater Treatment Concepts and Design Approach”,	Karia G.L., and Christian R.A	Prentice Hall of India Pvt. Ltd., New Delhi.	3 rd Edition, 2017
2	Water & Waste Water Technology	Mark.J, Hammer	John Wiley & Sons Inc., New York	2008.

Semester: IV
Course Name: Structural Analysis-1

Course Code:	21CV44	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Number of Pedagogy Hours	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites:

Students should have knowledge about engineering mechanics such as resolving the force, composition of force, resultant of force, moment of force, moment of couple centroid and moment of inertia of plane areas.

Course objectives:

1. Apply knowledge of mathematics and engineering in calculating slope and deflections
2. Identify, formulate and solve engineering problems
3. Analyse structural systems and interpret data
4. Engage in lifelong learning with the advances in Structural Engineering.

Module-1

Introduction and Analysis of Plane Trusses Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and non-linear analysis, Static and kinematic indeterminacies of structural systems, Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections.

8 Hours

Module-2

Definition of slope, Deflection and curvature, Sign conventions, Derivation of moment-curvature equation. Double integration method and Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple. Moment area method: Derivation, Mohr's theorems, Sign conventions, Application of moment area method for determinate prismatic beams, Beams of varying section, Use of moment diagram by parts. Conjugate beam method: Real beam and conjugate beam, conjugate beam theorems, Application of conjugate beam method of determinate beams of variable cross sections.

8 Hours

Module-3

Principle of virtual displacements, Principle of virtual forces, Strain energy and complimentary energy, Strain energy due to axial force, bending, shear and torsion, Deflection of determinate beams and trusses using total strain energy, Deflection at the point of application of single load, Castigliano's theorems and its application to estimate the deflections of trusses, bent frames, Special applications-Dummy unit load method.

8 Hours

Module-4

Three hinged parabolic arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels-Stiffening trusses for suspension cables.

8 Hours

Module-5

Influence Lines and Moving Loads: Concepts of influence lines-ILD for reactions, SF and BM for determinate beams-ILD for axial forces in determinate trusses-Reactions, BM and SF in determinate beams using rolling loads concepts.

8 Hours

Teaching-Learning Process:

1. Blackboard teaching/PowerPoint presentations (if needed)
2. Regular review of students by asking questions based on topics covered in the class.

Course Outcomes:

1. Evaluate the forces in determinate trusses by method of joints and sections.
2. Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods
3. Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames.
4. Determine the stress resultants in arches and cables.
5. Understand the concept of influence lines and construct the ILD diagram for the moving loads.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1.	Basic Structural Analysis	Reddy C S	Tata McGraw Hill	3 rd Edition
2.	Basic Structural Analysis	Muthu K U. etal,	IK International Pvt. Ltd	2 nd Edition
3.	Structual Analysis	Bhavikatti	Vikas Publishing House	3 rd Edition
Reference Books				
1	Structual Analysis	Hibbeler R C	Prentice Hall	9 th Edition
2	Structual Analysis	Devadoss Menon	NarosaPublishing House	2008
3	Structual Analysis	Prakash Rao D S,	University Press	2007

Semester: IV
Name of the Laboratory: TOTAL STATION LAB

Course Code	21CVL45	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Number of Pedagogy Hours	20	Total Marks	100
Credits	01	Exam Hours	03

List of Experiments:

SN	Experiments
1	Total Station, Parts of total station, Prism Reflector.
2	Instrument setup and Temporary adjustments of total station.
3	Distance and Angle measurement by using Total Station.
4	Determination of area using total station.
5	Traversing using total station.
6	Contouring using total station.
7	Determination of remote height using total station.
8	Distance, gradient, difference, height between two inaccessible points using total station.
9	Stake out using total station.

Course Outcomes:

After a successful completion of the course, the student will be able to:

1. Apply the basic principles of engineering surveying and measurements
2. Follow effective field procedures required for a professional surveyor
3. Use techniques, skills and advance surveying instruments necessary for engineering practice.
4. Measure distances, angles and area by using total station.
5. Use total station in the field of civil engineering land survey.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Surveying & levelling Vol. I ,II & III	B. C. Punmia	Laxmi Publications	17 th Edition (2016)
2	Surveying Vol.I& II	S. K. Duggal	McGraw Hill Education	4 th Edition (2017)

Semester: IV
Name of the Laboratory: Engineering Geology Laboratory

Course Code	21CVL46	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Number of Pedagogy Hours	20	Total Marks	100
Credits	01	Exam Hours	03

List of Experiments:

SN	Experiments
1	Evaluation of minerals based on physical properties for basic raw material for construction, industrial application
2	Investigation of rock based on physical, textural, and mineralogical properties for construction
3	Tests on aggregates (crushing, impact analysis, shape-elongation, flakiness as per IS Code 2386)
4	Dip and Strike problems. Determine Apparent dip and True dip.
5	Calculation of Vertical, True thickness and width of the outcrops.
6	Borehole problems: Determination of subsurface behavior of rocks, their attitude related to foundation, tunnels, reservoirs and mining. Triangular and Square methods.
7	Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc. (10 Maps)
8	Study of Topo sheets and Interpretation, Extraction of Drainage Basin and its Morphometric Analysis. (3 Toposheets)
9	Interpretation of Satellite Images. (2 Satellite images)

Course out comes:

At the end of the course, Students will be able to

1. Identify the minerals, rocks and utilize them effectively in civil engineering practices.
2. Assess the suitability of aggregates used in building construction.
3. Understand the geological conditions of the area for implementation of civil engineering projects.
4. Interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone
5. Apply the Geospatial technology in Civil Engineering.

Suggested Learning Resources:

1. Parbin Singh "Text book of Engineering and General Geology", Katson publication house, Ludhiana, 2009.
2. Mukerjee P.K "Text book of Geology", World press Pvt. Ltd. Kolkatta
3. Maruthesha Reddy, M.T. "Applied Engineering Geology", Subhas stores, Bangalore, 2013.

Reference Books:

1. MP Billings, Structural Geology, CBS Publishers and Distributors, New Delhi.
2. B.S. Satyanarayana Swamy, Engineering Geology Laboratory Manual, Dhanpat Rai Sons, New Delhi.
3. LRA Narayan, remote sensing and its applications, University Press.
4. P.K.MUKERJEE, Textbook of Geology, World Press Pvt. Ltd., Kolkatta
5. John I Platt and John Challinor, Simple Geological Structures, Thomas Murthy & Co, London.

Semester: IV
Course Name: SOFT SKILLS AND BASIC APTITUDE

Course Code	21SSA480	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:2:0	SEE Marks	50
Total Hours of Pedagogy	30	Total Marks	100
Credits	2	Exam Hours	02

Pre-requisites:

- Basic Conversational English
- Fundamentals of Mathematics
- Basic Knowledge of Reasoning

Module-1

Communication Skills

Basic Tools of Communication, Listening Skills, Body Language, Voice, Verbal Language, Conversations in Professional Setting **6 Hours**

Module-2

Presentation Skills

Zero Presentation, Individual Presentations, Feedback, Types of Introductions, Captivating the Audience, Interaction Methods, Signing off. **6 Hours**

Module-3

Verbal & Numerical Ability

Vocabulary is Fun, Root Words, Sentence Structures, Bouncing, Similar and Opposite Words, Common Errors, Number System, Factors and Multiples. **6 Hours**

Module-4

English Language

Phonetic and Non-phonetic Languages, sounds in English, IPA, Syllables, Word Stress, Stress patterns in Indian languages vs English, Pausing and Rhythm in English, Sentence Structures, Bouncing, Common Errors **6 Hours**

Module-5

Verbal Ability and Verbal Reasoning

Similar and Opposite words, Number and Alphabet Series, Human Relations, Direction Tests, Coding Decoding, Clocks and Calendars **6 Hours**

Teaching-Learning Process:

Pedagogy: Chalk, Talk, and e-presentation, Problem Solving and Exercises

Course Outcomes:

- CO1: Demonstrate communicative ability in a professional environment
 CO2: Articulate one's ideas and demonstrate them to an audience
 CO3: Transform one's English Vocabulary and Language Structure
 CO4: Interpret international phonetic symbols, stress patterns, and enhance English speech
 CO5: Identify patterns, determine the problem-solving process & validate solutions

Assessment Details

CIE:

	Components	Number	Weight age	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	1	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

Alternate Assessment Tool: 5-10 minute presentation (one on one-offline/online)

SEE

The SEE question paper will be set for 60 marks. The pattern of the question paper will be objective type (MCQ) and reduced to 50 marks.

60 objective questions in 120 minutes covering all modules.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Reasoning N' Reasoning-Verbal & Non-verbal Reasoning	Dr. Ravi Chopra	Galgotia	1994
2	Magical Book on Quicker Math	M. Tyra	BSC	I Edition, 2018
3	Communicate With Confidence	Diana Booher	McGraw Hill	Nov 2011
Reference Books				
1	Cambridge Advanced Learner's Dictionary	Cambridge University Press	CBS	IV Edition, 2013
2	A Modern Approach to Verbal and Non-verbal Reasoning	R S Agarwal	S Chand	II Edition, 2018
3	Word Power Made Easy	Norman Lewis	Goyal Publishers	IV Edition, 2014
4	Speak With Confidence	Diana Booher	McGraw Hill	I Edition, 2002

Semester: IV
Course Name: BIOLOGY FOR ENGINEERS

Course Code	21ABE481	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	2

Module-1

BIOMOLECULES AND THEIR APPLICATIONS (QUALITATIVE):

Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (DNA Vaccine for Rabies and RNA vaccines for Covid19, Forensics-DNA fingerprinting), Proteins (Proteins as food-whey protein and meat analogs, Plant based proteins), lipids (biodiesel, cleaning agents/detergents), Enzymes (glucose-oxidase in biosensors, lignolytic enzyme in bio-bleaching).

3 Hours

Module-2

HUMAN ORGAN SYSTEMS AND BIO DESIGNS-1 (QUALITATIVE):

Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics. Engineering solutions for Parkinson's disease). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signalling-ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).

3 Hours

Module-3

HUMAN ORGAN SYSTEMS AND BIO-DESIGNS-2 (QUALITATIVE):

Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology-COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems). Muscular and Skeletal Systems as scaffolds (architecture, mechanisms, bioengineering solutions for muscular dystrophy and osteoporosis).

3 Hours

Module-4

NATURE-BIOINSPIRED MATERIALS AND MECHANISMS (QUALITATIVE):

Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes-hemoglobin-based oxygen carriers (HBOCs) and per flour carbons (PFCs).

3 Hours

Module-5

TRENDS IN BIOENGINEERING (QUALITATIVE):

Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis. Self-healing Bio-concrete (based on bacillus spores, calcium lactate nutrients and bio-mineralization processes) and Bioremediation and Bio-mining via microbial surface adsorption (removal of heavy metals like Lead, Cadmium, Mercury, Arsenic).

3 Hours

Course Outcomes:

1. Elucidate the basic biological concepts via relevant industrial applications and case studies.
2. Evaluate the principles of design and development, for exploring novel bioengineering projects.
3. Corroborate the concepts of biomimetic for specific requirements.
4. Think critically towards exploring innovative bio-based solutions for socially relevant problems.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Human Physiology	Stuart Fox, Krista Rompolski	McGraw-Hill eBook	16 th Edition, 2022
2	Biology for Engineers	Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K	Tata McGraw-Hill	2012
3	Biology for Engineers	Arthur T. Johnson	CRC Press, Taylor and Francis	2011

4	Biomedical Instrumentation	Leslie Cromwell	Prentice Hall	2011
5	Biology for Engineers	Sohini Singh and Tanu Allen	Vayu Education of India	2014
6	Biomimetics: Nature-Based Innovation	Yoseph Bar-Cohen	CRC Press	1st Edition, 2012
7	Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies	D. Floreano and C. Mattiussi	MIT Press	2008
8	Bioremediation of heavy metals: bacterial participation	C R Sunilkumar, N Geetha A C Udayashankar Lambert	Academic Publishing	2019
9	3D Bioprinting: Fundamentals, Principles and Applications	Ibrahim Ozbolat	Academic Press	2016
10	Blood Substitutes	Robert Winslow	Elsevier	2005

Semester: IV
Course Name: CONCRETE TECHNOLOGY

Course Code	21ACV482	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	03

Module-1

CEMENT AND AGGREGATES

Cement, Chemical composition, Manufacture of cement, Hydration of cement, Types of cement, Tests on cement-Field tests. Fineness by Sieve test, Normal consistency, Setting time and Soundness.

Fine aggregates-Natural fine aggregate & M-sand-introduction and manufacturing.

Coarse aggregates-Importance of size, shape and texture & Grading of aggregates.

3 Hours

Module-2

FRESH PROPERTIES OF CONCRETE

Workability-Factors affecting workability, Measurement of workability-slump test, flow test, Compaction factor test and Vee-Bee Consistometer tests, Process of manufacture of concrete: Batching, Mixing, Transporting, Placing, Compaction, Curing, need and Types of curing, accelerated curing. Segregation and bleeding

3 Hours

Module-3

ADMIXTURES:

Chemical Admixtures-Plasticizers, accelerators, retarders and air entraining agents. Mineral admixtures-Fly ash, GGBS, silica fume, Metakaolin and rice husk ash.

MIX DESIGN: Concept of Concrete Mix design, variables in proportioning, exposure conditions, Procedure of mix design as per IS 10262-2019, Numerical examples of Mix Design on mix design for OPC concrete mixes and Mineral admixtures-Concrete mixes and high performance concrete.

3 Hours

Module-4

Hardened Properties:

Factors affecting strength, assessment of compressive strength, flexural strength, tensile strength.

W/C ratio, gel/space ratio, maturity concept, Shrinkage of concrete-plastic shrinking and drying shrinkage & factors affecting shrinkage of concrete.

3 Hours

Module-5

Durability and In-situ testing of Concrete:

Definition, Factors influencing durability. Sulphate attack, chloride attack, carbonation, freezing and thawing. Durability requirements as per IS-456.

In situ testing of concrete-Penetration and pull out test, rebound hammer test, ultrasonic pulse velocity, core extraction-Principal, applications and limitations.

Special Concretes: Introduction to special concretes and their applications

3 Hours

Course Outcomes:

At the end of the Course the Students will be able to:

1. Choose the materials used to make concrete; including their sources, and its characteristics.
2. Demonstrate the tests relevant to the application of concrete at laboratory and site.
3. Design the concrete mix as per IS code specifications.
4. Identify the durability properties & different in-situ tests of concrete.
5. Evaluate properties of concrete in fresh and hardened state

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Concrete Technology Theory and Practice	M.S.Shetty	S.Chand and Co, New Delhi	2002
2	Concrete Technology	Neivelle A.M and Brooks	J.J ELBS Edition, London Delhi,	4 th Edition 2004
3	Concrete Technology	SanthaKumar.A.R	Oxford University Press, New Delhi,.	2007
Reference Books				
1	Concrete Technology	Gambhir.M.L	Varchney. R.S., Concrete Technology, Oxford and IBH Publishers	1995
2	Design of Concrete Mixes,	Krishnaraju.N	Sehgal Educational Consultants & Publishers Pvt. Ltd., Faridabad	2002

Semester: IV

Course Name: Universal Human Values: Understanding Harmony and Ethical Human Conduct

Course Code	21UHV490	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	2

Module-1

Introduction to Value Education

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the Basic Human Aspirations, Happiness and Prosperity-Current Scenario, Method to Fulfill the Basic Human Aspirations

3 Hours

Module-2

Harmony in the Human Being

Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

3 Hours

Module-3

Harmony in the Family and Society

Harmony in the Family-the Basic Unit of Human Interaction, 'Trust'-the Foundational Value in Relationship, 'Respect'-as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order

3 Hours

Module-4

Harmony in the Nature/Existence

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

3 Hours

Module-5

Implications of the Holistic Understanding-a Look at Professional Ethics

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

3 Hours

Course Outcomes:

- CO.1 Develop personality with responsibilities and self-respect.
- CO.2 Build real world skills like communication, lifelong-learning and problem-solving.
- CO.3 Create harmonious relationship among faculty and students.
- CO.4 Provide an organized philanthropic service to the society through activities.
- CO.5 Create awareness on health, yoga, human relationships, universal peace, environment, society and nation.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	A Foundation Course in Human Values and Professional Ethics, R	R Gaur, R Asthana, G P Bagaria,	Excel Books, New Delhi,	2nd Revised Edition, 2019. ISBN 978-93-87034-47-1
2	The Teachers Manual For A Foundation Course in Human Values and Professional Ethics, R	R Gaur, R Asthana, G P Bagaria,		

Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth-by Mohandas Karamchand Gandhi
5. Small is Beautiful-E. F Schumacher.
6. Slow is Beautiful-Cecile Andrews
7. Economy of Permanence-J C Kumarappa
8. Bharat Mein Angreji Raj-Pandit Sunderlal
9. Rediscovering India-by Dharampal
10. Hind Swaraj or Indian Home Rule-by Mohandas K. Gandhi
11. India Wins Freedom-Maulana Abdul Kalam Azad
12. Vivekananda-Romain Rolland (English)
13. Gandhi-Romain Rolland (English)
14. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
15. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth-Club of Rome's report, Universe Books.
16. A Nagaraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
17. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
18. A. N Tripathy, 2003, Human Values, New Age International Publishers.
19. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
20. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
21. M Govindrajan, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
23. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Semester: IV
Course Name: ADDITIONAL MATHEMATICS-II

Course Code	21MATDIP41	CIE Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	-
Total Hours of Pedagogy	40	Total Marks	100
Credits	0	Exam Hours	-

Pre-requisites:

- Differentiation
- Integration
- Trigonometric formulae
- Differential equations

Module-1

Higher Order ODE's

Linear Differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators.[Particular integral restricted to $\phi(x) = e^{ax}, \sin ax, \cos ax$ for $f(D)y = \phi(x)$

Self-Study: Finding particular Integral for $\phi(x) = x^m$

8 Hours

Module-2

Partial Differential Equations (PDE's):

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct by integration. Homogeneous PDE involving derivative with respect to one independent variable only.

Self-Study: Method of separation of variables

8 Hours

Module-3

Laplace Transform:

Definition, Laplace transforms of elementary functions. Laplace transform of $e^{at}f(t), t^n f(t)$ (without proof). Laplace transform of Periodic functions (statement only) and Unit-step function-problems.

Inverse Laplace Transform: Definition, Inverse Laplace Transform of standard functions. Inverse transform by Partial Fraction Method. Apply the concepts of Laplace Transforms to find the solution of linear differential equations.

Self-Study: Convolution Theorem

8 Hours

Module-4

Numerical Methods:

Solution of algebraic and transcendental equations by Newton-Raphson method and Secant method.

Interpolation: Newton's Forward and Backward Interpolation formulae, Newton's divided difference formula, Lagrange's Interpolation formula-problems.

Numerical Integration: Simpson's 1/3rd and 3/8th rule (without proof)-problems.

Self-Study: Weddle's Rule

8 Hours

Module-5

Probability:

Introduction, sample space and events. Axioms of probability. Addition & multiplication theorems. Conditional probability, Bayes' theorem. Problems.

Self-Study: Applications Bayes' theorem

8 Hours

Course outcomes:

Upon completion of this course, student will be able to,

1. Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
2. Construct a variety of partial differential equations and solution by various methods.
3. Use Laplace Transform and inverse Laplace Transform in solving differential /integral equation arising in network analysis, control systems and other fields of engineering
4. Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
5. Use the concepts of probability in different probability distribution.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint).2016
3	Additional Mathematics-2	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed., 2019.
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11 th Edition.2010

SUGGESTED TEACHING LEARNING PROCESS

The faculty members are suggested to use appropriately the following Teaching Learning methods:

1. Active Learning
2. Chalk and Board for Numerical
3. Demonstration using simulator
4. Laboratory Demonstrations
5. Power Point Presentations
6. Problem based learning
7. Video Lecturers

Assessment Details

1. Integrated professional Core Courses (IPCC): CIE for the Theory component of IPCC: 30 Marks

	Components	Number	Weightage	Max. Marks
1	Tests (A)	3	60%	18
2	Alternate Assessment Tools(AAT) (B)	3	40%	12
X	Total Marks for theory component A+B			30

CIE for the LAB component of IPCC: 20 Marks

	Components	Weightage	Max. Marks
1	Lab Work: Conduction of Experiments (A)	40%	08
2	Lab Journal Writing & Submission (B)	10%	02
3	Lab Test (C)	30%	06
4	Open-Ended Experiments / Course Projects (D)	20%	04
Y	Total Marks		20

Final Marks for IPCC Courses = X + Y = 30 + 20 = 50

SEE for IPCC Theory for **3 Hourss** duration

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module. The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component)
- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks-20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

2. Professional Core / Basic Science Courses (PCC / BSC) Theory:

Continuous Internal Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B) = 30 + 20 = 50

Semester End Examination (SEE)

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE.
- Marks secured will be scaled down to 50.

3. Professional Core Course (PCC) Lab:

Continuous Internal Evaluation (CIE):

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments (D)	20%	10
	Total Marks: A+B+C+D		50

Semester End Evaluation (SEE):

1. All laboratory experiments are to be included for practical examination
2. Students can pick one experiment from the lot with equal choice to all the students in a batch.
3. Change of experiment is allowed only once and 15% marks allotted to the procedure part to be made zero.
4. **Marks distribution: Procedure (15%) + Execution (70%) + Viva Voce (15%)**

Semester End Evaluation (SEE) for MC lab

1. All laboratory experiments (Part A and Part B) are to be included for practical examination
2. Students can pick one experiment from the questions lot of Part A with equal choice to all the students in a batch.
3. Weightage of marks for Part A is 50% and Part B is 50%
4. Change of experiment is allowed only once for Part A and Part B. 15% marks allotted to the procedure part to be made zero.
5. Marks distribution: Procedure (15%) + Execution (70%) + Viva voce (15%)

4. Ability Enhancement Course (AEC):

Assessment Details of CIE

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools (AAT) (B)	3	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

SEE Guidelines for the Courses

1. 21ACS38-Unix and Shell Programming
2. 21ACS482-R Programming
3. 21ACS483-Web Designing
1. The pattern of the question paper consists of 5 Modules.
2. Each Module contains two questions where student needs to answer ONE full question from each module.
3. The time allotted for SEE is 02 hours

5. SEE Guidelines for the Courses

- a. 21CIP37/47-Constitution of India, professional Ethics and Cyber Law
- b. 21DTI39-Design Thinking and Innovation
- c. 21SSA480-Soft Skills and Basic Aptitude
- d. 21ABE481-Biology for Engineers
- e. 21UHV490-Universal Human Values

1. SEE will be conducted with common question papers for the subject.
2. SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 100 marks which will be scaled down to 50 marks.
3. Duration of the examination is 02Hours

For the Courses

- a. 21MATDIP31 / 41-Additional mathematics I and II
- b. 21KSK37/47-Samskrutika Kannada
- c. 21KBK37/47-Balake Kannada

Continuous Internal Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	60
(ii)	Alternate Assessment Tools(AAT) (B)	3	40%	40
	Total Marks			100

There is no SEE for the above Courses

Suggested Alternate Assessment Tools for PCC, IPCC and AEC Courses:

1. Quiz
2. Assignments
3. Seminars / Presentations
4. Paper Publications
5. Mini Projects
6. MOOCs
7. Industrial Visits and Report Writing
8. Self-learning with Certifications and
9. Cooperative and problem based learning.

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BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

BoS MEETING INVITATION

Date: 15/09/2022

By the direction of Dean Academics and Principal BITM Ballari, a meeting of Board of Studies is scheduled on **17/09/2022 at 10:30 AM** [On-line] to finalize the Scheme and Syllabus for the subjects of **B.E. III & IV Semester** Computer Science & Engineering and Artificial Intelligence & Machine Learning. The details about the Meeting link and draft syllabus is already shared to your official mail Id. Faculty members having more than **5 Years of Experience** are requested to make it convenient to attend the meeting.

Name of the Faculty	Signature	Name of the Faculty	Signature
Dr. B. M. Vidyavalk		Pratibha Mishra	
Dr. Navin K. Raj		Shwethashree A.	
Dr. Rajshree V. Bihade		Sreenivasa M	
Dr. Muhibur Rahman		Sheetal J.	
DR. SURESH Y		Vedavyas J	
Dr. Girish Kumar		Saisaila Naith	
A. Venkateshwar		SRIDHAR S.R.	
P. Patil same person			
C. K. Sridivas			
Usman S			
Sudhakar A.			
Dadapoo			
M. D. Shafiqulla			
Vishwaksha Gowd			
Harikrishna			
V. Chandrasekhar			
KIRAN MUDARADDI			
Sunitha D V			
Anita S. Patil			

Head of the Department,
 Dept. of Computer Science & Engg
 Ballari Institute of Technology & Management
 (formerly Bellary Engineering College)
 BELLARY

15/09/2022
 Dr. R N Kulkarni
 Chairmen BoS
 CSE & AIML

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROCEEDINGS OF 2nd BOARD OF STUDY MEETING HELD ON 17/09/2022 @ 10:30 AM


Dated: 17/09/2022

Venue / Mode: ONLINE

Time: 10:30 AM

Members Present

S. No.	Name of the Member	Designation	Organization
1	Dr. R N Kulkarni	Chairman	Professor & Head CSE - B.I.T.M. Ballari
2	Faculty Members with different specializations	Members	CSE & AIML Departments
3	Dr. Rajan M A	Member	Research Scientist & CTO ISM Core Group, TCS Research, TCS
4	Dr. Umakanth Kulkarni	Member	Professor & Head, CSE Department, SDMCET, Dharwad
5	Dr. Bharati Harsoor	Member	Professor & Head, ISE Department, PDACE Kalburgi
6	Dr. Basavaraj S Anami	Member	Principal, KLE Institute of Technology, Hubballi
7	Mr. Vijay Kaggal	Member	Chief Strategy Officer, SLK Bengaluru
8	Mr. Sundar K S	Member	Associate Vice – President, IMS Academia, Infosys Ltd., Mysuru
9	Smt. K Triveni	Member	Manager, JSW Torangallu
10	Mr. Suneet Patil	Member	Conversational AI Lead, EVERY India,
11	All faculty of CSE / AI&ML departments	Members	Ballari Institute of Technology & Management, Ballari.


Head of the Department,
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BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

At the outset, the Chairman welcomed all the Honorable members for the 2nd meeting of Board of Studies (UG) for discussing and finalizing the Scheme and Syllabus for B.E. III & IV Sem. for year common to CSE & AI & ML Branches. The subjects proposed for BE III & IV Sem. are:

B.E. III Sem. CSE / AI & ML

S N	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SE E	Total
01	IPCC	21CS32	Object Oriented Programming using Java	Concerned Department	Concerned Department	3	0	2	4	3	50	50	100
02	PCC	21CS33	Data Structures and Applications	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
03	PCC	21CS34	Digital Systems Design and Computer Organization	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
04	PCC	21CSL35	Data Structures and Applications Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
05	PCC	21CSL36	Digital Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
06	AEC	21ACS38	Unix and Shell Programming	Concerned Department	Concerned Board	1	0	0	1	2	50	50	100

B.E. IV Sem. CSE / AI & ML

SN	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	IPCC	21CS42	Software Engineering	Concerned Department	Concerned Department	3	0	2	4	3	50	50	100
02	PCC	21CS43	Design And Analysis Of Algorithms	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
03	PCC	21CS44	Microcontroller And Embedded Systems	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100
04	PCC	21CSL45	Design And Analysis Of Algorithms Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
05	PCC	21CSL46	Microcontroller and Embedded Systems Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100
06	AEC	21ACS48 X	Biology for engineers / Department specific Ability Enhancement Course	Chemistry/ Physics/ Concerned Department	Concerned Board	0	0	2	1	2	50	50	100
						For AEC as lab course							
						1	0	0					
						For AEC as theory course							

Agenda I:

To consider and approve the Scheme and Syllabus for the following courses of B.E. III & IV Sem. CSE and AIML

BE III Sem. Courses

1. Object Oriented Programming using Java - 21CS32
2. Data Structures and Applications – 21CS33
3. Digital Systems Design and Computer Organization – 21CS34
4. Data Structures and Applications Lab – 21CSL35
5. Digital Lab – 21CSI36
6. Unix and Shell Programming – 21ACS38

Object Oriented Programming Using Java – 21CS32	Suggestions	<ul style="list-style-type: none"> • Suggested to change the Title of the course from Object Oriented Concepts to Object Oriented Programming Java • Implement the Concepts using Java or Python • Courses hosted on Infosys Spring Board may be considered as supplementary reference material • Demonstrate and Implement the Inheritance concepts using some real life examples
	Action Taken	<ul style="list-style-type: none"> • Course title is changed to Object Oriented Programming using Java. • Concepts are implemented using Java programming
Data Structures and Applications – 21CS33	Suggestions	<ul style="list-style-type: none"> • Working principles and applications of different data structures in Business scenarios need to be discussed • Design and development of programs based on Experiential Learning
	Action Taken	<ul style="list-style-type: none"> • Suggestions are to be incorporated during the delivery of the course contents. • Suggested to use Infosys Spring Board platform for Alternate Assessment.
Digital Systems Design and Computer Organization – 21CS34	Suggestions	<ul style="list-style-type: none"> • Shift Registers to be included • VHDL should be taught in Lab
	Action Taken	Suggestions are incorporated in the syllabus and the delivery methods
Data Structures and	Suggestions	<ul style="list-style-type: none"> • Design separate exercise for all the concepts
	Action Taken	Suggestions are incorporated and the contents are modified.


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Applications Lab – 21CS135		
Digital Lab – 21CS136	Suggestions	<ul style="list-style-type: none"> No Suggestions
	Action Taken	--
Unix and Shell Programming – 21ACS38	Suggestions	<ul style="list-style-type: none"> Introduce a Lab component
	Action Taken	<ul style="list-style-type: none"> Suggestion is incorporated and the teaching methodology is changed.
<u>BE IV Sem. Courses</u>		
21ACS48X	Biology for engineers / Department specific Ability Enhancement Course	
Software Engineering – 21 CS42	Suggestions	<ul style="list-style-type: none"> Arrange workshop on Agile Methods Introduce tools for testing
	Action Taken	<ul style="list-style-type: none"> Suggestions will be incorporated
Design And Analysis Of Algorithms – 21CS43	Suggestions	<ul style="list-style-type: none"> Include some concepts from Art of Computer Programming Book Use optimization techniques
	Action Taken	<ul style="list-style-type: none"> Suggestions will be incorporated during the delivery of the syllabus
Microcontroller And Embedded Systems – 21CS44	Suggestions	No Suggestions
	Action Taken	--
Design And Analysis Of Algorithms Lab – 21CS135	Suggestions	<ul style="list-style-type: none"> Identify appropriate technique for the given problem Perform priority Analysis
	Action Taken	Suggestions will be incorporated during the delivery of the Lab experiments
Microcontroller and Embedded Systems	Suggestions	No Suggestions
	Action Taken	--

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Lab 21CS136		
Biology for engineers / Departmen t specific Ability Enhancem ent Course - 21ACS48X	Suggestions	No Suggestions
	Action Taken	--
Overall Suggestions		The following points were suggested by the Members: 1. To teach the subject in a Blended mode, preferably in the Lab. 2. Suggested to make changes in the Objectives and Course Outcomes.
Action Taken		<ul style="list-style-type: none"> Objectives and Outcomes are appropriately modified as per the suggestions Regarding teaching the course in a Blended mode, the contents will be discussed with the faculty and appropriate steps will be taken.

Signature of the Members

S. No.	Name of the Member	Designation	Signature
1	Dr. R N Kulkarni	Chairman	<i>[Signature]</i>
2	Dr. Rajan M A	Member	ONLINE
3	Dr. Umakanth Kulkarni	Member	ONLINE
4	Dr. BharatiHarsoor	Member	ONLINE
5	Dr. Basavaraj S Anami	Member	ONLINE
6	Mr. Vijay Kaggal	Member	--
7	Mr. Sundar K S	Member	ONLINE
8	Smt. K Triveni	Member	ONLINE
9	Mr. SuneetPatil	Member	ONLINE

[Signature]

Head of the Department,
Dept. of Computer Science & Engg
Ballari Institute of Technology & Management
(formerly Bellary Engineering College)
BALLARI



BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

10			
11	Dr. Rajashree V. Biradar	Professor	<u>Rajshree</u>
12	Dr. B. M. Vidyavathi	Prof. & Head	<u>Vidyavathi</u>
13	Dr. Anadhana D	Prof	<u>Anadhana</u>
14	Dr. Aniladas Patil	Assoc. Prof	<u>Aniladas</u>
15	Dr. GIRISH. KUMAR	Assoc. Prof	<u>Girish</u>
16	Usman S	Asst. Prof	<u>Usman</u>
17	Md. Shafiqulla	Asst. Prof.	<u>Shafiqulla</u>
18	Srisaile Nath	Asst. Prof.	<u>Srisaile</u>
19	C.K. Srinivas	Asst. Prof	<u>Srinivas</u>
20	A. Venkateshwar	Asst. Prof	<u>Venkateshwar</u>
21	T.M. HAYATH	Asst. Prof	<u>Hayath</u>
22	Sudhakar. A	Asst. Prof	<u>Sudhakar</u>
23	Virepaksha Gowde	Asst. Prof	<u>Virepaksha</u>
24	Pratibha Mishra	Asst. Prof	<u>Pratibha</u>
25	Sreenivasa. H	Asst. Prof	<u>Sreenivasa</u>
26			
27			
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33			

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Semester IV

SN	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks				
						L	T	P			CIE	SEE	Total		
01	BSC	21MCS41	Maths-4	Mathematics	Mathematics	3	0	0	3	3	50	50	100		
02	IPCC	21CS42	Software Engineering	Concerned Department	Concerned Department	3	0	2	4	3	50	50	100		
03	PCC	21CS43	Design And Analysis Of Algorithms	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100		
04	PCC	21CS44	Microcontroller And Embedded Systems	Concerned Department	Concerned Department	3	0	0	3	3	50	50	100		
05	PCC	21CSL45	Design And Analysis Of Algorithms Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100		
06	PCC	21CSL46	Microcontroller and Embedded Systems Lab	Concerned Department	Concerned Department	0	0	2	1	3	50	50	100		
07	HS	21KSK37/47	Sanskritika Kannada	HSMC	HSMC	1	0	0	1	--	100	---	100		
		21KKB37/47	Balake Kannada												
	OR														
	HS	21CIP37/47	Constitution of India, professional Ethics and Cyber Law						2	50	50				
08	AEC	21SSA480	Soft skills and basic aptitude	Humanities	Humanities	1	2	0	2	2	50	50	100		
09	AEC	21ACS48X	Biology for engineers / Department specific Ability Enhancement Course	Chemistry/ Physics/ Concerned Department	Concerned Board	0	0	2	1	2	50	50	100		
						For AEC as lab course									
						1	0	0							
						For AEC as theory course									
10	UIV	21UHV490	Universal Human Values	Concerned Department	ANY DEPT.	1	0	0	1	2	50	50	100		
11	INT	21INT491	Internship - I	Evaluation By the appropriate authorities		Completed during the inter			2	---	100	--	100		
Total													600/650	500/50	1100
Course prescribed to lateral entry Diploma holders admitted to III semester B.E. Program															
12	NGM C	21MATDIP 41	Additional Mathematics - I	Mathematics	-	3	0	0	0	-	100	-	100		

Ability Enhancement Course

01	21ABE481	Biology for Engineers
02	21ACS482	R Programming
03	21ACS483	Web Designing

Internship - I (21INT491):

All the students admitted to engineering programmes shall have to undergo a mandatory internship-I of 03 weeks during the intervening vacation of II and III semesters. All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory internship-I of 03 weeks during the intervening period of III and IV semesters. Internship-I shall include Inter / Intra Institutional activities. A Viva-voce examination (Presentation followed by question-answer session) shall be conducted during IV semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent examinations after satisfying the internship requirements The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card.

[Signature]
Head of the Department,

Dept. of Computer Science & Engg
Ballari Institute of Technology & Management
(formerly Bellary Engineering College)

RELIARY

Semester: III

Course Name: FOURIER TRANSFORM, NUMERICAL METHODS AND DISCRETE MATHEMATICAL STRUCTURES

Course Code	21MCS31	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Pre-requisite(s):

1. Integration by parts using Bernolli's rule.
2. First order Ordinary Differential Equations.
3. Propositions, construction of truth tables for different logical connectives.
4. Definition of set, operations on sets.
5. Definitions of different types of functions.

Module – 1

Infinite Fourier Transforms: Infinite Fourier transforms, definition, Fourier Sine and Cosine transforms. Inverse Fourier transforms, Inverse Fourier Cosine and Sine transforms and Problems.
Self-Study: Leibnitz rule for differentiation under integral sign. 8 Hours

Module - 2

Numerical Solution of first-Order ODEs
 Taylor's series method, Modified Euler's method, Runge-Kutta method of order four, Milne's predictor and corrector formula, Adam's-Bashforth formula. (all methods without Derivations)
Self-Study: Solution of ODE using Picard's method. 8 Hours

Module – 3

Logical Connectives: Disjunction, Conjunction, Negation, Exclusive Disjunction. Conditional and Bi-conditional statements. Laws of logic, Tautologies and contradictions, Logical Equivalence, Duality, Converse, inverse and contra positive. Rules of inference, open statements and Quantifiers.
Self-Study: Logical gates. 8 Hours

Module – 4

Relations: Definition of a relation, Matrix of a relation, Diagraph of a relation. Union/intersection of relations. Complement of a relation. Connectivity relation, inverse of a relation, composition of a relation. Properties of relation. Equivalence relation (Theorems on Equivalence Relations) Partial ordered relation and poset. Least upper bound and greatest lower bound. Extremal elements of a poset, Hasse diagram.
Self-Study: Lattices. 8 Hours

Module – 5

Functions and Recurrence relations: Compositions of functions (Theorems on Composition functions), Invertible functions (Theorems on Invertible functions). Permutation functions. Recurrence relations. First order recurrence relation, Second order homogeneous recurrence relation, higher order linear homogeneous recurrence relation, Non-homogeneous recurrence relations.
Self-Study: Generating functions. 8 Hours

Course Outcomes:

Upon completion of this course, student will be able to:

1. Demonstrate the Fourier transform to study the behavior of periodic functions and their applications in system communications, Analysis and design of algorithms.
2. Solve first order ODE's arising in engineering problems using single step numerical methods
3. Apply the concepts of logic for effective computation and relating problems in the Engineering domain.
4. Analyze the concepts of relations to various fields of Engineering.
5. Apply the concepts of functions and recurrence relations in the context of various fields of Computer Science Engineering, like, Database, finite Automata and formal languages, Compilers etc...

Re: Request to Approve the syllabus of B.E. 4 Year (H & R) Tech. Computer Science & Engineering & Artificial Intelligence & Machine Learning Based.

Dr. S. Kulkarni, s.kulkarni@nitrrs.edu

NITRRS, Durgam

To: Suresh K S, sureshk@sivcega.com; Dr. B. Kulkarni, b.kulkarni@sivcega.com; Dignity S, digdignity@gmail.com

Approved

With Regards

Dr. Suresh K S

Professor, Department of IT

SIET, College of Engineering and Technology

(Durgam), Hyderabad-500 082

Mob: 9848911200

Dr. Suresh K S, sureshk@sivcega.com; Dr. B. Kulkarni, b.kulkarni@sivcega.com; Dignity S, digdignity@gmail.com

Dr. Suresh K S

Approved

Suresh K S

Dr. Suresh K S

Suresh K S, sureshk@sivcega.com; Dr. B. Kulkarni, b.kulkarni@sivcega.com

Dr. Suresh K S

Suresh K S, sureshk@sivcega.com

Dr. Suresh K S, sureshk@sivcega.com

Dr. Suresh K S

Suresh K S, sureshk@sivcega.com

Dr. Suresh K S

Dr. Suresh K S

Dr. Suresh K S

Dr. Suresh K S

Dr. Suresh K S, sureshk@sivcega.com

Dr. Suresh K S, sureshk@sivcega.com

From: Suresh K S, sureshk@sivcega.com

Date: Monday, September 16, 2023, 2:16 PM

To: Suresh K S, sureshk@sivcega.com; Dr. B. Kulkarni, b.kulkarni@sivcega.com; Suresh K S, sureshk@sivcega.com



Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

umakant kulkarni <upkulkarni@yahoo.com>

Mon 26-Sep-22 2:02 PM

To: Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; Rajan A <rajan.ma@tcs.com>

Approved

With Regards

Dr. Umakant P.Kulkarni

Professor, Department of CSE,

SDM College of Engineering and Technology,

Dhavalagiri, Dharwad-580 002.

Mob: 09448915301

On Monday, September 26, 2022 at 01:54:15 PM GMT+5:30, Rajan A <rajan.ma@tcs.com> wrote:

TCS Confidential

Approved.

Thanks & Regards

Dr. Rajan M A

Research Scientist and CTO ISM core Group,

TCS Research

Tata Consultancy Services

18, SJM Towers, Sheshadri Road,

Gandhinagar,

Bangalore - 560009, Karnataka

India

Ph:- 080 67247961

Buzz:- 4847961

Cell.- +91 9480319023

Mailto: rajan.ma@tcs.com

Website: <http://www.tcs.com>

From: Rajan A <rajan.ma@tcs.com>

Sent: Monday, September 26, 2022 1:25 PM

To: Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Rajan A <rajan.ma@tcs.com>

Mon 26-Sep-22 1:52 PM

To: Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

TCS Confidential

Approved.

Thanks & Regards

Dr. Rajan M A

Research Scientist and CTO ISM core Group,
TCS Research

Tata Consultancy Services

18, SJM Towers, Sheshadri Road,

Gandhinagar,

Bangalore - 560009, Karnataka

India

Ph:- 080 67247961

Buzz:- 4847961

Cell:- +91 9480319023

Mailto: rajan.ma@tcs.comWebsite: <http://www.tcs.com>

From: Rajan A <rajan.ma@tcs.com>**Sent:** Monday, September 26, 2022 1:25 PM**To:** Sundar K S <sundarks@infosys.com>; Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>**Subject:** Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Approved.

Thanks & Regards

Dr. Rajan M A

Research Scientist and CTO ISM core Group,
TCS Research

Tata Consultancy Services

18, SJM Towers, Sheshadri Road,

Gandhinagar,


Bangalore - 560009, Karnataka

India

Ph:- 080 67247961

Buzz:- 4847961

Cell:- +91 9480319023

Mailto: rajan.ma@tcs.comWebsite: <http://www.tcs.com>
Head of the Department,
Dept. of Computer Science & Engg
Baltan Institute of Technology & Management
(formerly Bellary Engineering College)
BELLARY

From: Sundar K S <sundarks@infosys.com>
Sent: Monday, September 26, 2022 12:47 PM
To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; Rajan A <rajan.ma@tcs.com>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>
Subject: RE: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

"External email. Open with Caution"

Approved

Thanks and Regards,
Sundar KS
ETA, Infosys Mysore.

-----Original Message-----

From: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>
Sent: Monday, September 26, 2022 12:41 PM
To: rajan.ma@tcs.com; Sundar K S <sundarks@infosys.com>; upkulkarni@yahoo.com
Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

[**EXTERNAL EMAIL**]

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Dear Sir / Madam,
 As per the discussion held in the Second Board of Studies meeting of Computer Science & Engineering & Artificial Intelligence & Machine Learning Board on 17/09/2022 @10:00AM, I am herewith attaching the Final copy of the Syllabus after incorporating all the necessary suggestions.
 I request you to kindly go through the syllabus for both theory and lab and approve the same.

Kind Regards

Dr. R N Kulkarni

TCS Confidential

=====

Notice: The information contained in this e-mail message and/or attachments to it may contain confidential or privileged information. If you are

Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

bharati a jeergi <bharati_a@rediffmail.com>

Sat 24-Sep-22 2:20 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Dear Sir,

I have gone thru in detail the content of the syllabus, it is good and can be approved.

Thanks & Regards

Dr Bharati Harsoor

Professor, ISE Dept

PDA College of Engg, kalaburgi

From: "Dr. R N Kulkarni" <rnkulkarni@bitm.edu.in>

Sent: Sat, 24 Sep 2022 13:28:09

To: "Dept. of CSE" <csestaff@bitm.edu.in>, "anami_basu@hotmail.com" <anami_basu@hotmail.com>, Sundar K S <sundarks@infosys.com>, "rajan.ma@tcs.com" <rajan.ma@tcs.com>, "Vijay C. Kaggal" <vijay.kaggal@slkgroup.com>, "mailtosuneetpatil@gmail.com" <mailtosuneetpatil@gmail.com>, Triveni Kakimani <triveni.kakimani@gmail.com>, "bharati_a@rediffmail.com" <bharati_a@rediffmail.com>, "upkulkarni@yahoo.com" <upkulkarni@yahoo.com>

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

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Kind Regards

Dr. R N Kulkarni



Head of the Department,
Dept. of Computer Science & Engg
Ballari Institute of Technology & Management
(formerly Bellary Engineering College)
BELLARY

RE: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Sundar K S <sundarks@infosys.com>

Mon 26-Sep-22 12:47 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>; rajan.ma@tcs.com <rajan.ma@tcs.com>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

Approved

Thanks and Regards,
Sundar KS
ETA, Infosys Mysore.

-----Original Message-----

From: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Sent: Monday, September 26, 2022 12:41 PM

To: rajan.ma@tcs.com; Sundar K S <sundarks@infosys.com>; upkulkarni@yahoo.com

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

[**EXTERNAL EMAIL**]

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

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Kind Regards

Dr. R N Kulkarni

Head of the Department,
Dept. of Computer Science & Engg
Ballari Institute of Technology & Management
(Formerly Bellary Engineering College)
BELLARY

<https://outlook.office.com/mail/inbox/id/AAQkADdI0DIIZjM0LTVkOWQINDM4NC1hN2FmLTEwNjM1N2I2Mjg3MAAQAPmzxEOLB8iDpugizxVtVv4%3D> 1/1

Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Suneet Patil <mailto:suneetpatil@gmail.com>

Sat 24-Sep-22 1:41 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Hi Sir,

Syllabus looks good and approved from my side.

Note: I see last few emails I received is going spam so I missed it. Please check why it is going spam folders.

Thanks,
Suneet

On Sat, 24 Sep 2022 at 12:45 PM, Dr. R N Kulkarni <rnkulkarni@bitm.edu.in> wrote:

Dear Sir / Madam,

As per the discussion held in the Second Board of Studies meeting of Computer Science & Engineering & Artificial Intelligence & Machine Learning Board on 17/09/2022 @10:00AM, I am herewith attaching the Final copy of the Syllabus after incorporating all the necessary suggestions. I request you to kindly go through the syllabus for both theory and lab and approve the same.

Kind Regards

Dr. R N Kulkarni



Head of the Department,
Dept. of Computer Science & Engg
Ballari Institute of Technology & Management
(formerly Bellary Engineering College)
BELLARY



Re: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Basavaraj Anami <anami_basu@hotmail.com>

Sat 24-Sep-22 5:39 PM

To: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Dear Sir,

I hereby approve the syllabus. This is for your kind information.

with regards

Prof. Anami

From: Dr. R N Kulkarni <rnkulkarni@bitm.edu.in>

Sent: Saturday, September 24, 2022 7:15 AM

To: Dept. of CSE <csestaff@bitm.edu.in>; anami_basu@hotmail.com <anami_basu@hotmail.com>; Sundar K S <sundarks@infosys.com>; rajan.ma@tcs.com <rajan.ma@tcs.com>; Vijay C. Kaggal <vijay.kaggal@silkgroup.com>; mailtosuneetpatil@gmail.com <mailtosuneetpatil@gmail.com>; Triveni Kakimani <triveni.kakimani@gmail.com>; bharati_a@rediffmail.com <bharati_a@rediffmail.com>; upkulkarni@yahoo.com <upkulkarni@yahoo.com>

Subject: Request to Approve the Syllabus of B.E. II Year [III & IV Sem.] Computer Science & Engineering & Artificial Intelligence & Machine Learning Board

Dear Sir / Madam,

As per the discussion held in the Second Board of Studies meeting of Computer Science & Engineering & Artificial Intelligence & Machine Learning Board on 17/09/2022 @10:00AM, I am herewith attaching the Final copy of the Syllabus after incorporating all the necessary suggestions.

I request you to kindly go through the syllabus for both theory and lab and approve the same.

Kind Regards

Dr. R N Kulkarni



Head of the Department,
Dept. of Computer Science & Engg
Ballari Institute of Technology & Management,
(formerly Bellary Engineering College)
BELLARY



Sadyojatha k.m. <saddukm@gmail.com>

**PROCEEDINGS OF 2nd BOARD OF STUDY MEETING, E&CE, BITM,
Ballari Regarding..**

5 messages

Sadyojatha k.m. <saddukm@gmail.com>

Fri, Sep 23, 2022 at 10:34 AM

To: prrjntu@gmail.com, sskul <sskul@pes.edu>, dschalam.ece@bmsce.ac.in,
ishwarayya.m@gmail.com, sridhar r <rsri011@gmail.com>

Dear Sir,

I am very much thankful for attending the 2nd Online BOS meeting of E&CE Department, BITM, Ballari, conducted on 14/09/2022.

I am herewith attaching the Minutes of the Meeting (MOM) and the Modified Syllabus for B.E. 2nd year of **Electronics & Communication Engineering (E&CE)** for your approval.

The suggestions of the honorable members are well taken and the content of the syllabus is modified accordingly.

Kindly approve the same through the reply mail.

Thanking You,

Regards,

Dr.Sadyojatha K M
Professor & HOD, Dept of E&CE,
Ballari Institute of Technology and Management
Bellary - Hospet Road , Near Allipur, Bellary , Karnataka
Mb :9448020788

Res:# Ananya,Plot 66, Bhuvanagiri,Siruguppa Road,
Bellary 583103

3 attachments

 **ECE_BOS Meeting MOM for Syllabus approval_2022.pdf**
851K

 **3rd Sem BITM_ECE Draft Syllabus-2022.pdf**
1960K

 **4th Sem BITM_ECE Draft Syllabus_2022.pdf**
2194K

SESHACHALAM D <dschalam.ece@bmsce.ac.in>
To: "Sadyojatha k.m." <saddukm@gmail.com>

Fri, Sep 23, 2022 at 10:42 AM

Dear Professor I am according the approval for the syllabus discussed and corrections attached

With regards
Dr Seshachalam
Professor, Department of ECE
BMS College of Engineering
Bangalore-19

[Quoted text hidden]

Fri, Sep 23, 2022 at 10:58 AM

PESIT Bangalore South Campus <sskul@pes.edu>

To: "Sadyojatha k.m." <saddukm@gmail.com>

Cc: prrjntu@gmail.com, dschalam.ece@bmsce.ac.in, ishwarayya.m@gmail.com, sridhar r <rsri011@gmail.com>

Dear Dr. Sadyojatha,
I approve the revised content. Please go ahead.

Note: Please see if you can align the content of Math Subject to your curriculum needs.

Best Regards

Dr. Subhash S Kulkarni,
Principal,
PESIT - Bangalore South Campus,
Hosur Road, 1Km Before Electronic City,
Bangalore - 560100
Karnataka, India
Ph: 080 - 66186601
<http://pesitsouth.pes.edu>

On Fri, Sep 23, 2022 at 10:34 AM Sadyojatha k.m. <saddukm@gmail.com> wrote:

[Quoted text hidden]

Sridhar Reddy <rsri011@gmail.com>
To: "Sadyojatha k.m." <saddukm@gmail.com>

Thu, Sep 29, 2022 at 7:46 AM

Dear Sir,

Approved. Please proceed.

Best Regards,
Sridhar

[Quoted text hidden]

Sadyojatha k.m. <saddukm@gmail.com>
To: Sridhar Reddy <rsri011@gmail.com>

Thu, Sep 29, 2022 at 7:53 AM

Dear Sridhar,
Thanks for the approval.

Regards

[Quoted text hidden]

PROCEEDINGS OF 2nd BOARD OF STUDY MEETING, E&CE, BITM,
Ballari Regarding..

Prof. Sadyojatha K M <sadyojatha@bitm.edu.in>

Fri 9/23/2022 10:28 AM

To: PATIL RAMANA REDDY <prjntu@gmail.com>; PESIT Bangalore South Campus
<sskul@pes.edu>; dschalam.ece@bmsce.ac.in
<dschalam.ece@bmsce.ac.in>; Ishwar Mathapati
<ishwarayya.m@gmail.com>; Sridhar Reddy <rsri011@gmail.com>

Dear Sir,

I am very much thankful for attending the 2nd Online BOS meeting of E&CE
Department, BITM, Ballari, conducted on 14/09/2022.

I am herewith attaching the Minutes of the Meeting (MOM) and the Modified
Syllabus for B.E. 2nd year of **Electronics & Communication Engineering
(E&CE)** for your approval.

The suggestions of the honorable members are well taken and the content of
the syllabus is modified accordingly.

Kindly approve the same through the reply mail.

Thanking You,

With Regards,

Dr. K M Sadyojatha,
Professor and Head,
Dept. of E&CE, BITM, Ballari-04

Board of Study Meeting ECE BITM

Prof. Sadyojatha K M <sadyojatha@bitm.edu.in>

Thu, 04 Nov 2022, 12:14

To: Dept. of ECE <ecestaff@bitm.edu.in>

3 attachments (4 MB)

BITM_ECE_Scheme_III_IV SEM.pdf, Draft_3rd_sem_ece_syllabus_2022.pdf, Draft_4th_sem_ece_syllabus_2022.pdf.

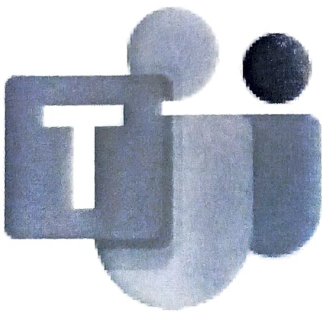
Dear All,

I am happy to invite you for the BOS meeting as a member. The **online/offline meeting** is scheduled on 14-09-2022 from 3 PM onwards.

I am herewith attaching the draft autonomous syllabus and scheme of III and IV semesters. Kindly make it convenient to attend the meeting. Your suggestions are very much valuable in finalizing the syllabus.

The online link of the meeting:

<https://teams.microsoft.com/l/meetup-join/19%3aeWShUul-e53672zK4-cMwoB-bsXGbgHgXJ0sQp4hSzl1%40thread.tacv2/1662962672881?context=%7b%22Tid%22%3a%22d95f6094-d28c-42bc-9096-e0746ed850b7%22%2c%22Oid%22%3a%22ce412867-e791-4a1e-8d31-6e0815e75edf%22%7d>



Join conversation

teams.microsoft.com

Thanking you for your kind cooperation,

Warm Regards

Sincerely Yours

K M Sadyojatha
Professor and Head, Dept. of E&CE
BITM, Ballari

Mobile: +91 9448020788

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under Visvesvaraya Technological University, Belagavi

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"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Dr. Sadyojatha K M, BE, ME, Ph.D., Prof. & Head

Ph: 08392-237177, Email: sadyojatha@bitm.edu.in

Ref: ECE/ACD/2022-23/02

Date:15/09/2022

BOS Meeting Review Comments

With reference to the BOS meeting held on 14/09/2022, the following are the review comments/suggestions given by the expert committee.

Sl. No.	Sem	Course Code	Name of the Course	Review Comments/Suggestions
1.	III	21EC32	Basic Signal Processing	<ul style="list-style-type: none"> • Include Convolution integral along with Convolution sum in Module-2 • Relook the concept of FT of periodic/apperiodic signals in Module-3. • Consider the removal of Noise reduction and stable inverse topics from the practical components of IPCC.
2.		21EC33	Digital System Design using Verilog	<ul style="list-style-type: none"> • Suggested to modify the course title as Digital Circuit Design using Verilog. • Check the possibility of swapping the contents of Module-2 and Module-3.
3.		21 EC 34	Analog Electronic Circuits	<ul style="list-style-type: none"> • Recommended to include Voltage Regulators or advanced electronics devices in-place of JFET. • Recommended to remove the topic Phase shift oscillators and include Current Sources and Current Mirrors in Module-4. • Recommended to include topics such as peak detector, Instrumentation amplifier in-place of Small Signal half wave rectifier and Absolute value output circuit in Module-5.
4.		21ECL35	Digital System Design Lab	Remove Expt. No. 3 of PART-A and add one more experiment in PART-B.
		21ECL36	Analog Electronics Lab	Remove JFET related experiments
5.		21AEC38	Basic Arduino & Raspberry Pi Programming	Change number of teaching hours and title of the course.
6.	IV	21EC42	Network Theory & Control Systems	Review the Contact hours in-line with the syllabus.
7.		21EC43	Digital Signal Processing	Consider the possibility of including the topic Chebyshev filter.
8.		21EC44	Communication Theory	Change of Course title and Restructure the



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			Fundamentals	contents of Module-1 and 2 in relevance to the present context.
9.	21ECL45	Digital Signal Processing Lab		classify list of experiments into PART A, B, C. Mention the Open ended experiment/Mini Lab Projects in PART-C and explore the possibility of including experiments on advanced DSP Processors.
10.	21ECL46	Communication Lab-I		Remove the experiments related to Amplitude Modulation concepts. Recommended to focus on deep analysis on experiments like PWM, PLL etc.

H.O.D.

Head of the Department,
Dept. of Electronics & Communication Engg
Ballari Institute of Technology & Management
(formerly Bellary Engineering College)
BELLARY.

Copy to:

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Dr. Sadyojatha K M, BE, ME, PH.D., Prof. & Head

Ph: 08392-237177, Email: sadyojatha@bitm.edu.in

Sl. NO	Name of the Faculty	Signature
1	Dr. Sadyojatha K M	
2	Dr. U Eranna	
3	Dr. V C Patil	
4	Dr. Naseeruddin	
5	Dr. Fareduddin J.S	
6	Dr. Mallikarjuna. A	
7	Dr. Renuka Sagar	
8	Dr. William Thomas H M	
9	Dr. Abdul Lateef Haroon P S	
10	Mr. Premachand D.R	
11	Mr. Shiva Kumar K.S	
12	Mrs. Nilam Chheda	
13	Mr. Prabhakar. K	
14	Ms. Sowbhagya B	
15	Mr. Vishnukanth .K	
16	Mr. Srikantha K.M	
17	Mr. Hemanth Kumar R	
18	Mr. Manjunath. G.	
19	Mr. Sagara T.V	
20	Mrs. Shilpa K.R	
21	Mrs. Sumalatha Venkoba Rao	
22	Mrs. Simantini Roy	
23	Mr. Ulaganathan. J	
24	Mrs. Swetha N	
25	Mrs. Geetha H Y	
26	Mr. Aswathanarayana	
27	Mr. Vinay Kumar Javalkar	
28	Mr. Ambrayya	
29	Mrs. Nayana .M	
30	Mrs. Priyanthika Paul	
31	Mr. Venkatayya G	
32	Mr. Udayaraj Kumar M	
33	Mrs.Vijaya Rani	
34	Mrs.Ghousiya S Sabreen	

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Dr. B.S.Khened, Dean - Academics

Ph: 08392-237170, Email: dean_academics@bitm.edu.in

Ref. No. BITM/BOS/2022-23/ECE/06

Date: 10/09/2022

To,

Mr. JAYAPRAKASH YANGAL

Director, Talent Acquisition

MIRAFATECHNOLOGIES

Dear Sir,

Subject: Regarding Board of studies meeting.

Board of studies meeting in **Electronics and Communication Engineering** board is scheduled on **14/09/2022** from **3.00PM** onwards at our institute in both **online and offline mode**. You are requested to kindly attend the meeting.

The agenda of the meeting is to finalize scheme and syllabus of B.E. III and IV semesters.

Thanking you sir.

Yours sincerely

Dr. B.S. Khened
(Dean-Academics)**Dr. B.S. KHENED**

Dean Academics

Ballari Institute of Technology



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Dr. B.S.Khened, Dean - Academics

Ph: 08392-237170, Email: dean_academics@bitm.edu.in

Ref. No. BITM/BOS/2022-23/ECE/07

Date: 10/09/2022

To,

Mr. ISHWARAYYA MATHAPATI
Sr. Member, Technical,
KPIT Cummins Infor Systems Ltd

Dear Sir,

Subject: Regarding Board of studies meeting.

Board of studies meeting in **Electronics and Communication Engineering** board is scheduled on **14/09/2022** from **3.00PM** onwards at our institute in both **online and offline mode**. You are requested to kindly attend the meeting.

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Yours sincerely

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(Dean-Academics)

Dr. B.S. KHENED

Dean Academics

Ballari Institute of Technology & Management





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Dr. B.S.Khened, Dean - Academics

Ph: 08392-237170, Email: dean_academics@bitm.edu.in

Ref. No. BITM/BOS/2022-23/ECE/01

Date: 10/09/2022

To,

Dr. PATIL RAMANA REDDY B.Tech, M.Tech, PhD

Professor & HOD Dept. of E&CE

JNTU, CEA, Anantapuram

Dear Sir,

Subject: Regarding Board of studies meeting.

Board of studies meeting in **Electronics and Communication Engineering** board is scheduled on **14/09/2022** from **3.00PM** onwards at our institute in both **online and offline mode**. You are requested to kindly attend the meeting.

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Yours sincerely

Dr. B.S. Khened
(Dean-Academics)

Dr. B.S. KHENED
Dean Academics

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Dr. B.S.Khened, Dean - Academics

Ph: 08392-237170, Email: dean_academics@bitm.edu.in

Ref. No. BITM/BOS/2022-23/ECE/02

Date: 10/09/2022

To,

Dr. Seshachalam

Professor, Dept. of E&CE

BMSCE, Bengaluru.

Dear Sir,

Subject: Regarding Board of studies meeting.

Board of studies meeting in **Electronics and Communication Engineering** board is scheduled on **14/09/2022** from **3.00PM** onwards at our institute in both **online and offline mode**. You are requested to kindly attend the meeting.

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Thanking you sir.

Yours sincerely

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(Dean-Academics)

Dr. B.S. KHENED

Dean Academics

Ballari Institute of Technology & Management





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Dr. B.S.Khened, Dean - Academics

Ph: 08392-237170, Email: dean_academics@bitm.edu.in

Ref. No. BITM/BOS/2022-23/ECE/03

Date: 10/09/2022

To,

Dr. SUBHASH KULKARNI, B.E, M.Tech, PhD

Professor & HOD Dept. of E&CE,

PES University, Bengaluru

Dear Sir,

Subject: Regarding Board of studies meeting.

Board of studies meeting in **Electronics and Communication Engineering** board is scheduled on **14/09/2022** from **3.00PM** onwards at our institute in both **online and offline mode**. You are requested to kindly attend the meeting.

The agenda of the meeting is to finalize scheme and syllabus of B.E. III and IV semesters.

Thanking you sir.

Yours sincerely

Dr. B.S. Khened
(Dean-Academics)

Dr. B.S. KHENED

Dean Academics

Ballari Institute of Technology & Management





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Ph: 08392-237170, Email: dean_academics@bitm.edu.in

Ref. No. BITM/BOS/2022-23/ECE/04

Date: 10/09/2022

To,

Mr. KRISHNA KUMAR M

Vice President, Global Talent Acquisition

CYIENT- Bengaluru

Dear Sir,

Subject: Regarding Board of studies meeting.

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Yours sincerely

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(Dean-Academics)

Dr. B.S. KHENED

Dean Academics

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Dr. B.S.Khened, Dean - Academics

Ph: 08392-237170, Email: dean_academics@bitm.edu.in

Ref. No. BITM/BOS/2022-23/ECE/05

Date: 10/09/2022

To,

Mr. REDDY SRIDHAR

Robert Bosch, Bengaluru

Dear Sir,

Subject: Regarding Board of studies meeting.

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The agenda of the meeting is to finalize scheme and syllabus of B.E. III and IV semesters.

Thanking you sir.

Yours sincerely

Dr. B.S. Khened
(Dean-Academics)

Dr. B.S. KHENED

Dean Academics

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Near Allipura, Ballari-583 104 (Karnataka)**

**Scheme of Teaching and Evaluation for
B. E-III & IV Semester
Electronics & Comm. Engg. Program**

**3rd / 4th Semester Scheme
(Effective from the academic year 2021-22)**

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DEPARTMENT OF ELECTRONICS & COMM. ENGG.
Semester III

SN	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	BSC	21MEE31	Transform Calculus & Numerical Methods	Mathematics	Mathematics	3	0	0	3	3	50	50	100
02	IPCC	21EC32	Basic Signal Processing	E&C Engg	E&C Engg	3	0	2	4	3	50	50	100
03	PCC	21EC33	Digital Circuit Design using Verilog	E&C Engg	E&C Engg	3	0	0	3	3	50	50	100
04	PCC	21EC34	Analog Electronic Circuits	E&C Engg	E&C Engg	3	0	0	3	3	50	50	100
05	PCC	21ECL35	Digital Circuit Design Laboratory	E&C Engg	E&C Engg	0	0	2	1	3	50	50	100
06	PCC	21ECL36	Analog Electronic Circuits Laboratory	E&C Engg	E&C Engg	0	0	2	1	3	50	50	100
07	HS	21KSK37/ 47	Samskrutika Kannada	Humanities	Humanities	1	0	0	1	-	100	----	100
		21KBK37/ 47	Balake Kannada										
	OR												
	HS	21CIP37/ 47	Constitution of India, Professional Ethics and Cyber Law						1	2	50	50	
08	AEC	21AEC38	Programming with Hardware Controllers	E&C Engg	E&C Engg	0	0	2	1	2	50	50	100
09	AEC	21DTI39	Ability Enhancement Course (Design Thinking and Innovation)	E&C Engg	E&C Engg	1	0	0	1	2	50	50	100
Total									18		500/450	400/450	900
Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs													
10	NCMC	21MATDIP31	Additional Mathematics - I	Mathematics	-	3	0	0	0	-	100	-	100

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credits for IPCC are 04 and its Teaching – Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE

DEPARTMENT OF ELECTRONICS & COMM. ENGG.
Semester IV

SN	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	BSC	21MCE41	Linear Algebra, Probability and Statistical Methods	Mathematics	Mathematics	3	0	0	3	3	50	50	100
02	IPCC	21EC42	Network Theory & Control Systems	E&C Engg	E&C Engg	3	0	2	4	3	50	50	100
03	PCC	21EC43	Digital Signal Processing	E&C Engg	E&C Engg	3	0	0	3	3	50	50	100
04	PCC	21EC44	Communication Systems-I	E&C Engg	E&C Engg	3	0	0	3	3	50	50	100
05	PCC	21ECL45	Digital Signal Processing Laboratory	E&C Engg	E&C Engg	0	0	2	1	3	50	50	100
06	PCC	21ECL46	Communication Laboratory-I	E&C Engg	E&C Engg	0	0	2	1	3	50	50	100
07	HS	21KSK37/ 47	Sanskritika Kannada	HSMC	HSMC	1	0	0	1	--	100	---	100
		21KKB37/ 47	Balake Kannada										
	OR												
	HS	21CIP37/47	Constitution of India, Professional Ethics and Cyber Law						1	2	50	50	
08	AEC	21SSA480	Soft skills and basic aptitude	Humanities	Humanities	1	2	0	2	2	50	50	100
09	AEC	21AEC482	Digital System Design with FPGA	E&C Engg	E&C Engg	1	0	0	1	2	50	50	100
10	UHV	21UHV490	Universal Human Values	Concerned Department	ANY DEPT.	1	0	0	1	2	50	50	100
11	INT	21INT491	Summer Internship - I	Evaluation By the appropriate authorities		Completed during the intervening period of II and III semesters. Lateral entry students have to attend the internship during the intervening period of III and IV semesters			2	----	100	--	100
		Total							22		600/650	500/450	1100
Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs													
12	NCCM	21MATDIP41	Additional Mathematics - II	Mathematics	-	3	0	0	0	-	100	-	100

**Semester: III
(COMMON TO ECE & EEE)**

Course Name: Transform Calculus & Numerical Methods

Course Code	21MEE31	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites:

- Basic formulae of differentiation, partial differentiation, Integration.
- Differential equations
- Periodic function

Module-1

Fourier Series: Introduction to infinite series, Periodic functions, Dirichlet's conditions, Euler's formulae. Fourier series of periodic functions with period 2π . Fourier series of even and odd functions and Fourier series of arbitrary period $2l$. Problems on time periodic signals. Practical harmonic analysis.

Self -Study: Convergence and Divergence of series.

8 Hours

Module-2

Infinite Fourier Transforms

Representation of periodic and non-periodic functions, continuous time Fourier Transform, Properties of Fourier Transform (without Proof). Discrete time Fourier Transform, Properties of DTFT (without Proof).

Self -Study: Leibnitz rule for differentiation under integral sign.

8 Hours

Module-3

Z-Transforms: Z-transform-definition, Z-transforms of standard functions, Region of convergence, properties- Linearity, scaling, Shifting theorem with Problems. Inverse Z- transforms and applications to solve difference equations. Transform analysis of LTI system transfer function.

Self-Study: Initial and final value theorem.

8 Hours

Module-4

Numerical Solution of first-Order ODEs

Taylor's series method, Modified Euler's method, Runge-Kutta method of order four, Milne's predictor and corrector formula, Adam's-Bash forth formula (No derivations only formulae).

Self-Study: Solution of first order ODE using Picard's method.

8 Hours

Module-5

Numerical Solution of Simultaneous and Second-Order ODEs

Simultaneous differential Equations: Picard's method, Runge-Kutta method. (No derivations of formulae).

Second-order differential equations: Runge-Kutta method and Milne's predictor and corrector method. (No derivations of formulae).

Self-Study: Solution of ODE by analytical method.

8 Hours

Course Outcomes:

Upon completion of this course, student will be able to:

1. Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
2. Make use of Fourier Transform to illustrate discrete / continuous function arising in wave and Heat propagation, signals and systems.
3. To apply Z- Transform techniques to solve difference equations.
4. Solve first order ODE arising in engineering problems using single step numerical methods.
5. Solve second order ODE arising in engineering problems using single step numerical methods.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers	43 rd Ed. 2015
2	Advanced Engineering Mathematics	E. Kreyszig	John willy & Sons	10 th Ed. (Reprint). 2016
3	Signals & Systems	ALAN V. OPPENHEIM ALAN S. WILLSKY WITH S. HAMID NAWAB	Prentice- hall signal processing Series	2 nd edition
Reference Books				
1	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill	11 th Edition. 2010
2	Calculus	George. B. Thomas	Pearsons edn. Inc	13 th Edition. 2014
3	A Text book of Engineering Mathematics	N. P. Bali and Manish Goyal	Laxmi Publications	Latest edition

Semester: III
Course Name: Basic Signal Processing

Course Code	21EC32	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40(T)+20(P)	Total Marks	100
Credits	04	Exam Hours	03

Pre-requisites: Basics of Mathematics-Fourier series, Partial fractions.

Module-1

<p>Introduction and Classification of signals: Definition of signal and systems with examples, Elementary signals / Functions: Exponential, sinusoidal, step, impulse and ramp functions</p> <p>Basic Operations on signals: Amplitude scaling, addition, multiplication, time scaling, time shift and time reversal. Expression of triangular, rectangular and other waveforms in terms of elementary signals</p> <p>Classification of Systems and properties: Linear-nonlinear, Time variant -invariant, causal-non causal, static-dynamic, stable-unstable, invertible-non invertible.</p> <p>(Text 1, Chapter 1: 1. 1 to 1. 8)</p>	8 Hours
Self-Study topics: Plotting of basic signals and operations on signals with properties.	

Module-2

<p>Time domain representation of LTI System: Impulse response, convolution sum and integral. Computation of convolution sum using graphical method for unit step and unit step, unit step and exponential, exponential and exponential, unit step and rectangular, and rectangular and rectangular signals.</p> <p>LTI system Properties in terms of impulse response: System interconnection, Memory less, Causal, Stable, Invertible and Deconvolution and step response.</p> <p>(Text 1, Chapter 2: 2. 1 to 2. 9)</p>	8 Hours
Self-Study topics: Applications of LTI Systems	

Module-3

<p>Continuous Time Fourier Transform: Fourier Transform of periodic / aperiodic signals, Properties of CTFT: Linearity, time shifting, conjugation and conjugate symmetry, differentiation and integration, time and frequency scaling, duality, Parseval's relation, convolution and modulation theorem</p> <p>(Text 2, Chapter 4:4. 1 to 4. 5)</p>	8 Hours
Self-Study topics: Verification of properties	

Module-4

<p>Discrete Time Fourier Transform: Fourier analysis of discrete time Signals and systems, DTFT, Properties of DTFT -periodicity, linearity, time and frequency shifting, conjugate symmetry, time reversal</p> <p>(Text 2, Chapter 5: 5. 1 to 5. 3)</p>	8 Hours
Self-Study topics: Verification of properties	

Module-5

<p>The Z-Transforms: Z transform, unilateral, Initial conditions, properties of the region of convergence, properties of the Z-transform, Inverse Z-transform by partial fraction, Causality and stability, Transform analysis of LTI systems.</p> <p>(Text 1, Chapter 6: 6. 1 to 6. 10)</p>	8 Hours
Self-Study topics: Solving Z-Transforms by partial fractions	

PRACTICAL COMPONENT OF IPCC

SN	Experiments
1	Generation and plotting of Continuous and Discrete Signals ex: unit step, unit ramp, sinusoidal, exponential, square, pulse, saw tooth, Sinc Signals (Any arbitrary Signals)
2	To verify different Properties of given System. a)Causal and no causal Systems b)Static and dynamic systems c)Linear and nonlinear Systems d)Time-Invariant and variant systems
3	Different mathematical Operations on Continuous and discrete time signals a)Addition of two signals b)Even and odd component Signals c) amplitude scaling and Time shifting
4	Convolution of CT and DT signals
5	To find Fourier transform of a given signal and plot its magnitude and phase spectrum
6	To find impulse response of LTI System and locate the zeros and poles, plot the zero-pole maps in Z plane
7	Transformation of signals into time and frequency domain

8	Modulation of Signals
9	Noise reduction in Communication systems
10	Synthesizing the Sound of a plucked String
11	Impulse Response and distortion removal

Course Outcomes:

1. **Perform** mathematical operations on a given continuous / discrete type signal and Classify systems based on their properties.
2. **Develop** input output relationship for a given LTI system and analyze the LTI system properties.
3. **Apply** Fourier transform to the continuous and discrete time signals and analyze their properties.
4. **Analyze** the discrete time signals and LTI systems applying Z transforms.
5. **Demonstrate** the solution for a given open ended problem / Mini-lab project through simulation / emulation in the field of signal processing.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Signals and Systems	Simon Haykin	Wiley India	2 nd Edition & 2008
2	Signals and Systems	Alan V. Oppenheim, Alan S, Wilsky with Hamid Nawab	PHI Publications	2 nd Edition & 2011
Reference Books				
1	Fundamentals of Signals & Systems	Michael Roberts	Tata McGraw Hill Education(India), Private Limited	2 nd edition
2	Signals and Systems	H P Hsu, R Ranjan	Schaum's Outlines	TMH 2006

Semester: III
Course Name: Digital Circuit Design Using Verilog

Course Code	21EC33	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites: Number systems, Arithmetic and Logical operations, Basic gates.

Module-1

Principles of Combinational Logic: Definition of combinational logic, Problem statements to truth tables, Deriving switching equations, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps, Three and four variables Karnaugh maps, Incompletely specified Functions(Don't care Terms), Simplifying Maxterm Equations, Map entered variables, Multiple output functions.

Text1: 3. 1, 3. 1. 1, 3. 1. 2, 3. 2, 3. 3, 3. 4, 3. 4. 1, 3. 4. 5, 3. 4. 6, 3. 6 & 3. 8 **8 Hours**

Self-study topics: Hazards in combinational circuits, Quine-McCluskey Minimization Technique, Quine-McCluskey using Don't Care Terms.

Module-2

Overview of digital design with Verilog HDL: Typical HDL flow, Importance of HDLs.

Hierarchical Modeling concepts: Design methodologies, Modules.

Verilog basic concepts: Lexical conventions, data types.

Modules and ports: Module definition, port declaration, port connection rules.

Gate level modeling: Gate types, AND / OR gates, BUF / NOT gates, Examples like 4-bit ripple carry full adder.

Text 2: 1. 3, 1. 4, 2. 1, 2. 3, 3. 1, 3. 2, 4. 1, 4. 2, 4. 2, 4. 2, 5. 1, 5. 1. 1, 5. 1. 2, 5. 1. 4 **6 Hours**

Self-study topics: Popularity of Verilog HDL, Components of a simulation, Half Adder & full adder using gate level modeling.

Module-3

Analysis and Design of Combinational Logic: Introduction to Digital Integrated circuits, Decoders, BCD Decoder, Encoders, Digital Multiplexers, Using multiplexer as Boolean Function generators, Adders and Subtractors, Cascading full adders, Look ahead carry, Binary Comparator (1 bit, 2-bit comparators only), Tri-state buffers.

Text1: 4. 2, 4. 3, 4. 3. 1, 4. 4, 4. 5, 4. 5. 1, 4. 6, 4. 6. 1, 4. 6. 2, 4. 7, 4. 10 **8 Hours**

Self-study topics: Adders types, role of decoder in processor, ALU and Array Multipliers.

Module-4

Sequential circuits: Sequential circuit models (universal model only), Flip-flops: flip-flop logic symbols, function and triggering, Latches, J-K Clocked flip-flops, clocked T&D flip-flop, Master-slave flip-flops, Edge triggered flip-flops, Flip Flop timing specifications.

Simple counters: Divide by 2, 4, and 8 counters (Asynchronous), Mod-8 synchronous counter. Registers: Register Data input and output, Parallel input / Parallel output, Serial input / serial output shift registers.

Finite State Machines: Mealy sequential circuit design, Design of Moore sequential Circuit, Equivalent States and Reduction of State Tables.

Text1: 5. 1, 5. 2, 5. 3, 5. 4, 5. 6, 5. 6. 1, 6. 1, 6. 2, 6. 2. 1, 6. 2. 2, 6. 5

Text3: 1. 7, 1. 8, 1. 9 **10 Hours**

Self-study topics: Johnson counter (Synchronous), Ring counter (synchronous), Up-Down Decade counter design, Difference between Moore and Mealy models,

Module-5

Data Flow Modeling: Expressions, Operators and operands, operator types, Examples such as 4to1 multiplexer, 4-bit full adder.

Behavioral Modeling: Structured procedures, Procedural assignments, Delay based timing control, Multiway branching, loops, Examples -Only Verilog Description

Text 2: 6. 3, 6. 4, 6. 5, 6. 5. 1, 6. 5. 2, 7. 1, 7. 2, 7. 3. 1, 7. 5, 7. 6, 7. 9. **8 Hours**

Self-study topics: Logic synthesis with Verilog

Course Outcomes:

1. **Use** Karnaugh map and Quine-McCluskey minimization methods to simplify the given digital circuits.
2. **Explore** the applications of combinational logic circuits such as Decoder, Encoder, Multiplexer, Adder, Subtractor etc. to realize the given Boolean function.
3. **Explore** the applications of sequential logic circuits and their machine models to design digital circuits.
4. **Realize** the given digital circuits using structural, data flow and behavioral verilog HDL modeling styles with appropriate design approaches.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Digital Logic Applications and Design.	John M Yarbrough	Cengage Learning	2008 (reprint)
2	Verilog HDL: A Guide to Digital Design and Synthesis.	Samir Palnitkar	Pearson Education	2 nd Edition
3	Fundamentals of Logic Design.	Charles H. Roth (Jr.)	West publications	4 th Edition, 1992
Reference Books				
1	Modern Digital Electronics	R P Jain	Tata McGraw-Hill.	3 rd Edition
2	Digital Principle and Design.	Donald D. Givone	McGraw-Hill	2003
3	HDL Programming VHDL and Verilog	Nazeih M Botros	Dreamtech press	2009

Semester: III
Course Name: Analog Electronic Circuits

Course Code	21EC34	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites: Semiconductor Physics, Electronic Devices

Module-1

Introduction to Electronic Devices

Diode & its Applications: Introduction, pn-Junction Diode, Equivalent Circuit of Diode, Half Wave & Full Wave Rectification(With Derivation of Efficiency & Ripple Factor), Wave Shaping Circuits-Clipping, Clamping

Voltage Regulators: Fixed Voltage Regulators and Adjustable Voltage Regulators

BJT: Introduction, BJT Construction and Operation, BJT Configuration and characteristics

FET: Introduction to FET, Construction, operation, Characteristics of MOSFET

Text 1: 2. 1, 2. 2, 2. 2. 3, 2. 4, 2. 5. 1, 2. 5. 2, 2. 5. 4, 2. 5. 5, 3. 1, 3. 2, 3. 3, 4. 1, 4. 3 Text 3: 9. 7. 1, 9. 7. 2

8 Hours

Self-Study Topics: BJT as Switch & as Amplifier

Module-2

BJT Biasing: Biasing in BJT amplifier circuits: The Classical Discrete circuit bias (Voltage-divider bias), Biasing using a collector to base feedback resistor.

BJT Small signal operation and Modeling: Collector current and transconductance, Base current and input resistance at the base, Emitter current and input resistance at the emitter, voltage gain, Separating the signal and the DC quantities, The hybrid Π model, The T model.

MOSFETs Biasing: Biasing in MOS amplifier circuits: Biasing by Fixing V_{GS} , Biasing by Fixing V_G and Biasing using a Drain to Gate feedback resistor.

MOSFET Small signal operation and Modeling: The DC bias point, signal current in drain terminal, voltage gain, Separating the DC Analysis and the signal analysis, small signal equivalent circuit models, Transconductance, The T equivalent circuit model.

Text 2: 3. 5(3. 5. 1, 3. 5. 3), 3. 6(3. 6. 1 to 3. 6. 7), 4. 5(4. 5. 1, 4. 5. 2, 4. 5. 3), 4. 6(4. 6. 1 to 4. 6. 7) **8 Hours**

Self-Study Topics: Large Signal Modeling for BJT

Module-3

MOSFET Amplifier configuration: Basic Structure, characterizing amplifiers, CS amplifier with and without source resistance R_s , Source follower amplifier.

MOSFET internal capacitances and High frequency model: The gate capacitive effect, Junction capacitances, High frequency MOSFET model.

Frequency response of the CS amplifier: The three frequency bands, high frequency response, Low frequency response.

IC Biasing: Current Sources, Current Mirrors and Current Steering Circuits.

Text 2: 4. 7 (4. 7. 1 to 4. 7. 4, 4. 7. 6), 4. 8(4. 8. 1, 4. 8. 2, 4. 8. 3), 4. 9(4. 9. 1, 4. 9. 2, 4. 9. 3), 6. 3(6. 3. 1, 6. 3. 2)

8 Hours

Self-Study Topics: Large Signal Modeling for MOSFET

Module-4

Feedback Amplifier: General feedback structure, Properties of negative feedback, The Four Basic Feedback Topologies, The series-shunt Feedback amplifier, series-series Feedback amplifier, shunt-shunt and shunt-series Feedback amplifiers (Qualitative Analysis).

Power Amplifiers: Introduction, Classification of output stages, Class A and Class B output stage: Transfer Characteristics, Power Dissipation, Power Conversion efficiency, Class AB output stage: Circuit operation, output resistance, Class C Output Stage: Efficiency.

Text 2: 7. 1, 7. 2, 7. 3, 7. 4. 1, 7. 5. 1, 7. 6 (7. 6. 1 to 7. 6. 3), 12. 1, 12. 2 (12. 2. 1, 12. 2. 3, 12. 2. 4), 12. 3 (12. 3. 2, 12. 3. 3, 12. 3. 4), 12. 4, 12. 6 **8 Hours**

Self-Study Topics: Class D Power Amplifier

Module-5

Op-Amp Applications: Instrumentation Amplifier, Peak detector, DAC-Weighted resistor and R-2R ladder, ADC-Successive approximation type, Active Filters- First and second order low-pass and high-pass Butterworth filters, Band-pass filters, Band reject filters.

IC 555 Timers and its Operating modes: Introduction, Monostable and Astable Multivibrators.

Text 3: 6. 6, 8. 11(8. 11. 1(a), 8. 11. 1(b), 8. 11. 2(a), 8. 14, 7. 2-7. 6, 7. 8, 7. 9, 9. 4

8 Hours

Self-Study Topics: Waveform generators using 555 Timer.

Course Outcomes:

After studying this course, students will be able to:

1. **Outline** the Construction, operation & characteristics of Junction & Field Effect devices
2. **Design** and **analyze** BJT and FET amplifiers with different circuit configurations and biasing conditions.
3. **Apply** the concepts of feedback topologies in the design of amplifiers and oscillators.
4. **Explore** the wide range applications of linear ICs such as ADC, DAC, filters and timers.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1.	Basic Electronics	D. P Kothari & I J Nagrath	McGraw Hill Education (India) Pvt. Limited,	2014, ISBN: 978-93-329-0158-2,
2	“Micro Electronic Circuits Theory and Application”	Adel S. Sedra and Kenneth C. Smith,	Oxford University Press	5 th Edition, 2013, ISBN-10:978-0-19-806225-7
3	“Op-Amps and Linear Integrated Circuits”	Ramakant A Gayakwad	Pearson Education	4 th Edition, 2018. ISBN: 978-93-325-4991-3
Reference Books				
1	“Electronics devices and Circuit theory”	Robert L. Boylestad and Louis Nashelsky	Pearson Education	10 th / 11 th Edition, 2012, ISBN:978-81-317-6459-6.
2	“Integrated Electronics Analog and Digital Circuits and Systems”	J. Millman&C. C. Halkias	McGraw Hill Education (India) Pvt. Limited,	2 nd edition, 2010, ISBN 0- 07-462245-5

Semester: III
Name of the Laboratory: Digital Circuit Design Laboratory

Course Code	21ECL35	CIE Marks	50
Teaching Hours / Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	03

Pre-requisites: Number systems, Arithmetic and Logical operations, Basic gates.

List of Experiments

SN	Experiments
Prerequisites:	
To verify	
i) The SOP and POS expressions using universal gates.	
ii) De- Morgan's theorem for 2 variables.	

Part - A

The following experiments can be done using Digital IC Trainer Kit

1	Design and implement i) Half adder and Full adder using NAND gates. ii) Full subtractor using NAND gates. iii) 4-bit parallel adder using IC7483.
2	Design and implement i) Simplified 4 variable function using basic gates by applying Boolean rules and K-map. ii) 4 variable function using IC74151 (8:1MUX).
3	Realize i) SR Flip Flop ii) D Flip Flop iii) Master and slave JK Flip Flop iv) T Flip Flop
4	i) Realize shift register using IC 7495. a. SISO b. SIPO c. PISO d. PIPO ii) Realize Mod-n synchronous counter using IC74192. iii) Realize Mod-n asynchronous counter using IC7490.
5	Design and implement 3 bit sequence detector to detect given sequence.

Part B

The following experiments can be done using Xilinx / Mentor Graphics or any other equivalent EDA tools

1	Write a Verilog code to describe the functions of a Full Adder using three modeling styles
2	Write a Verilog Code to i) Design 8:3 Encoders with and without Priority. ii) Design 2:1 Multiplexer using Conditional Operator.
3	Design a Mod-n counters (Synchronous reset and Asynchronous reset) using Verilog code.
4	Design Mealy FSM model to detect the given sequence with / without overlap using verilog.

Part C

Demonstration Experiments / Open ended Experiments

1	Write a Verilog code to interface DAC unit to the FPGA / CPLD for square and triangular waveform generation.
2	Write Verilog code to interface a 7-segment display to the FPGA / CPLD.
3	Any Open ended experiments / Mini Lab Projects

Course outcomes:

- Design** and **realize** the combinational logic circuits such as adders, subtractors, comparators etc. as per the given specifications.
- Design** and **realize** the sequential logic circuits such as Flip flops, registers etc. as per the given specifications.
- Utilize** Verilog constructs as per the IEEE 1364-2001 Verilog standard to design and verify the digital circuits for the given specifications.
- Demonstrate** the solutions for the given open ended problem / Mini lab projects in the area of digital circuit design.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Digital Logic Applications and Design.	John M Yarbrough	Thomson Learning	2008 (reprint)
2	Verilog HDL: A Guide to Digital Design and Synthesis.	Samir Palnitkar	Pearson Education	2 nd Edition
Reference Books:				
1	Fundamentals of Logic Design.	Charles H. Roth (Jr.)	West publications	4 th Edition, 1992
2	Modern Digital Electronics	R P Jain	Tata McGraw-Hill.	3 rd Edition
3	Digital Principle and Design.	Donald D. Givone	McGraw-Hill	2003
4	HDL Programming VHDL and Verilog	Nazeih M Botros	Dreamtech press	2009

Semester: III
Name of the Laboratory: Analog Electronic Circuits Laboratory

Course Code	21ECL36	CIE Marks	50
Teaching Hours / Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	03

Pre-requisites: Semiconductor Physics, Electronic Devices

List of Experiments

SN	Part-A Experiments using Discrete components
1	Design and set up the following rectifiers with and without filters and determine ripple factor and efficiency: (a) Full Wave Rectifier (b) Bridge Rectifier
2	Conduct experiment to test diode clipping (single / double ended) and clamping circuits (positive / negative) for given specifications.
3	Design and set up the BJT common emitter amplifier using voltage divider bias with and without feedback and determine the gain- bandwidth product from its frequency response
4	Design and set-up the crystal oscillator and determine the frequency of oscillation.
5	Design Adder, Integrator and Differentiator circuits using Op-Amp
6	Test a comparator circuit and design a Schmitt trigger for the given UTP and LTP values and obtain the hysteresis
7	Design Astable Multivibrator using 555 Timer for given specifications
8	Design 4-bit R-2R DAC using Op-Amp
Part-B Simulation using EDA software (p-spice, Multisim or any Equivalent tool)	
1	Design and Simulate the RC-Phase shift Oscillator using Op-Amp, and Verify the frequency of Oscillations
2	Design and Simulate the Monostable Multivibrator using 555 Timer for given specifications
3	Simulate the transfer and drain characteristics of a MOSFET and calculate its drain resistance, mutual conductance and amplification factor
4	Simulate Current Mirror Circuits using MOSFET
Part-C Open-Ended Experiments / Mini Lab Projects	
Any Open-Ended Experiments / Mini Lab Projects	

Course Outcomes:

At the end of this laboratory course, the students will be able to:

1. **Implement** circuits of rectifiers, clipping circuits, clamping circuits for a given specifications
2. **Analyze** the characteristics of BJT / MOSFET in the design of amplifiers and current mirrors
3. **Design** analog circuits using OPAMPs and 555 timer for different applications
4. **Demonstrate** the solutions for the given open ended problem / Mini lab projects applying Analog circuit design principles

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
1.	"Basic Electronics"	D. P Kothari & I J Nagrath	McGraw Hill Education (India) Pvt. Limited,	2014, ISBN: 978-93-329-0158-2,
2	"Micro Electronic Circuits Theory and Application"	Adel S. Sedra and Kenneth C. Smith,	Oxford University Press	5th Edition, 2013, ISBN-10:978-0-19-806225-7
3	"Op-Amps and Linear Integrated Circuits"	Ramakant A Gayakwad	Pearson Education	4th Edition, 2018. ISBN: 978-93-325-4991-3

Reference Books:

1	"Electronics Lab Manual"	Navas K A,	PHI Learning Pvt. Ltd.	2018
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Semester: III / IV (Common to All)
ಬಳಕೆ ಕನ್ನಡ – Balake Kannada (Kannada for Usage)

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)

ವಿಷಯ ಸಂಕೇತ (Course Code)	21KSK37/47	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಅಂಕಗಳು (Continuous Internal Evaluation Marks)	100
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / Week (L:T:P))	1-0-0		
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	15 ಗಂಟೆಗಳು	ಒಟ್ಟು ಅಂಕಗಳು (Total Marks)	100
PEÆrmiil (Credits)	01	ಪರೀಕ್ಷೆಯ ಅವಧಿ (Exam Hours)	02 ಗಂಟೆ

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು: (Course Learning Objectives):

- To create the awareness regarding the necessity of learning local language for comfortable and healthy life.
- To enable learners to Listen and understand the Kannada language properly.
- To speak, read and write Kannada language as per requirement.
- To train the learners for correct and polite conversation.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಷಯ ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕಗಳನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
 2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
 3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
1. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪರಿಚಯಿಸಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
 2. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾಯಂಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module-1

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities
3. Key to Transcription.
4. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು – Personal Pronouns, Possessive Forms, Interrogative words

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-2

1. ನಾಮಪದಗಳು ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possessive forms of nouns, dubitative question and Relative nouns
2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals
3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-3

1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative Cases and Numerals
2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal Numerals and Plural markers.
3. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು – Defective / Negative Verbs and Colour Adjectives.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-4

1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, Encouraging and Urging words (Imperative words and sentences).
2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication.
3. “ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯ ಪದಗಳು. - Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs.
4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ. Comparative, Relationship, Identification and Negation Words

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

Module-5

1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು – different types of forms of Tense, Time and Verbs
2. ದ್, -ತ್, -ತು, -ಇತು, -ಆಗಿ, -ಅಲ್ಲ, -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ Formation of Past, Future and Present Tense Sentences with Verb Forms
3. Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು – Kannada Words in Conversation

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

Skill Set: At the end of the Course, The Students will be able

1. To understand the necessity of learning of local language for comfortable life.
2. To Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To communicate (converse) in Kannada language in their daily life with Kannada speakers.
5. To speak in polite conversation.

Textbook:

ಬಳಕೆ ಕನ್ನಡ

ಲೇಖಕರು: ಡಾ. ಎಲ್.ತಿಮ್ಮೇಶ

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

Semester: III / IV (Common to all)
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ವಿಷಯ ಸಂಕೇತ (Course Code)	21KSK37/47	ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನದ ಅಂಕಗಳು	100
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / Week (L:T:P:S))	1-0-0		
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	15 ಗಂಟೆಗಳು	ಒಟ್ಟು ಅಂಕಗಳು	100
ಕ್ರೆಡಿಟ್ಸ್ (Credits)	01	ಪರೀಕ್ಷೆಯ ಅವಧಿ	02 ಗಂಟೆ

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
4. ಕನ್ನಡ ಶಬ್ದ ಸಂಪತ್ತಿನ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯ ಬಳಕೆ ಹಾಗೂ ಕನ್ನಡದಲ್ಲಿ ಪತ್ರ ವ್ಯವಹಾರವನ್ನು ತಿಳಿಸಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ

(Teaching-Learning Process - General Instructions):

These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಪಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ-1 ಲೇಖನಗಳು

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ.ಕೇಶವಮೂರ್ತಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ

1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು: ಅದರಂದೇನು ಫಲ ಇದರಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು
ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ

1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದು ಕೆಲವು ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ
3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ

1. ಡಾ. ಸರ್.ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ - ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ-5 ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

1. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ
2. ಮೇಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ:

ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು: (Course Outcomes):

1. ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿಯು ಮೂಡುತ್ತದೆ.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.
4. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.

ಪಠ್ಯಪುಸ್ತಕ:

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್.ತಿಮ್ಮೇಶ
ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

Semester: III / IV**Course Name: CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW**

Course Code	21CIP37/47	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	02

Module – 1**Introduction to Indian Constitution**

The Making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India. Fundamental Rights. Directive Principles of State Policy (DPSP). Fundamental Duties.

3 Hours**Module - 2****Union Executive and State Executive:**

Parliamentary System, Federal System, Union Executive – President, Prime Minister, Union Cabinet, Parliament – Union Legislature, Lok Sabha and Rajya Sabha types of bills. Union judiciary Supreme Court of India.

3 Hours**Module – 3****Elections, Amendments and Emergency Provisions**

Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments - Methods in Constitutional Amendments. Important Constitutional Amendments. Amendments – 7, 9, 10, 12, 42, 44, 61, 73, 74, 75, 86, and 91, 94, 95, 100, 101, 118. Emergency Provisions, types of Emergencies and its consequences. Special Provisions (Articles 370,371,371J) for some States

3 Hours**Module – 4****Professional / Engineering Ethis:**

Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics. Role morality. What is profession characteristic of profession? The NSPE board of Professional ethics. Engineering ethics as preventive ethics. Responsible Engineer. Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. What is conflict of interest? Honesty integrity and reliability. IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.

3 Hours**Module – 5****Internet Laws, Cyber Crimes and Cyber Laws:**

Internet and Need for Cyber Laws, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000. Cybercrimes and enforcement agencies.

3 Hours**Course Outcomes:**

1. Have constitutional knowledge and legal literacy.
2. Understand Engineering and Professional ethics and responsibilities of Engineers
3. Understand the cybercrimes and cyber laws for cyber safety measures

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Constitution of India, Professional Ethics and Human Rights	Shubham Singles, Charles E. Haries, and et al	Cengage Learning India	2018
2	Cyber Security and Cyber Laws	Alfred Basta and et al	Cengage Learning India	2018
3	Introduction to the Constitution of India	Durga Das Basu	Prentice –Hall	2008
4	Engineering Ethics	M. Govindarajan, S. Natarajan, V. S. Senthilkumar	Prentice –Hall	2004

Semester: III
Name of the Course: Programming with Hardware Controllers

Course Code	21AEC38	CIE Marks	50
Teaching Hours / Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	02

Pre-requisites: Basic Electronics and fundamentals of C programming.

List of Experiments

Part A: Basic Arduino Programming	
SN	Experiments
1	Getting Started with Arduino: Arduino platform, Prototyping environment
2	Arduino IDE: Arduino Development Environment, setting up the Arduino board with Electronic components and connections.
3	Arduino First Program: Creating sketches, using Libraries, using example codes, Debugging Using the Serial Monitor.
4	Arduino Interfaces- Different Sensors & Actuators
Part B: Basic Raspberry Pi Programming	
1	Getting Started with Raspberry Pi Basic functionality of the Raspberry Pi board and its Processor, setting and configuring the board
2	Introduction to Linux: Overview of Linux and its terminal Commands for operating Raspberry Pi
3	Programming the Raspberry Pi: Python-Introducing to Python programming language & Python Programming Environment
4	Exploring Electronics with the Raspberry Pi: Sensors & Actuator Interfacing
Part C: Open Ended Experiments / Mini-Project (Only for CIE, not for SEE)	
A Mini-project using Arduino / Raspberry Pi	

Course Outcomes:

At the end of the course the student will be able to:

1. Create sketches, libraries inside the Arduino Development Environment.
2. Wire Raspberry Pi and create a fully functional computer.
3. Use Python-based IDE, trace and debug Python code on Raspberry Pi.
4. Interface suitable sensors and actuators with Arduino / Raspberry Pi to measure and control physical world.
5. Implement the solution using arduino / raspberry pi for a given open ended problem.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Arduino Cookbook	Michael Margolis,	O'Reilly Media	1 st edition.
2	Raspberry Pi Cookbook for Python Programmers	Tim Cox	Packt Publishing Ltd.	2 nd Revised edition, 2016
Reference Books				
1	Arduino for beginners : Essential Skills Every Maker Needs	John Baichtal	Pearson Education, Inc	1 st edition, 2013
2	Raspberry Pi User Guide	Eben Upton and Gareth Halfacree	John Wiley Publications	4 th Edition. 2016

Semester: III
Course Name: DESIGN THINKING & INNOVATION

Course Code	21DTI39	CIE Marks	50
Teaching Hours / Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	02

Module-1

PROCESS OF DESIGN

Understanding Design thinking

Shared model in team-based design-Theory and practice in Design thinking-Explore presentation signers across globe-MVP or Prototyping **5 Hours**

Teaching-Learning Process:

1. Introduction about the design thinking: Chalk and Talk method
2. Theory and practice through presentation
3. MVP and Prototyping through live examples and videos

Module-2

Tools for Design Thinking

Real-Time design interaction capture and analysis-Enabling efficient collaboration in digital space-Empathy for design-Collaboration in distributed Design **5 Hours**

Teaching-Learning Process:

1. Case studies on design thinking for real-time interaction and analysis
2. Simulation exercises for collaborated enabled design thinking
3. Live examples on the success of collaborated design thinking.

Module-3

Design Thinking in IT

Design Thinking to Business Process modelling-Agile in Virtual collaboration environment-Scenario based Prototyping **5 Hours**

1. Case studies on design thinking and business acceptance of the design
2. Simulation on the role of virtual eco-system for collaborated prototyping
3. Chalk and Talk are used for Problem Solving.

Module-4

DT For strategic innovations

Growth - Story telling representation - Strategic Foresight – Change - Sense Making - Maintenance Relevance - Value redefinition - Extreme Competition - experience Design – Standardization – Humanization - Creative Culture - Rapid prototyping, Strategy and Organization - Business Model **5 Hours**

Teaching-Learning Process:

1. Business model examples of successful designs.
2. Presentation by the students on the success of design.
3. Live project on design thinking in a group of 4 students.

Module-5

Design thinking workshop

Design Thinking Workshop Empathize, Design, Ideate, Prototype and Test **5 Hours**

Teaching-Learning Process:

Design thinking workshop from the expert and then presentation by the students on the learning from the workshop

Course Outcomes:

At the end of the course the student will be able to,

- C01: Identify the methods, processes, and tools of Design Thinking
- C02: Apply the Design Thinking approach and model to real world situations
- C03: Propose design ideas through different Technique
- C04: Develop technical drawings for design ideas
- C05: Execute innovation driven projects using design thinking principles

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Design	John. R. Karsnitz, Stephen O'Brien and John P. Hutchinson	Cengage learning	2 nd Edition, 2013
2	The Design of Business	Roger Martin	Harvard Business Press	2009
3	Design Thinking: Understand- Improve - Apply	Hasso Plattner, Christoph Meinel and Larry Leifer	Springer	2011
Reference Books				
1	Design Thinking for Strategic Innovation	Idris Mootee	John Wiley & Sons	2 nd Edition, 2011
2	Engineering Design Process	Yousef Haik and Tamer M. Shahin	CengageLearning	1 st edition, 2012

Semester: III
Course Name: ADDITIONAL MATHEMATICS-I

Course Code	21MATDIP31	CIE Marks	100
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	-
Total Hours of Pedagogy	40	Total Marks	100
Credits	00	Exam Hours	-

Pre-requisites:

1. Algebraic formulae
2. Differentiation
3. Integration
4. Trigonometric formulae

Module – 1

Linear Algebra

Introduction-Rank of matrix by elementary row operations- Echelon form. Consistency of system of linear equations, Solution of linear equations-Gauss elimination method. Eigen values and Eigen vectors of a square matrix. Problems.

Self-Study: Gauss Jordon Method

8 Hours

Module - 2

Differential Calculus:

Review of successive differentiation-Illustrative examples. Maclaurin's series expansions-Illustrative examples. Partial Differentiation: Euler's theorem-problems on first order derivatives only. Total derivatives-differentiation of composite functions. Jacobian of order two-problems.

Self-Study: Taylor's series expansion.

8 Hours

Module – 3

Vector Differentiation:

Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and Vector point functions. Gradient, Divergence and Curl- Simple problems. Solenoidal and irrotational vector fields-Problems.

Self-Study: Angle between two surfaces

8 Hours

Module – 4

Integral Calculus:

Review of elementary integral calculus. Reduction formulae for $\sin^n x$, $\cos^n x$ (with proof) and $\sin^m x \cos^n x$ (without proof) and evaluation of these with standard limits- Examples. Double and triple integrals-Simple problems.

Self-Study: Change of Order of Integration.

8 Hours

Module – 5

Ordinary Differential Equations:

Introduction-Solutions of first order and first degree differential equation: exact, Equation reducible to exact. Linear differential equations and Bernoulli's equation.

Self-Study: Homogeneous differential equations

8 Hours

Course outcomes:

1. Upon Completion of this course, student will be able to,
2. Make use of matrix theory for solving system of linear equations and compute eigen values and Eigen vectors.
3. Learn the notion of partial differentiation to calculate the rate of change of multivariate functions and solve problems related to composite functions and Jacobians
4. Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors
5. Apply the concept of integration and variables to evaluate multiple integrals and their usage in computing the area and the volumes.
6. Solve first order linear differential equations analytically using standard methods.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers	43 rd Ed. 2015
2	Advanced Engineering Mathematics	E. Kreyszig	John Willy & Sons	10 th Ed. (Reprint). 2016
3	Additional Mathematics-1	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed. 2019.
Reference Books				
1	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill	11 th Edition. 2010

Teaching-Learning Process

The Course faculty and students are recommended to follow the appropriate strategies to facilitate teaching and learning process. The following are some of the suggested teaching-learning methods but not limited to:

- Black board presentation
- Power Point Presentation
- Demonstration through YouTube videos
- Demonstration through ICT Tools / Simulation tools / Virtual Labs
- Industrial Visits
- Self-Study, Case Study
- Flipped Class Room, Google Class Room

Assessment Details

The Assessment of Continuous Internal Examination / Evaluation (CIE) and Semester End Examination (SEE) for a course is planned based on the type** of course category.

Course Category	BSC	Number of Credits	03	Semester	III
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21MEE31	Transform Calculus & Numerical Methods			

Assessment Details:

Continuous Internal Examination / Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The Alternate Assessment Tools are Assignments, Quiz and Seminar

Semester End examination (SEE):

The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

1. The question paper will have ten full questions carrying 20 marks each.
2. There will be two full questions (with a maximum of four sub questions) from each module.
3. The students will have to answer five full questions, selecting one full question from each module.

Course Category	IPCC	Number of Credits	04	Semester	III
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21EC32	Basic Signal Processing			

Assessment Details:

Continuous Internal Examination / Evaluation (CIE):

CIE for the theory component of IPCC: 30 marks

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	18
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	12
	Total Marks for theory component (A+B)			30

The following are the Alternate Assessment Tools but not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

CIE for the LAB component of IPCC: 20 marks

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	08
(ii)	Lab Journal Writing & Submission (B)	10%	02
(iii)	Lab Test (C)	30%	06
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	04
	Total Marks (A+B+C+D)		20

Final CIE Marks = CIE for theory component + CIE for LAB component

Semester End examination (SEE):SEE for IPCC Theory for **3 hours** duration

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module. The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. (Questions mentioned in the SEE paper shall include questions from the practical component)
- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04 / 05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Course Category	PCC-Theory	Number of Credits	03	Semester	III
Number of Courses	02				
List of Courses	Course Code	Course Name			
	21EC33	Digital Circuit Design using Verilog			
	21EC34	Analog Electronic Circuits			

Assessment Details:**Continuous Internal Examination / Evaluation (CIE):**

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

Semester End Examination (SEE):

The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

1. The question paper will have ten full questions carrying 20 marks each.
2. There will be two full questions (with a maximum of four sub questions) from each module.
3. The students will have to answer five full questions, selecting one full question from each module.

Course Category	PCC-Laboratory	Number of Credits	01	Semester	III
Number of Courses	02				
List of Courses	Course Code	Course Name			
	21ECL35	Digital Circuit Design Laboratory			
	21ECL36	Analog Electronic Circuits Laboratory			

Assessment Details:**Continuous Internal Examination / Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks (A+B+C+D)		50

Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute.
- All laboratory experiments are to be included for practical examination.
- Based on the course requirement evaluation rubrics shall be decided jointly by examiners.

- Students can pick one question (experiment) from the questions lot prepared by the internal / external examiners jointly.
- Evaluation of test write-up / conduction procedure and result / viva will be conducted jointly by examiners.
- General rubrics suggested for SEE is mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks.
- SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
- The duration of SEE is **03 hours**

Course Category	HS	Number of Credits	01	Semester	III
Number of Courses	02				
List of Courses	Course Code	Course Name			
	21CIP37	Constitution of India, professional Ethics and Cyber Law			
	21KSK37 / 21KBK37	Samskrutika Kannada / Balake Kannada			

Assessment Details:

For Constitution of India, professional Ethics and Cyber Law (21CIP37)

Continuous Internal Examination / Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

Semester End Examination (SEE):

- Theory SEE will be conducted with common question papers for the subject.
- The question paper will have 100 questions. Each question is set for 01 mark.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 100 marks which will be scaled down to 50 marks.
- Duration of the examination is 02 Hour.

For Samskrutika Kannada / Balake Kannada (21KSK37 / 21KBK37)

Continuous Internal Examination / Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	50
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	50
	Total Marks			100

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, and Open Book etc.

Course Category	AEC-Theory	Number of Credits	01	Semester	III
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21DTI39	Design Thinking and Innovation			

Assessment Details:

Continuous Internal Examination / Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

Semester End Examination (SEE):

- Theory SEE will be conducted with common question papers for subject.
- The question paper will have 100 questions. Each question is set for 01 mark.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 100 marks which will be scaled down to 50 marks.
- Duration of the examination is 02 Hour.

Course Category	AEC-Laboratory	Number of Credits	01	Semester	III
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21AEC38	Programming with Hardware Controllers			

Assessment Details:

Continuous Internal Evaluation (CIE):

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
Total Marks (A+B+C+D)			50

Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute.
- All laboratory experiments are to be included for practical examination.
- Based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal / external examiners jointly.
- Evaluation of test write-up / conduction procedure and result / viva will be conducted jointly by examiners.
- General rubrics suggested for SEE is mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks.
- SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
- The duration of SEE is 02 hours

Course Category	NCMC	Number of Credits	00	Semester	III
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21MATDIP31	Additional Mathematics-I			

Assessment Details:

Continuous Internal Examination / Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	60
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	40
Total Marks				100

Final CIE Marks = (A) + (B)

The Alternate Assessment Tools are Assignments, Quiz and Seminar

There is no SEE for Samskrutika Kannada / Balake Kannada (21KSK37 / 47 / 21KBK37 / 47) and Additional Mathematics-I (21MATDIP31), Additional Mathematics-II (21MATDIP41),

**IPCC: Integrated Professional Core Course	PCC: Professional Core Course
AEC: Ability Enhancement Course	BSC: Basic Science Course
HS: Humanities and Sciences	NCMC: Non-Credit Mathematics Course
UHV: Universal Human Values	INT: Internship

Semester: IV

Course Name: LINEAR ALGEBRA, PROBABILITY AND STATISTICAL METHODS

Course Code	21MCE41	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Pre-requisites:

1. Basic formulae of differentiation and Integration
2. Matrices and determinants
3. Statistics and probability

Module – 1

Vector Spaces and Linear Equations: Vector spaces and subspaces, Linear Independence, Basis and Dimension. The four fundamental Subspaces, Linear Transformation, Rank Nullity Theorem.

Orthogonality: Orthogonal vector, Projections, Least Square approximations, orthonormal bases and Gram-Schmitt Orthogonalization.

Self-Study: Gaussian Elimination.

8 Hours

Module - 2

Determinants:

Eigen Values and Vectors: Introduction to Eigen values and vectors. Diagonalization of matrix, positive definite matrices (Tests for Positive definite matrices) Symmetric matrices (some important theorems) Singular Value decomposition (SVD)

Self-Study: transpose of a matrix

8 Hours

Module – 3

Statistical Methods: Correlation and regression- Karl Pearson's coefficient of correlation and rank correlation, problems. Regression analysis, lines of regression, problems.

Curve Fitting: Curve fitting by the method of least squares, fitting the curves of the forms

$y = ax + b$, $y = ax^b$ and $y = ax^2 + bx + c$.

Self-Study: Angle between two regression lines, problems.

8 Hours

Module – 4

Probability Distributions: Review of basic probability theory. Random Variable (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance. Binomial, Poisson and normal distributions-problems (derivations for mean and standard deviation for Binomial and Poisson distributions only)- Illustrative examples.

Self-Study: Exponential distribution.

8 Hours

Module – 5

Joint Probability Distribution: Joint Probability distribution for two discrete random variables, expectation, covariance and correlation.

Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, Student's t-distribution and Chi-square distribution as a test of goodness of fit.

Self-Study: Point estimation and interval estimation.

8 Hours

Course Outcomes:

Upon completion of this course, student will be able to:

1. Understand the concept of Vector Spaces and its applications
2. Solve Differential equation and Discrete Dynamical system using the concept of Eigen value and Eigen Vector
3. Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
4. Applying discrete and continuous probability distributions in analysing the probability models arising in engineering field.
5. Construct joint probability distributions and demonstrate the validity of testing hypothesis.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers	43 rd Ed. 2015
2	Advanced Engineering Mathematics	E. Kreyszig	John Willy & Sons	10 th Ed. (Reprint). 2016
3	Linear Algebra and its Applications	Gilbert Strang	Cengage Publishers	4 th edition. 2014
4	Linear Algebra and Application	David C Lay	Pearson Education	6 th edition
Reference Books				
1	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill	11 th Edition. 2010
2	Calculus	George. B. Thomas		
3	A Text book of Engineering Mathematics	N. P. Bali and Manish Goyal	Laxmi Publications	Latest edition
4	Linear Algebra	Kenneth Hoffmann, Ray Kunze	Prentice Hall India Learning Private Limited	2 nd Edition 1978

Semester: IV
Course Name: Network Theory & Control Systems

Course Code	21EC42	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	40+20	Total Marks	100
Credits	04	Exam Hours	03

Pre-requisites: Knowledge of complex numbers, Laplace transforms, differential equations, matrix algebra.

Module-1

Basic concepts and network theorems

Types of Sources, Loop analysis, Nodal analysis with independent DC and AC Excitations.

(Textbook 1: 2. 3, 4. 1, 4. 2, 4. 3, 4. 4, 10. 6)

Super position theorem, Thevenin's theorem, Norton's Theorem, Maximum Power transfer Theorem, Millimans Theorem, Reciprocity Theorem.

(Textbook 2: 9. 2, 9. 4, 9. 5, 9. 7)

8 Hours

Self-study topics: KVL and KCL

Module-2

Two port networks: Short-circuit Admittance parameters, Open- circuit Impedance parameters, Transmission parameters, Hybrid parameters and inter-relation between the parameters.

(Textbook 3: 11. 1, 11. 2, 11. 3, 11. 4, 11. 5)

Laplace transform and its Applications: Step, Ramp, Impulse, Solution of networks using Laplace transform, Initial value and final value theorem

(Textbook 3: 7. 1, 7. 2, 7. 4, 7. 7, 8. 4)

8 Hours

Self-study topics: Numerical problems on Laplace transforms

Module-3

Basic Concepts and representation of control systems :

Introduction to control systems, Types of control systems, effect of feedback systems, differential equation of physical systems (only electrical systems), Introduction to block diagrams, transfer functions, Signal Flow Graphs

(Textbook 4: Chapter 1. 1, 2. 2, 2. 4, 2. 5, 2. 6)

8 Hours

Self-study topics: Numerical Problems on differential equations 1-D Kinematics

Module-4

Time Response analysis: Time response of first order systems. Time response of second order systems, time response specifications of second order systems (Textbook 4: Chapter 5. 3, 5. 4)

Stability Analysis: Concepts of stability necessary condition for stability, Routh stability criterion, relative stability Analysis (Textbook 4: Chapter 6. 1, 6. 2, 6. 4, 6. 5)

8 Hours

Self-study topics: Time response of first order systems

Module-5

Root locus: Introduction the root locus concepts, construction of root loci (Textbook 4: 7. 1, 7. 2, 7. 3) Frequency Domain analysis and stability: Correlation between time and frequency response and Bode plots (Textbook 4: 8. 1, 8. 2, 8. 4)

State Variable Analysis: Introduction to state variable analysis: Concepts of state, state variable and state models. State model for Linear continuous -Time systems, solution of state equations.

(Textbook 4: 12. 2, 12. 3, 12. 6)

8 Hours

Self-study topics: Stability analysis on second order systems (Practical Component)

PRACTICAL COMPONENT OF IPCC

SN	Experiments (For CIE only, not for SEE)
1	Verification of Superposition theorem
2	Verification of Thevenin's theorem
3	Speed torque characteristics of i)AC Servomotor ii) DC Servomotor
4	Determination of time response specification of a second order Under damped System, considering different damping factors.
5	Determination of frequency response of a second order System
6	Determination of frequency response of a lead lag compensator
7	Using Suitable simulation package study the speed control of DC motor using i) Armature control ii) Field control
8	Using suitable simulation package, draw Root locus & Bode plot for the given transfer function.

Demonstration Experiments

1	Using suitable simulation package, obtain the time response from state model of a system.
2	Implement a PID Controller and hence realize an Error Detector.
3	Demonstrate the effect of PI, PD and PID controller on the system response

Course Outcomes:

At the end of the course the student will be able to:

1. **Analyze** electrical circuits and two port networks by applying network concepts (loop analysis and network theorems)
2. **Deduce** transfer function of a given physical system, represented by differential equation, block diagram representation and SFG
3. **Analyze** the time response behavior for standard test input signals and construct the state model for the specified control system
4. **Perform** the stability of a system using numerical (Routh-Hurwitz criteria), graphical (root locus) approach and bode plot (frequency responses) approach.
5. **Demonstrate** the concept of electrical networks and control systems through simulation / emulation

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering circuit analysis	William H Hayt, Jr, Jack E Kemmerly, Steven M Durbin	Mc Graw Hill	8 th Indian Edition (8e).
2	Networks and Systems	D Roy Choudhury	New age international Publishers	2 nd edition
3	Network Analysis,	M E Van Valkenburg	Pearson	3 rd edition.
4	Control Systems Engineering	J Nagrath, M. Gopal	New age international Publishers	5 th edition

Semester: IV
Course Name: Digital Signal Processing

Course Code	21EC43	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites: Basics of Signal Processing and transformations (CFT, DTFT, ZT).

Module-1

Introduction Discrete Fourier Transforms (DFT): Frequency domain sampling and Reconstruction of Discrete Time Signals, The Discrete Fourier Transform, DFT as a linear transformation, Properties of the DFT: Periodicity, Linearity and Symmetry properties, Multiplication of two DFTs and Circular Convolution [Text 1: Chapter 7: 7. 1, 7. 2]	8 Hours
Self-Study Topics: Sampling theorem with conditions, Linear transformation	

Module-2

Linear filtering methods based on the DFT: Use of DFT in Linear Filtering, Filtering of Long Data Sequences (Overlap Save and Add). Fast-Fourier-Transform (FFT) algorithms: Efficient Computation of the DFT: Radix-2 FFT algorithms for the computation of DFT and IDFT decimation in- time, Chirp-z Transform, Goertzel Algorithm. [Text 1:Chapter 7:7. 3, Chapter 8: 8. 1(8. 1. 1 to 8. 1. 3), 8. 3]	8 Hours
Self-Study Topics: Difference between DFT and FFT. Application of Goertzel algorithm	

Module-3

Design of FIR Filters: Characteristics of practical frequency-selective filters, Symmetric and Anti- symmetric FIR filters, Design of Linear-phase FIR (low pass and High pass) filters using windows-Rectangular, Hamming, Hanning, Bartlett windows. Structure for FIR Systems: Direct form, Linear-phase form and Lattice structures. [Text1:Ch10:10. 2(10. 2. 1, 10. 2. 2), Ch9:9. 2]	8 Hours
Self-Study Topics: Types of windows and differences	

Module-4

IIR Filter Design: Infinite Impulse Response Filter Format, Bilinear Transformation Design Method, Analog Filters using Low pass prototype transformation, Normalized Butterworth and Chebyshev Functions, Bilinear Transformation and Frequency Warping, Bilinear Transformation Design Procedure, Digital Butterworth Filter Design using BLT. Realization of IIR Filters in Direct form I and II. [Text 2:Ch 8:8. 1, 8. 2, 8. 3]	8 Hours
Self-Study Topics: Difference between FIR and IIR	

Module-5

Digital Signal Processors: DSP Architecture, DSP Hardware Units, fixed point format, Floating point Format, IEEE Floating point formats, Fixed point digital signal processors. [Text 2:Ch 9:9. 1 to 9. 4]	8 Hours
Self-Study Topics: Different types of Architectures	

Course Outcomes:

At the end of the course the student will be able to:

1. **Analyze** the process of sampling and reconstruction of a given signal in frequency domain
2. **Compute** DFT of real and complex discrete time sequence using Linear Transformation Techniques.
3. **Analyze** the Fourier transform of discrete signal using FFT and linear filtering approaches.
4. **Design** digital IIR / FIR filters for a given specifications by choosing appropriate filtering techniques.
5. **Analyze** the DSP processor architecture and IEEE format representation of a given data sequence.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Digital Signal Processing-Principles Algorithms & Applications	Proakis & Manolakis	Pearson education, New Delhi	4 th Edition & 2007
2	Digital Signal processing-Fundamentals and Applications	Li Tan, Jean Jiang	Academic Press	2 nd Edition 2013
Reference Books				
1	Digital Signal Processing, A Computer Based Approach	Sanjit K Mitra	McGraw Hill Education,	4 th edition, 2013
2	Discrete Time Signal Processing	Oppenheim & Schaffer	PHI	2003

Semester: IV
Course Name: Communication Systems- I

Course Code	21EC44	CIE Marks	50
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites: Signals and Systems, Probability theory, Random Processes.

Module-1

Introduction to Communication System: Introduction, Elements of a Communication System, Need for Modulation, Electromagnetic Spectrum and Typical Applications, Terminologies in Communication Systems, Basics of Signal Representation and Analysis.

Amplitude Modulation (AM) Systems: Introduction, Time and Frequency domain representation, AM Generation-Switching Modulator, AM Detection- Envelop detector, significance of RC time constant in envelop detector, virtues, limitations, and modifications of amplitude modulation, Comparison of AM Modulation techniques- Standard AM, DSBSC, SSB and VSB, Frequency translation, Frequency division Multiplexing, Quadrature carrier Multiplexing.

(Text-1: 3. 1, 3. 2, 3. 4, 3. 7, 3. 8 & Text-2: 1. 1-1. 6)

8 Hours

Self-study topics: Basic tools for Communication-Fourier Transforms, Trigonometric relations, Dirac Delta function.

Module-2

Angle Modulation: Basic Definitions- Description of phase modulation (PM) and Frequency modulation (FM), Properties of Angle modulated waves, Relationship between FM and PM.

Frequency Modulation (FM): Narrow band FM, Wideband FM, transmission bandwidth of FM signals using Carson's Rule.

Generation of FM Signals: Direct and Indirect method.

Demodulation of FM Signals: Balanced frequency discriminator and Phase locked loop.

FM stereo Multiplexing, Super heterodyne Receiver.

(Text-1: 4. 1-4. 6 & Text-2: Chapter 4)

8 Hours

Self-study topics: EM Spectrum for FM Broadcasting system [Text-3], Survey on various FM stations around the state.

Module-3

Noise in Analog Modulation: Introduction, shot noise, thermal noise, white noise, Narrow band noise. Representation of noise in-terms of In phase and quadrature components, representation of noise in-terms of envelop and phase components.

Noise in AM Receivers: Signal to Noise Ratios, AM receiver Model, Noise in AM receivers, and Noise in DSBSC receivers.

Noise in FM Receivers: FM receiver Model, Noise in FM reception, FM threshold effect, pre-emphasis and de-emphasis in FM.

(Text-1: 5. 10, 6. 1-6. 6)

8 Hours

Self-study topics: Gaussian Distribution, AWGN, Noise Figure, Power Spectral Density.

Module-4

Analog to Digital Transition: Introduction, Why Digitize Analog Sources? The Low pass Sampling Process, Practical aspects of sampling and signal recovery, Types of Sampling (Natural, Flat top / Sample and Hold, Impulse), Pulse Amplitude Modulation, Time Division Multiplexing, Pulse-Position Modulation, Theme Example- PPM in Impulse Radio.

(Text-1: 7. 1-7. 7)

8 Hours

Self-study topics: Bandwidth requirements for TDM, T1 Carrier Systems- A Case Study (Text 3: 6. 3), Importance of Interleaving.

Module-5

Analog to Digital Transition (Cont. . .): The Quantization Random Process, Quantization Noise, Types of Quantization, Pulse-Code Modulation: Sampling, Quantization, Encoding, Regeneration, Decoding, Filtering, Multiplexing; Delta Modulation, Application examples- (a) Video + MPEG and (b) Vocoders.

Line Codes (RZ & NRZ): Unipolar, Polar, Bipolar, Manchester Coding / Signaling. Other baseband signaling- HDB3, BnZs

(Text-1: 7. 8-7. 11 & Text-3: 6. 8, 7. 1, 7. 2)

8 Hours

Self-study topics: Digital Multiplexing.

Course Outcomes:

At the end of the course the student will be able to:

1. Apply mathematical tools / transformations to analyze the performance of amplitude modulation schemes (Standard AM, DSBSC, SSB & VSB).
2. Analyze FM modulated / demodulated signals from the learning resources and realize the design principles of FM in audio broadcasting.
3. Characterize the influence of channel noise on the modulated signals and analog receivers.
4. Relate the design principles of analog to digital transformations in context to digital signal processing / multimedia applications.
5. Design and Conduct experiment by way of simulation or emulation on analog communication subsystems targeting to specific radio applications.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Communication Systems	Simon Haykins & M Moher	John Willey India Pvt. Ltd.	5 th Edition & 2010
2	Electronic Communication Systems	George Kennedy, Bernard Davis & S R M Prasanna	McGraw Hill Education (India) Private Limited	5 th Edition & 2015
3	Modern Digital and Analog Communication Systems	B P Lathi & Zhi Ding	Oxford University Press	4 th Edition & 2010
Reference Books				
1	Principles of Communication Systems	H Taub & D L Schilling	TMH	3 rd Edition & 2011
2	An Introduction to Analog and Digital Communication	Simon Haykins	John Willey India Pvt. Ltd.	2008

Semester: IV
Name of the Laboratory: Digital Signal Processing Laboratory

Course Code	21ECL45	CIE Marks	50
Teaching Hours / Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	03

Pre-requisites: Basics of Signal Processing and transformations (CFT, DTFT, ZT).

List of Experiments

Part A: List of Programs to be implemented & executed using MATLAB
<ol style="list-style-type: none"> 1. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum. 2. Computation of circular convolution of two given sequences and verification of commutative, distributive and associative property of convolution. 3. Computation of linear convolution of two sequences using DFT and IDFT. 4. Computation of circular convolution of two given sequences using DFT and IDFT 5. Verification of Linearity property, circular time shift property & circular frequency shift property of DFT. 6. Verification of Parseval's theorem 7. Design and implementation of IIR (Butterworth) low pass filter to meet given specifications. 8. Design and implementation of IIR (Butterworth) high pass filter to meet given specifications. 9. Design and implementation of low pass FIR filter to meet given specifications. 10. Design and implementation of high pass FIR filter to meet given specifications.
Part B: List of Hardware Programs to be implemented & executed using CC Studio & TMS320C6713
<ol style="list-style-type: none"> 1. To compute N- Point DFT of a given sequence using DSK 6713 simulator 2. To compute linear convolution of two given sequences using DSK 6713 simulator 3. To compute circular convolution of two given sequences using DSK 6713 simulator
Part C: Demo / Open Ended Experiments (Only for CIE, not for SEE)
<ol style="list-style-type: none"> 1. Implementation of keypad using Goertzel Algorithm 2. Simulation based Face Recognition System 3. Any Open ended Experiments / Mini Lab Projects

Course outcomes:

1. **Determine** response of LTI systems using time domain and DFT techniques
2. **Compute** DFT of real and complex discrete time signals and its properties on MATLAB / DSP Processor.
3. **Compute** Linear and Circular Convolution and verify its properties.
4. **Design** FIR and IIR Digital Filters for a given specifications.
5. **Demonstrate** the solutions for the given open ended problem / Mini lab projects in the area of Digital signal Processing.

Suggested Learning Resources:

1. Lab Manual

Reference Books:

1. Digital Signal Processing: principles and Applications, Dimitris G. Manolakis. J. G. Proakis, Pearson 4th Ed.
2. Digital Signal processing, S. K. Mitra, Mc Graw Hill Education, 4th Ed.

Semester: IV
Name of the Laboratory: Communication Laboratory-I

Course Code	21ECL46	CIE Marks	50
Teaching Hours / Week (L:T:P)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	20	Total Marks	100
Credits	01	Exam Hours	03

Pre-requisites: Signals and Systems, Analog and Digital circuit fundamentals, Probability theory and Random Processes.

List of Experiments

Part A: Design of Experiments using Discrete Components	
SN	Experiments
1	Design of active second order Butterworth Low pass and high pass filters
2	Amplitude Modulation and Demodulation of Standard AM
3	FM Signal generation (IC8038 / IC2206 can be used)
4	Pulse Amplitude Modulation and demodulation
5	Design and test BJT / FET Mixer
Part B: Design based / Simulation based Experiments using MATLAB / SCILAB / SIMULINK / LABVIEW etc.	
1	Illustration of (a) AM modulation and demodulation and display the signal and its spectrum. (b) DSB-SC modulation and demodulation and display the signal and its spectrum.
2	Illustration of FM modulation and demodulation and display the signal and its spectrum
3	Illustration of Pulse code modulation and demodulation
4	Illustration of Delta Modulation and the effects of step size selection in the design of DM encoder
5	Illustrate the process of sampling and reconstruction of low pass signals. Display the signals and its spectrums of both analog and sampled signals.
6	Simulate Line codes and Generate NRZ, RZ Unipolar and Polar signaling waveforms.
Part C: Demo / Kit based / Open Ended Experiments (Only for CIE, not for SEE)	
1	Demonstrate Time Division Multiplexing and De-multiplexing of two band limited signals.
2	Design of active Butterworth Band pass filter using Op-amp.
3	Pulse width Modulation
4	Phase Locked Loop Synthesis
5	Any Open ended Experiments / Mini Lab Projects

Course Outcomes:

At the end of the course the student will be able to:

1. Design and Validate 2nd order active filters as per the given design Specifications (Cut-off frequency, Roll off factor, Gain, Bandwidth etc) and stability requirements.
2. Demonstrate the AM and FM modulation / Demodulation for a given specification through discrete circuit implementation and Measure its performance parameters (Modulation Index, Carrier frequency, Bandwidth etc).
3. Design and Test the Pulse Amplitude Modulation / demodulation using discrete circuits and Comment on sampling criteria / Conditions.
4. Test BJT / FET Mixer and realize the need of mixer and local oscillator in superheterodyne receivers.
5. Simulate / Emulate assorted communication system applications that involve signal transmission / recovery, modulation process, multiplexing, analog to digital signal transformations, line coding etc.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Communication Systems	Simon Haykins & M Moher	John Willey India Pvt. Ltd.	5 th Edition & 2010
2	Modern Digital and Analog Communication Systems	B P Lathi & Zhi Ding	Oxford University Press	4 th Edition & 2010
3	Principles of Electronics Communication Systems	Louis E Frenzel	TMH	2016
Reference Books				
1	An Introduction to Analog and Digital Communication	Simon Haykins	John Willey India Pvt. Ltd.	2008
2	Principles of Communication Systems	H Taub & D L Schilling	TMH	2011

Semester: IV
Course Name: Soft Skills and Basic Aptitude

Course Code	21SSA480	CIE Marks	50
Teaching Hours / Week (L:T:P)	1:2:0	SEE Marks	50
Total Hours of Pedagogy	30	Total Marks	100
Credits	02	Exam Hours	02

Pre-requisites:

- Basic Conversational English
- Fundamentals of Mathematics
- Basic Knowledge of Reasoning

Module-1

Communication Skills

Basic Tools of Communication, Listening Skills, Body Language, Voice, Verbal Language, Conversations in Professional Setting **6 Hours**

Module-2

Presentation Skills

Zero Presentation, Individual Presentations, Feedback, Types of Introductions, Captivating the Audience, Interaction Methods, Signing off. **6 Hours**

Module-3

Verbal & Numerical Ability

Vocabulary is Fun, Root Words, Sentence Structures, Bouncing, Similar and Opposite Words, Common Errors, Number System, Factors and Multiples. **6 Hours**

Module-4

English Language

Phonetic and Non-phonetic Languages, sounds in English, IPA, Syllables, Word Stress, Stress patterns in Indian languages vs English, Pausing and Rhythm in English, Sentence Structures, Bouncing, Common Errors **6 Hours**

Module-5

Verbal Ability and Verbal Reasoning

Similar and Opposite words, Number and Alphabet Series, Human Relations, Direction Tests, Coding Decoding, Clocks and Calendars **6 Hours**

Course Outcomes:

At the end of the course the student will be able to:

1. Demonstrate communicative ability in a professional environment
2. Articulate one's ideas and demonstrate them to an audience
3. Transform one's English Vocabulary and Language Structure
4. Interpret international phonetic symbols, stress patterns, and enhance English speech
5. Identify patterns, determine the problem-solving process & validate solutions

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Reasoning N' Reasoning-Verbal & Non-verbal Reasoning	Dr. Ravi Chopra	Galgotia	1994
2	Magical Book on Quicker Math	M. Tyra	BSC	I Edition, 2018
3	Communicate With Confidence	Diana Booher	Mc-Graw-Hill	Nov 2011
Reference Books				
1	Cambridge Advanced Learner's Dictionary	Cambridge University Press	CBS	IV Edition, 2013
2	A Modern Approach to Verbal and Non-verbal Reasoning	R S Agarwal	S Chand	II Edition, 2018
3	Word Power Made Easy	Norman Lewis	Goyal Publishers	IV Edition, 2014
4	Speak With Confidence	Diana Booher	Mc-Graw-Hill	I Edition, 2002

Semester: IV
Course Name: Digital System Design with FPGA

Course Code	21AEC482	CIE Marks	50
Teaching Hours / Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	02

Pre-requisites: Familiarity with Digital logic and working knowledge of Verilog language

Module-1

Review of Logic Design Fundamentals & Verilog HDL: Combinational & Sequential Logic, Sequential Circuit Timing Diagram, Melay & Moore Sequential Circuit Design, Verilog HDL constructs & simple examples.
Textbook 1: Chapter 1 & Chapter 2 **3 Hours**

Module-2

Introduction to Programmable Logic Devices: Brief Overview of Programmable Logic Devices Simple Programmable Logic Devices (SPLDs), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Arrays (FPGAs)
Textbook 1: 3. 1, 3. 2, 3. 3 and 3. 4 **4 Hours**

Module-3

FPGA Design and Verification Flow: Design Phase, Implementation Phase, Debug & Verification Phase, Static Timing analysis, Target to FPGA
Web link-1 **4 Hours**

Module-4

Designing with FPGAs: Implementing Functions in FPGAs, Implementing Functions Using Shannon's Decomposition, Carry Chains in FPGAs, Cascade Chains in FPGAs, Examples of Logic Blocks in Commercial FPGA, Dedicated Memory in FPGAs, Dedicated Multipliers in FPGAs, Cost of Programmability.
Textbook 1: 6. 1, 6. 2, 6. 3, 6. 4, 6. 5, 6. 6, 6. 7, 6. 8 **4 Hours**

Course Outcomes:

At the end of the course the student will be able to:

1. Explore different programmable logic devices and their use to design digital circuits.
2. Identify different phases in the FPGA Design and verification.
3. Employ Verilog language constructs to design a digital circuit and implement the solution on a FPGA board.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1.	Digital System Design Using Verilog	Charles H Roth, Lizy Kurian John, Byeong Kil Lee	Cengage Learning	1 st Edition, 2016

Web link:

https://www.researchgate.net/figure/Design-flow-for-FPGA-based-systems_fig2_267478701

Semester: IV

Course Name: Universal Human Values: Understanding Harmony and Ethical Human Conduct

Course Code	21UHV490	CIE Marks	50
Teaching Hours / Week (L:T:P)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	02

Course Description:

This introductory course input is intended:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

This course is intended to provide a much-needed orientational input in value education to the young enquiring minds.

Teaching-Learning Process (General Instructions)

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 15 lectures (discussions)
3. It is free from any dogma or value prescriptions.
4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation-the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self- evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

Module-1

Introduction to Value Education

3 hours

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the Basic Human Aspirations, Happiness and Prosperity-Current Scenario, Method to Fulfil the Basic Human Aspirations

Module-2

Harmony in the Human Being

3 hours

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

Module-3

Harmony in the Family and Society

3 hours

Harmony in the Family-the Basic Unit of Human Interaction, 'Trust'-the Foundational Value in Relationship, 'Respect'-as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order

Module-4

Harmony in the Nature / Existence

3 hours

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

Module-5

Implications of the Holistic Understanding-a Look at Professional Ethics

3 hours

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

Course Outcomes:

At the end of the course the student will be able to:

1. Develop personality with responsibilities and self-respect.
2. Build real world skills like communication, lifelong-learning and problem-solving.
3. Create harmonious relationship among faculty and students.
4. Provide an organized philanthropic service to the society through activities.
5. Create awareness on health, yoga, human relationships, universal peace, environment, society and nation.

Suggested Learning Resources:

Text Book and Teachers Manual:

- a. The Textbook
A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN978-93-87034-47-1.
- b. The Teacher's Manual
Teacher's Manual for *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana.

Reference Books:

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A. N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth-by Mohandas Karamchand Gandhi
5. Small is Beautiful-E. F Schumacher.
6. Slow is Beautiful-Cecile Andrews
7. Economy of Permanence-J C Kumarappa
8. Bharat Mein Angreji Raj-Pandit Sunderlal
9. Rediscovering India-by Dharampal
10. Hind Swaraj or Indian Home Rule-by Mohandas K. Gandhi
11. India Wins Freedom-Maulana Abdul Kalam Azad
12. Vivekananda-Romain Rolland (English)
13. Gandhi-Romain Rolland (English)
14. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
15. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth-Club of Rome's report, Universe Books.
16. A Nagaraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
17. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
18. A N Tripathy, 2003, Human Values, New Age International Publishers.
19. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
20. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
21. M Govindrajran, S Natrajan & V. S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
23. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co. Lucknow. Reprinted 2008.

Semester: IV
Course Name: Additional Mathematics-II

Course Code	21MATDIP41	CIE Marks	100
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	--
Total Hours of Pedagogy	40	Total Marks	100
Credits	00	Exam Hours	00

Pre-requisites:

- Differentiation
- Integration
- Trigonometric formulae
- Differential equations

Module-1

Higher Order ODE's

Linear Differential equations of second and higher order equations with constant coefficients. Homogeneous / non-homogeneous equations. Inverse differential operators. [Particular integral restricted to $\phi(x) = e^{ax}, \sin ax, \cos ax$ for $f(D)y = \phi(x)$]

Self-Study: Finding particular Integral for $\phi(x) = x^m$

8 Hours

Module-2

Partial Differential Equations (PDE's):

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct by integration. Homogeneous PDE involving derivative with respect to one independent variable only.

Self-Study: Method of separation of variables

8 Hours

Module-3

Laplace Transform:

Definition, Laplace transforms of elementary functions. Laplace transform of $e^{at}f(t), t^n f(t)$ (without proof). Laplace transform of Periodic functions (statement only) and Unit-step function- problems.

Inverse Laplace Transform: Definition, Inverse Laplace Transform of standard functions. Inverse transform by Partial fraction Method. Apply the concepts of Laplace Transforms to find the solution of linear differential equations.

Self-Study: Convolution Theorem

8 Hours

Module-4

Numerical Methods:

Solution of algebraic and transcendental equations by Newton-Raphson method and Secant method.

Interpolation: Newton's Forward and Backward Interpolation formulae, Newton's divided difference formula, Lagrange's Interpolation formula-problems.

Numerical Integration: Simpson's 1 / 3rd and 3 / 8th rule (without proof)-problems.

Self-Study: Weddle's Rule

8 Hours

Module-5

Probability:

Introduction, sample space and events. Axioms of probability. Addition & multiplication theorems. Conditional probability, Baye's theorem. Problems.

Self-Study: Applications Baye's theorem

8 Hours

Course outcomes:

Upon completion of this course, student will be able to:

1. Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
2. Construct a variety of partial differential equations and solution by various methods.
3. Use Laplace Transform and inverse Laplace Transform in solving differential / integral equation arising in network analysis, control systems and other fields of engineering
4. Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
5. Use the concepts of probability in different probability distribution.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author / s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers	43 rd Ed. 2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint). 2016
3	Additional Mathematics-2	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed. 2019.
Reference Books				
1	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw-Hill	11 th Edition. 2010

Teaching-Learning Process

The Course faculty and students are recommended to follow the appropriate strategies to facilitate teaching and learning process. The following are some of the suggested teaching-learning methods but not limited to:

- Black board presentation
- Power Point Presentation
- Demonstration through YouTube videos
- Demonstration through ICT Tools / Simulation tools / Virtual Labs
- Industrial Visits
- Self-Study, Case Study
- Flipped Class Room, Google Class Room

Assessment Details

The Assessment of Continuous Internal Examination/Evaluation (CIE) and Semester End Examination (SEE) for a course is planned based on the type** of course category.

Course Category	BSC	Number of Credits	03	Semester	IV
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21MCE41	Linear Algebra, Probability and Statistical Methods			

Assessment Details:

Continuous Internal Examination/ Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The Alternate Assessment Tools are Assignments, Quiz and Seminar

Semester End examination (SEE):

The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

The question paper will have ten full questions carrying 20 marks each.

There will be two full questions (with a maximum of four sub questions) from each module.

The students will have to answer five full questions, selecting one full question from each module.

Course Category	IPCC	Number of Credits	04	Semester	IV
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21EC42	Network Theory & Control Systems			

Assessment Details:

Continuous Internal Examination/ Evaluation (CIE):

CIE for the theory component of IPCC: 30 marks

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	18
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	12
	Total Marks for theory component (A+B)			30

The following are the Alternate Assessment Tools but not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

CIE for the LAB component of IPCC: 20 marks

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	08
(ii)	Lab Journal Writing & Submission (B)	10%	02
(iii)	Lab Test (C)	30%	06
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	04
	Total Marks (A+B+C+D)		20

Final CIE Marks = CIE for theory component + CIE for LAB component

Semester End examination (SEE):**SEE for IPCC Theory for 3 hours duration**

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module. The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. (Questions mentioned in the SEE paper shall include questions from the practical component)
- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Course Category	PCC-Theory	Number of Credits	03	Semester	IV
Number of Courses	02				
List of Courses	Course Code	Course Name			
	21EC43	Digital Signal Processing			
	21EC44	Communication Systems-I			

Assessment Details:**Continuous Internal Examination/ Evaluation (CIE):**

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

Semester End examination (SEE):

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying 20 marks each.
- There will be two full questions (with a maximum of four sub questions) from each module.
- The students will have to answer five full questions, selecting one full question from each module.

Course Category	PCC-Laboratory	Number of Credits	01	Semester	IV
Number of Courses	02				
List of Courses	Course Code	Course Name			
	21ECL45	Digital Signal Processing Laboratory			
	21ECL46	Communication Laboratory-I			

Assessment Details:**Continuous Internal Examination/ Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks (A+B+C+D)		50

Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute.
- All laboratory experiments are to be included for practical examination.
- Based on the course requirement evaluation rubrics shall be decided jointly by examiners.

- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE is mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks.
- SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
- The duration of SEE is 03 hours

Course Category	HS	Number of Credits	01	Semester	IV
Number of Courses	02				
List of Courses	Course Code	Course Name			
	21CIP47	Constitution of India, professional Ethics and Cyber Law			
	21KSK47/21KBK47	Samskrutika Kannada/Balake Kannada			

Assessment Details:

For Constitution of India, professional Ethics and Cyber Law (21CIP47)

Continuous Internal Examination/ Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
Total Marks				50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

Semester End Examination (SEE):

- Theory SEE will be conducted with common question papers for the subject.
- The question paper will have 100 questions. Each question is set for 01 mark.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 100 marks which will be scaled down to 50 marks.
- Duration of the examination is 02 Hour.

For Samskrutika Kannada/Balake Kannada (21KSK47/21KBK47)

Continuous Internal Examination/ Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	50
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	50
Total Marks				100

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Open Book etc.

Note: There is no SEE for the course Samskrutika Kannada/Balake Kannada (21KSK47/21KBK47)

Course Category	AEC-Theory	Number of Credits	02	Semester	IV
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21SSA480	Soft skills and basic aptitude			

Assessment Details:

Continuous Internal Examination/ Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
Total Marks				50

Final CIE Marks = (A) + (B)

Alternate Assessment Tool: 5-10 minute presentation (one on one – offline/online)

Semester End Examination (SEE):

The pattern of the question paper will be objective type (MCQ) for 100 marks and then reduced to 50 marks.
The time allotted for SEE is 02 hours

Course Category	AEC-Theory	Number of Credits	01	Semester	IV
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21AEC482	Digital System Design with FPGA			

Assessment Details:**Continuous Internal Examination/ Evaluation (CIE):**

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

Semester End Examination (SEE):

- The question paper will have 100 questions. Each question is set for 01 mark.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 100 marks which will be scaled down to 50 marks.
- Duration of the examination is 02

Course Category	UHV	Number of Credits	01	Semester	IV
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21UHV490	Universal Human Values			

Assessment Details:**Continuous Internal Examination/ Evaluation (CIE):**

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

Semester End Examination (SEE):

- Theory SEE will be conducted with common question papers for subject.
- The question paper will have 100 questions. Each question is set for 01 mark.
- SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 100 marks which will be scaled down to 50 marks.
- Duration of the examination is 02

Course Category	NCMC	Number of Credits	00	Semester	IV
Number of Courses	01				
List of Courses	Course Code	Course Name			
	21MATDIP41	Additional Mathematics - II			

Assessment Details:

Continuous Internal Examination/ Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	60
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	40
	Total Marks			100

Final CIE Marks = (A) + (B)

Note: There is no SEE for the course Additional Mathematics - II

The Alternate Assessment Tools are Assignments, Quiz and Seminar

****IPCC:** Integrated Professional Core Course

AEC: Ability Enhancement Course

HS: Humanities and Sciences

UHV: Universal Human Values

PCC: Professional Core Course

BSC: Basic Science Course

NCMC: Non-Credit Mathematics Course

INT: Internship



Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT
Autonomous Institute under Visvesvaraya Technological University, Belagavi
Department of Electrical and Electronics Engineering



Date:21-11-2022

CIRCULAR

Dear Sir /Madam,

Board of Studies meeting in the Electrical & Electronics Engineering board is scheduled on **25-11-2022** at **10:30AM** in our institute in **ONLINE/OFFLINE** mode. You are requested to attend the meeting. The main agenda of the meeting is to finalize the syllabus of B.E. First Year subjects of EEE department.

H.O.D

Head of the Department,

Department of Electrical & Electronics Engineering,
Ballari Institute of Technology & Management,
BALLARI.



Date: 28/11/2022

Minutes of Meeting

Board of Studies Meeting of Electrical & Electronics Department was held on 25/11/2022 at 10:30 AM through online/offline mode. The Chairman welcomed all the honorable members to the meeting.

The agenda of meeting was:

1. To finalize contents of the syllabus for 3rd and 4th semester.

The contents of the syllabus was discussed and following suggestions were given by the members.

Sl. No.	Sem	Course Code	Name of the Course	Review Comments/Suggestions
1	I & II	22EEE13	Elements of Electrical Engineering	• Recommended to include measuring instruments in the Module 4
				• Suggested to change the title as Electrical energy consumption instead of electricity bill in Module 5 .
				• Suggested to include trivector meter in the Module 3 .
				• Suggested to change the title as 1-phase AC circuits in place of AC fundamentals.
2	I & II	22ESC142/242	Introduction to Electrical Engineering	• Recommended to include Electromagnetism in Module 1 .
				• Recommended to include Alternators and power generation (conventional) in the Module 3 instead of DC Machines.
				• Suggested to redefine the COs
				• Suggested to change the title as Electrical energy consumption instead of electricity bill in Module 5 .
3	I & II	22ETS15E/25E	Renewable Energy Resources	• No change in the contents of the syllabus and suggested to refine the CO with suitable action verbs.

Head of the Department,
Department of Electrical & Electronics Engineering,
Ballari Institute of Technology & Management,
BALLARI.

Copy to: For internal circulation only

Sl. NO	Name of the Faculty	Role	Online / Offline	Signature
1	Dr.Sharana Reddy	Chairman	Attended Offline	
2	Dr.Manjunath Sharma	V.T.U.Nominee	Attended on line	
3	Dr.Ramesh L.Chakrasali	Member (subject expert from outside)	Attended on line	
4	Dr. Suresh Jangamshetty	Member (subject expert from outside)	Attended on line	
5	Mr.Shivarajappa	Member	Attended on line	
6	Dr.B S Khened	Member	Attended Offline	
7	Dr.Raghavendra P	Member	Attended Offline	
8	Dr.Abdul Khadar.A	Member	Attended Offline	
9	Mrs. Arathi P.B	Member	Attended Offline	
10	Mr.Md Anwar	Member	Attended on line	
11	Mr.Shridhar S M	Member	Attended Offline	
12	Mr.Y Kamal Kishore	Member	Attended Offline	
13	Mrs.Sujatha. D	Member	Attended Offline	
14	Mrs.Farzana Begum K.	Member	Attended Offline	
15	Mrs.Parvathi	Member	Attended Offline	
16	Mr.Harish Kumar G	Member	Attended Offline	
17	Mr.Santhosh B M	Member	Attended Offline	
18	Mr.Vijaya Krsihna M	Member	Attended Offline	
19	Mr.Vijaya Kumar M K	Member	Attended Offline	
20	Mrs. Pushpalatha kumari	Member	Attended Offline	

The meeting ended with vote of thanks by the chairman.

H.O.D
 Head of the Department,
 Department of Electrical & Electronics Engineering
 Ballari Institute of Technology & Management
 BALLARI.



Date:12-09-2022

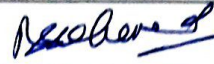
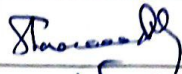
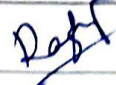


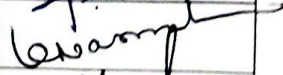

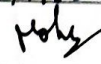
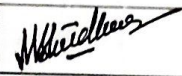






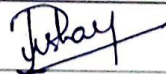
CIRCULAR

Dear Sir /Madam,

Board of Studies meeting in the Electrical & Electronics Engineering board is scheduled on **15-09-2022** at **10:30AM** in our institute in **ONLINE/OFFLINE** mode. You are requested to attend the meeting. The main agenda of the meeting is to finalize the scheme and syllabus of B.E. III/IV semesters.

The Meeting Link will be shared later.

Shree...
Head of the Department,
H.O.D
Department of Electrical & Electronics Engineering,
Ballari Institute of Technology & Management,
BALLARI.

S. No.	BoS Members	Signature
1	Dr. B . S. Khened	
2	Dr. Sharana Reddy	
3	Dr. Raghavendra P	
4	Dr. Abdul Khadar A	
5	Mrs. Arathi P.B	
6	Mr. Narasimhulu.K	
7	Mr. Y.Kamal Kishore	
8	Mr. Mahammad Anwar	
9	Mr. Shridhar S.M	
10	Mrs. Parvathi	
11	Mrs. Sujatha D	
12	Mrs. Farzana Begum.K	
13	Mr. Vijaya Krishna M	
14	Mr. Harish Kumar G	
15	Mr. Santosha B.M	
16	Mr. Vijay Kumar M.K	
17	Mrs. Pushpa Latha Kumari	

Date: 19/09/2022

Minutes of Meeting

Board of Studies Meeting of Electrical & Electronics Department was held on 15/09/2022 at 10:30 AM through online/offline mode. The Chairman welcomed all the honorable members to the meeting.

The agenda of meeting was:

- 1) To finalize credit distribution for 3rd and 4th semester scheme.
- 2) To finalize scheme and contents of the syllabus for 3rd and 4th semester.

The contents of the syllabus was discussed and following suggestions were given by the members.

Sl. No.	Sem	Course Code	Name of the Course	Review Comments/Suggestions
1	III	21EE33	Analog Electronic Circuits & Op - Amps	<ul style="list-style-type: none"> Recommended to include ADC and DAC topics in module-4 and suggested to remove active filters.
2		21EE34	Electrical Machines -I	<ul style="list-style-type: none"> Suggested to include main contents with title of the subject.
3		21EEL35	AEC & Op-Amp Laboratory	<ul style="list-style-type: none"> Suggested to include open ended experiments.
4		21EEL36	Electrical Machines Laboratory - I	<ul style="list-style-type: none"> Suggested to include open ended experiments.
5		21DTI39	Ability Enhancement Course - Design Thinking & Innovation	<ul style="list-style-type: none"> Suggested to include contact hours, RBT levels and course outcomes.
6	IV	21EE42	Digital System Design	<ul style="list-style-type: none"> Recommended to modify the course title as Digital Circuit Design Recommended to remove reduced prime implicant tables topic in Module 1. Suggested to remove counter design topic in Module 5.
7		21EE44	Electrical Machines - II	<ul style="list-style-type: none"> Recommended to include Permanent Magnet Synchronous Motor (PMSM) and Written Pole Motor in Module 5
8		21EEL45	Power Electronics Laboratory	<ul style="list-style-type: none"> Suggested to include open ended experiments.
9		21EEL46	Electrical Machine Laboratory - II	<ul style="list-style-type: none"> Suggested to include open ended experiments.
11		21AEE48X	Biography for Engineers	<ul style="list-style-type: none"> Suggested to include contact hours and RBT levels for each Module.
			Scilab for Electrical & Electronics Measurements	<ul style="list-style-type: none"> Suggested to change the title of the experiments.
12		21UHV490	Universal Human Values	<ul style="list-style-type: none"> Suggested to include contact hours and RBT levels for each Module.

Head of the Department,

 Department of Electrical & Electronics Engineering,
 Ballari Institute of Technology & Management,

BALLARI.



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Sl. NO	Name of the Faculty	Role	Online / Offline	Signature
1	Dr.Sharana Reddy	Chairman	Attended Offline	<i>Sharana Reddy</i>
2	Dr.Manjunath Sharma	V.T.U.Nominee	Attended on line	ONLINE
3	Dr.Ramesh L.Chakrasali	Member (subject expert from outside)	Attended on line	Attended online
4	Mr.Shivarajappa	Member	Attended on line	Attended online
5	Dr.B S Khened	Member	Attended Offline	
6	Dr.Raghavendra P	Member	Attended Offline	<i>Raghavendra P</i>
7	Dr.Abdul Khadar.A	Member	Attended Offline	<i>Abdul Khadar.A</i>
8	Mrs. Arathi P.B	Member	Attended Offline	<i>P.B Arathi</i>
9	Mr.Md Anwar	Member	Attended on line	Attended online
10	Mr.Shridhar S M	Member	Attended Offline	<i>Shridhar S M</i>
11	Mr.Y Kamal Kishore	Member	Attended Offline	<i>Y Kamal</i>
12	Mr.Narasimhulu K	Member	Attended Offline	<i>Narasimhulu K</i>
13	Mrs.Sujatha. D	Member	Attended Offline	<i>Sujatha D</i>
14	Mrs.Farzana Begum K.	Member	Attended Offline	<i>Farzana Begum K.</i>
15	Mrs.Parvathi	Member	Attended Offline	<i>Parvathi</i>
16	Mr.Harish Kumar G	Member	Attended Offline	<i>Harish Kumar G</i>
17	Mr.Santhosh B M	Member	Attended Offline	<i>Santhosh B M</i>
18	Mr.Vijaya Krsihna M	Member	Attended Offline	<i>Vijaya Krsihna M</i>
19	Mr.Vijaya Kumar M K	Member	Attended Offline	<i>Vijaya Kumar M K</i>
20	Mrs. Pushpalatha kumari	Member	Attended Offline	<i>Pushpalatha kumari</i>

The meeting ended with vote of thanks by the chairman.

Sharana Reddy
 H.O.D

BoS chairman,
 Head of the Department
 Department of Electrical & Electronics Engineering
 Ballari Institute of Technology & Management,
 BALLARI.



Date:04-08-2022

A meeting was held on 04-08-2022 at 10:30am to design curriculum of 3rd and 4th semesters for the academic year 2022-23. The following internal BoS members are involved in the preparation of curriculum design.

Sl.No	Name of the BoS members	Subjects allotted	Semester	Signature
1	Dr. Sharana Reddy	1.Electrical Machines-1	3 rd	
		2.Electrical Machines-2	4 th	
2	Dr. Raghavendra P	1.Ability Enhancement Course	3 rd	
		2.Ability Enhancement Course	4 th	
3	Dr. Abdul Khader A	1.Electrical Machines lab -1	3 rd	
		2.Electrical Machines lab-2	4 th	
4	Prof. Arathi P.B	1. Analog Electronic Circuits and Op - Amps	3 rd	
		2. A E C & Op - Amps lab		
5	Prof. Kamal Kishore Y	1.Electric Circuit Analysis	3 rd	
		2. Electric Circuit Analysis lab		
6	Prof. Md Anwar	1.Power Electronics	4 th	
		2. Power Electronics Lab		
7	Prof. Shridhar S M	1.Digital System Design	4 th	
		2.DSD Lab		
8	Prof. Sujatha H	1.Analog Electronic Circuits and Op - Amps	3 rd	
		2. A E C & Op - Amps lab		

H.O.D

Head of the Department,

Department of Electrical & Electronics Engineering,

Ballari Institute of Technology & Management,

BALLARI.



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Scheme of Teaching and Evaluation for B.E III & IV Semester Electrical & Electronics Engineering Program

SILVER JUBILEE YEAR
2021-22
QUALITY EDUCATION SINCE 1971



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Semester 1 - Physics Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT11	Calculus & Linear Algebra	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21PHY12	Engineering Physics	Physics	Physics	2	2	0	3	3	50	50	100
03	21BEE13	Basic Electrical Engineering	E & E Engg.	E & E Engg.	2	2	0	3	3	50	50	100
04	21CIV14	Elements Of Civil Engineering	Civil Engg.	Civil Engg.	2	2	0	3	3	50	50	100
05	21EGDL15	Engineering Graphics	Mech. Engg.	Mech. Engg.	2	0	2	3	3	50	50	100
06	21PEI16	Professional English - I	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21PHYL17	Engineering Physics Laboratory	Physics	Physics	0	0	2	1	3	50	50	100
08	21BEL18	Basic Electrical Engineering Laboratory	E & E Engg.	E & E Engg.	0	0	2	1	3	50	50	100
09	21SSD19	Study Skill & Self Development	Humanities	Humanities	1	0	0	1	3	50	50	100
Total					12	10	6	20	27	450	450	900

Semester 1 - Chemistry Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT11	Calculus & Linear Algebra	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21CHE12	Engineering Chemistry	Physics	Physics	2	2	0	3	3	50	50	100
03	21PSP13	Problem Solving Through C Programming	CSE	CSE	2	2	0	3	3	50	50	100
04	21ELN14	Electronics & Communication – Fundamentals & Applications	E & C Engg.	E & C Engg.	2	2	0	3	3	50	50	100
05	21EME15	Elements of Mechanical Engineering	Mech. Engg.	Mech. Engg.	2	2	2	3	3	50	50	100
06	21PEI16	Professional English - I	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21CHEL17	Engineering Chemistry Laboratory	Chemistry	Chemistry	0	0	2	1	3	50	50	100
08	21CPL18	Computer Programming Laboratory	CSE	CSE	0	0	2	1	3	50	50	100
09	21CEP19	Communicative Skill Enhancement Practice	Humanities	Humanities	0	0	2	1	3	50	50	100
Total					11	12	6	20	27	450	450	20

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Semester 2 - Physics Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT21	Advance Calculus & Numerical Methods	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21PHY22	Engineering Physics	Physics	Physics	2	2	0	3	3	50	50	100
03	21BEE23	Basic Electrical Engineering	E&E Engg.	E & E Engg.	2	2	0	3	3	50	50	100
04	21CIV24	Elements Of Civil Engineering	Civil Engg.	Civil Engg.	2	2	0	3	3	50	50	100
05	21EGDL25	Engineering Graphics	Mech. Engg.	Mech. Engg.	2	0	2	3	3	50	50	100
06	21PEI26	Professional English - II	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21PHYL27	Engineering Physics Laboratory	Physics	Physics	0	0	2	1	3	50	50	100
08	21BEL28	Basic Electrical Engineering Laboratory	E & E Engg.	E & E Engg.	0	0	2	1	3	50	50	100
09	21SSD29	Study Skill & Self Development	Humanities	Humanities	1	0	0	1	3	50	50	100
				Total	12	10	6	20	27	450	450	900

Semester 2 - Chemistry Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT21	Advance Calculus & Numerical Methods	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21CHE22	Engineering Chemistry	Physics	Physics	2	2	0	3	3	50	50	100
03	21PSP23	Problem Solving Through C Programming	CSE	CSE	2	2	0	3	3	50	50	100
04	21ELN24	Electronics & Communication – Fundamentals & Applications	E & C Engg.	E & C Engg.	2	2	0	3	3	50	50	100
05	21EME25	Elements of Mechanical Engineering	Mech. Engg.	Mech. Engg.	2	2	2	3	3	50	50	100
06	21PEI26	Professional English - II	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21CHEL27	Engineering Chemistry Laboratory	Chemistry	Chemistry	0	0	2	1	3	50	50	100
08	21CPL28	Computer Programming Laboratory	CSE	CSE	0	0	2	1	3	50	50	100
09	21CEP29	Communicative Skill Enhancement Practice	Humanities	Humanities	0	0	2	1	3	50	50	100
				Total	11	12	6	20	27	450	450	20

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Semester 3

SL	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	BSC	21MAT31	Engg. Mathematics - III	Mathematics	Mathematics	3	0	0	3	3	50	50	100
02	IPCC	21EE32	Electric Circuit Analysis	EEE	EEE	3	0	2	4	3	50	50	100
03	PCC	21EE33	Analog Electronic Circuits & Op - Amps	EEE	EEE	3	0	0	3	3	50	50	100
04	PCC	21EE34	Electrical Machines - I	EEE	EEE	3	0	0	3	3	50	50	100
05	PCC	21EEL35	AEC & Op-Amp Laboratory	EEE	EEE	0	0	2	1	3	50	50	100
06	PCC	21EEL36	Electrical Machines Laboratory - I	EEE	EEE	0	0	2	1	3	50	50	100
07	HS	21KSK37/47	Samskrutika Kannada	Humanities	Humanities	1	0	0	1	--	100	--	100
		21KBK37/47	Balake Kannada										
	OR												
	HS	21CIP37/47	Constitution of India and Professional Ethics							2	50	50	
08	AEC	21AEE38	Ability Enhancement Course - Circuit Laboratory Using Pspice	EEE	EEE	0	0	2	1	2	50	50	100
						For AEC as lab course							
						1	0	0					
09	AEC	21DTI39	Ability Enhancement Course - Design Thinking & Innovation	EEE	EEE	1	0	0	1	2	50	50	100
Total									18		500/450	400/450	900
Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs													
10	NMC	21MATDIP31	Additional Mathematics - I	Mathematics	-	3	0	0	0	-	100	-	100

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credits for IPCC are 04 and its Teaching – Learning hours (L : T : P) can be considered as (3 : 0 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE

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Semester 4

SL	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
01	BSC	21MAT41	Engg. Mathematics -4	Mathematics	Mathematics	3	0	0	3	3	50	50	100
02	IPCC	21EE42	Digital System Design	EEE	EEE	3	0	2	4	3	50	50	100
03	PCC	21EE43	Power Electronics	EEE	EEE	3	0	0	3	3	50	50	100
04	PCC	21EE44	Electrical Machines - II	EEE	EEE	3	0	0	3	3	50	50	100
05	PCC	21EEL45	Power Electronics Laboratory	EEE	EEE	0	0	2	1	3	50	50	100
06	PCC	21EEL46	Electrical Machine Laboratory - II	EEE	EEE	0	0	2	1	3	50	50	100
07	HS	21KSK37/47	Samskrutika Kannada	Humanities	Humanities	1	0	0	1	--	100	--	100
		21KKB37/47	Balake Kannada										
	OR												
	HS	21CIP37/47	Constitution of India and Professional Ethics							2	50	50	
08	AEC	21SSA480	Soft skills and basic aptitude	Humanities	Humanities	1	2	0	2	2	50	50	100
09	AEC	21AEE48X	Biology for Engineers / Ability Enhancement Course - II	Physics / Chemistr / EEE	Physics / Chemistr / EEE	0	0	2	1	2	50	50	100
						For AEC as lab course							
						1	0	0					
For AEC as theory course													
10	UHV	21UHV490	Universal Human Values	EEE	EEE	1	0	0	1	2	50	50	100
11	INT	21INT491	Summer Internship - I	Evaluation By the appropriate authorities		Completed during the intervening period of II and III semesters. Lateral entry students have to attend the internship during the intervening period of III and IV semesters			2	---	100	--	100
Total									22		600/650	500/450	1100

Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs

12	NCMC	21MATDIP41	Additional Mathematics - I	Mathematics	-	3	0	0	0	-	100	-	100
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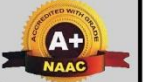
Ability Enhancement Course - II

01	21ABE481	Biology for Engineers
02	21AEE482	Scilab for Electrical & Electronics Measurements



Basavarajeswari Group of Institutions

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III Semester



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Semester: III

Course Name: Electric Circuit Analysis

Course Code (IPCC)	21EE32	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites:

- Basics of Calculus, trigonometry, complex numbers
- Electromagnetism
- Concepts of Electric current, voltage and power
- Series & parallel circuits

Course objectives:

1. To familiarize the basic laws, source transformations, theorems and the methods of analyzing electrical circuits.
2. To explain the use of network theorems and the concept of resonance.
3. To familiarize the analysis of two port networks.
4. To explain the importance of initial conditions, their evaluation and transient analysis of R-L and R-C circuits.
5. To impart basic knowledge on network analysis using Laplace transforms.

Module – 1

Basic Concepts: Active and passive elements, Concept of ideal and practical sources. Source transformation and Source shifting. Analysis of networks by (i) Network reduction method including star – delta transformation, (ii) Mesh and Node voltage methods for AC and DC circuits with independent and dependent sources (iii) Super-Mesh and Super node analysis.

8hour(RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations.

Practical topics: voltage divider with loads

Module - 2

Network Theorems: Super Position theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem and Millman's theorem. Analysis of networks with and without dependent AC and DC sources.

8hour(RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations

Practical topics: Verification of all the theorems

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Module – 3

Network topology: Graph of a network, concepts of: tree & co-tree, incidence matrix, tie-set & cut-set schedules, Principle of duality.

Resonant Circuits: Analysis of simple series RLC and parallel RLC circuits under resonances. Problems on Resonant frequency, Bandwidth and Quality factor at resonance.

8hour(RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations

Practical topics: Determination of Resonant frequency, Bandwidth and Quality factor of series and parallel resonance.

Module – 4

Transient Analysis: Transient analysis of RL and RC circuits under DC excitations: Behaviour of circuit elements under switching action, Evaluation of initial conditions.

Laplace Transformation: Laplace transformation (LT), LT of Impulse, Step, Ramp, Sinusoidal signals and shifted functions. Waveform synthesis. Initial and Final value theorems.

8hour(RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning

Module – 5

Two Port networks: Definition, Open circuit impedance, Short circuit admittance, hybrid and Transmission parameters and their evaluation for simple circuits, relationships between parameter sets, interconnection of two-port networks.

8hour(RBT levels: L1, L2, L3, L4)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning

PRACTICAL COMPONENT OF IPCC

SI.No	List of Experiments
1	Loading effect of different voltmeters on an electric circuit.
2	Voltage Dividers with Loads
3	Measurement AC and DC quantities (voltage, frequency, current) using oscilloscope.
4	Determination of resonant frequency, bandwidth, and Q of a series circuit.
5	Determination of resonant frequency, bandwidth, and Q of a parallel circuit.
6	Verification of Thevenin's theorem.
7	Verification of Norton's theorem.
8	Verification of Superposition theorem.
9	Power factor correction
10	Maximum power transfer theorem

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Course Outcomes:

1. Simplify the network complexity using basic concepts, basic laws and various reduction techniques.
2. Solve complex electric circuits using network theorems.
3. Discuss series, parallel resonant circuits and network duality.
4. Evaluate transient response of electric circuits and synthesize typical waveforms using Laplace transformation.
5. Analyze the parameters of two port networks.

Assessment Details

CIE:

CIE for the theory component of IPCC: 30 marks

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	18
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	12
	Total Marks for theory component A+B			30

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

CIE for the LAB component of IPCC : 20 marks

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	08
(ii)	Lab Journal Writing & Submission (B)	10%	02
(iii)	Lab Test (C)	30%	06
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	04
	Total Marks		20

Final CIE Marks = CIE for theory component + CIE for Lab component

SEE

SEE for IPCC Theory for 3 hours duration

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module. The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component)

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- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks - 20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Circuit Analysis	William H Hayt. et al	McGraw Hill	8th Edition, 2014
2	Network Analysis	M.E. Vanvalkenburg	Pearson	3rd Edition, 2014
Reference Books				
1	Fundamentals of Electric Circuits	Charles K Alexander Matthew N O Sadiku	McGraw Hill	5th Edition, 2013.

e-Resources:Network Analysis all modules: <http://archive.nptel.ac.in/courses/108/105/108105159/>

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Semester: III

Course Name: Analog Electronic Circuits & Op – Amps

Course Code	21EE33	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03

Pre-requisites:

- Basics of Semiconductors
- Transistor and Diode operation
- Fundamentals of Op-Amps
- KVL and KCL

Course objectives:

1. Provide the knowledge for the analysis of diode and transistor circuits.
2. Develop skills to design the electronic circuits using transistors and Op-amps.
3. To understand the concept and various types of converters.

Module – 1

Diode Circuits: Diode characteristics, Diode clipping, and clamping circuits.

BJT analysis: Transistor Amplifiers, Operating point, voltage divider bias circuit, stability factor, analysis of emitter follower using h – parameter model.

8 hours (RBT levels: L1,L2,L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations

Self Study: Symbol and characteristics of diodes and transistors

Module - 2

Multistage Amplifiers:, Cascade and cascade connections, Darlington circuits, analysis and design.

Feedback Amplifiers: Feedback concept, different types, practical feedback circuits.

Oscillators: Principle of operation, Analysis and derivation of frequency of oscillation of Wien Bridge Oscillator and Crystal Oscillator.

8 hours (RBT levels: L1,L2,L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations

Self Study: Different types of oscillators

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Module – 3

Power Amplifiers: Classification, analysis and design of Class A – Directly Coupled and Transformer Coupled, Class B- Complementary Symmetry and Push Pull, Class C and Class AB.

FETs: Construction, working and characteristics of JFETs and MOSFETs.

8 hours (RBT levels: L1,L2,L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations

Self Study: Symbol and characteristics of JFET and MOSFETs

Module – 4

Op-Amp Applications: A.C. amplifier, summing, scaling & averaging amplifier, inverting and non-inverting configuration.

Active Filters: First & Second order high pass & low pass Butterworth filters. Band pass filters, all pass filters.

Timer: Internal architecture of 555 timer, Astable multivibrators and applications.

8 hours (RBT levels: L1,L2,L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board

Self Study: Different types of filters

Module – 5

OP –Amp Signal Generators: Integrator and Differentiator circuits, Triangular / rectangular wave generator, phase shift oscillator, saw tooth generator.

OP –Amp Comparators and Converters: Basic comparator, zero crossing detector, inverting & non-inverting Schmitt trigger circuit.

DC Voltage Regulators: Voltage regulator basics, voltage follower regulator, adjustable output regulator, LM317 & LM337 Integrated circuits regulators.

8 hours (RBT levels: L1,L2,L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations

Self Study: Different Op-Amp circuits and voltage regulators

Course Outcomes:

1. Analyze different diode and transistor circuits.
2. Derive frequency of oscillations, input and output impedances of amplifier circuits.
3. Analyze different power amplifiers, JFETs and MOSFETs.
4. Analyze and Design different Op-Amp circuits, active filters and timer circuits.
5. Demonstrate the application of Op-amps circuits and DC voltage regulators.

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Assessment Details

CIE :

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

SEE: The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. The question paper will have 10 full questions carrying 20 marks each.
2. There will be 2 full questions (with maximum of four sub questions) from each module.
3. The students will have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electronic Devices and Circuit Theory	Robert L Boylestad, Louis Nashelsky	Pearson	11 th Edition, 2015.
2	Operational Amplifiers and Linear ICs	David A. Bell	Oxford	3 rd Edition 2011
Reference Books				
1	Electronic Devices and Circuits	David A Bell	Oxford University Press,	5 th Edition, 2008.
2	Op-Amps and Linear Integrated Circuits	Ramakant A Gayakwad	Pearson	4 th Edition 2015

e-Resources:

1. BJT Analysis: <https://youtu.be/qXdBCResKw>
2. Feedback in Amplifiers: <https://youtu.be/m4sjTt7rhow>
3. Power Amplifiers: https://youtu.be/gRcE2t_28co
4. Active Filters: <https://youtu.be/80WTmTblr6Y>
5. Timer Circuits: https://youtu.be/WFsPI8_ZKbc
6. Voltage Regulators: <https://youtu.be/bdSV4vU9DvQ>

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Semester: IV

Course Name: Biology for Engineers (Ability Enhancement Course)

Course Code	21ABE481	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	01	Exam Hours	02

Course objectives:

1. To familiarize the students with the basic biological concepts and their engineering applications.
2. To enable the students with an understanding of biodesign principles to create novel devices and structures.
3. To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
4. To motivate the students develop the interdisciplinary vision of biological engineering.

Module – 1

BIOMOLECULES AND THEIR APPLICATIONS (QUALITATIVE):

Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (DNA Vaccine for Rabies and RNA vaccines for Covid19, Forensics – DNA fingerprinting), Proteins (Proteins as food – whey protein and meat analogs, Plant based proteins), lipids (biodiesel, cleaning agents/detergents), Enzymes (glucose-oxidase in biosensors, lignolytic enzyme in bio-bleaching).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Module - 2

HUMAN ORGAN SYSTEMS AND BIO DESIGNS - 1 (QUALITATIVE):

Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics. Engineering solutions for Parkinson's disease). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signalling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

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Module – 3

HUMAN ORGAN SYSTEMS AND BIO-DESIGNS - 2 (QUALITATIVE):

Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems). Muscular and Skeletal Systems as scaffolds (architecture, mechanisms, bioengineering solutions for muscular dystrophy and osteoporosis).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Module – 4

NATURE-BIOINSPIRED MATERIALS AND MECHANISMS (QUALITATIVE):

Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Module – 5

TRENDS IN BIOENGINEERING (QUALITATIVE):

Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis. Self-healing Bioconcrete (based on bacillus spores, calcium lactate nutrients and biomineralization processes) and Bioremediation and Biomining via microbial surface adsorption (removal of heavy metals like Lead, Cadmium, Mercury, Arsenic).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Course Outcomes:

1. Elucidate the basic biological concepts via relevant industrial applications and case studies.
2. Evaluate the principles of design and development, for exploring novel bioengineering projects.
3. Corroborate the concepts of biomimetics for specific requirements.
4. Think critically towards exploring innovative biobased solutions for socially relevant problems.

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Assessment Details

CIE :

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

SEE:

Theory SEE will be conducted with common question paper for subject

The pattern of the question paper is MCQ. The time allotted for SEE is 02 hours.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Human Physiology	Stuart Fox, Krista Rompolski	McGraw-Hill eBook	16th Edition, 2022
2	Biology for Engineers	Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K	Tata McGraw-Hill, New Delhi,	2012
3	Biology for Engineers	Arthur T. Johnson	CRC Press, Taylor and Francis	2011
Reference Books				
1	Biomedical Instrumentation	Leslie Cromwell	Prentice Hall	2011
2	Biology for Engineers	Sohini Singh and Tanu Allen	Vayu Education of India, New Delhi	2014

e-Resources:

1. VTU EDUSAT / SWAYAM / NPTEL / MOOCS / Coursera / MIT-open learning resource
2. <https://nptel.ac.in/courses/121106008>
3. <https://freevideolectures.com/course/4877/nptel-biology-engineers-other-non-biologists>
4. <https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-design-spring-2009>
5. <https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring-2006>
6. <https://www.coursera.org/courses?query=biology>
7. https://onlinecourses.nptel.ac.in/noc19_ge31/preview
8. <https://www.classcentral.com/subject/biology>
9. <https://www.futurelearn.com/courses/biology-basic-concepts>

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III Semester

Name of the Laboratory: Analog Electronic Circuits and Op – Amp Laboratory

Course Code	21EEL35	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03

Course Objectives:

1. To realize clippers, clampers and rectifier circuits
2. To analyze BJT amplifier and oscillators.
3. To design inverting, non inverting amplifiers, RC phase shift oscillator and Schmitt Trigger circuits
4. To demonstrate the operation of comparator, ZCD, adder, subtractor, integrator and differentiator circuits
5. To realize different filter circuits, voltage regulators and timer circuits.

List of Experiments:

SN	Experiments
1	Experiments on clippers and clampers.
2	Testing of Full wave –centre tapped transformer type and bridge type rectifier circuits with and without capacitor filter. Determination of ripple factor, regulation and efficiency.
3	Frequency response of single stage BJT and FET RC coupled amplifier and determination of half - power points and bandwidth.
4	Design and testing of BJT -crystal oscillator for given frequency of oscillation.
5	Design and realize an op – amp amplifier under inverting and non - inverting configuration for a given gain.
6	Design and verify the output waveform of an op – amp RC phase shift oscillator for a desired frequency.
7	Design and realize Schmitt trigger circuit using an op – amp for desired upper trip point (UTP) and lower trip point (LTP).
8	Verify the operation of an op – amp as (a) voltage comparator circuit and (b) zero crossing detectors.
9	Design and verify the operation of op – amp as an (a) adder (b) subtractor (c) integrator and (d) differentiator.
10	Design and realize an op – amp based first order Butterworth (a) low pass (b) high pass and (c) band pass filters for a given cut off frequency/frequencies to verify the frequency response characteristic.
11	Designing of fixed voltage power supply(voltage Regulator) using IC regulators 78 series.
12	Design and verify an IC 555 timer based pulse generator

Course outcomes:

1. Design and realize clippers, clampers and rectifier circuits
2. Analyze BJT amplifier and oscillators.
3. Design inverting, non inverting amplifiers, RC phase shift oscillator and Schmitt Trigger circuits
4. Demonstrate the operation of comparator, ZCD, adder, subtractor, integrator and differentiator circuits
5. Analyze different filter circuits, voltage regulators and timer circuits.

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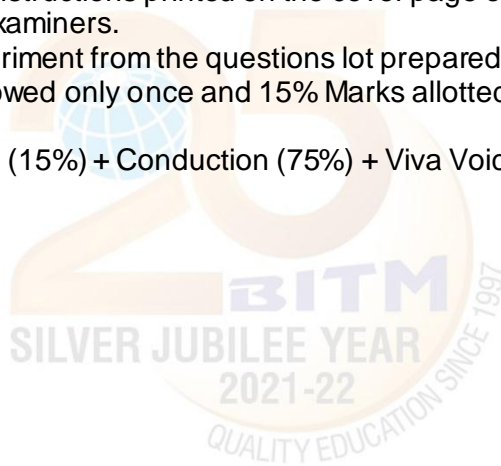
Assessment Details**Continuous Internal Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks		50

Semester End Evaluation (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
- 4 Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
5. Marks distribution: Write up (15%) + Conduction (75%) + Viva Voice (15%)



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III Semester

Name of the Laboratory: Electrical Machines Laboratory – I

Course Code	21EEL36	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03

Course Objectives:

1. To conduct different tests on transformers and synchronous machines and their performance evaluation.
2. To verify the parallel operation of two single phase transformers.
3. To perform transformer banking using single phase transformers for three phase operation and phase conversion.
4. Study of synchronous generator connected to infinite bus.

List of Experiments:

SN	Experiments
1	Open Circuit and Short circuit tests on single phase step up or step down transformer and pre determination of (i) Efficiency and regulation (ii) Calculation of parameters of equivalent circuit.
2	Sumpner's test on similar transformers and determination of combined and individual transformer efficiency.
3	Parallel operation of two dissimilar single-phase transformers of different kVA and determination of load
4	Ratio and Polarity test on single-phase transformer.
5	Comparison of performance of 3 single-phase transformers in delta – delta and V – V (open delta) connection under load.
6	Scott connection with balanced and unbalanced loads.
7	Separation of hysteresis and eddy current losses in single phase transformer.
8	Voltage regulation of an alternator by EMF and MMF methods.
9	Slip test – Measurement of direct and quadrature axis reactance and predetermination of regulation of salient pole synchronous machines.
10	Performance of synchronous generator connected to infinite bus, under constant power and variable excitation & vice - versa.
11	Sequence impedance of three phase alternator
12	Sequence impedance of three phase transformer

Course outcomes:

1. **Determine** the efficiency, voltage regulation and equivalent circuit constants of a 1-phase transformer by conducting O.C and S.C tests.
2. **Perform** parallel operation of two different kVA transformers to determine the load shared by each transformer.
3. **Conduct** experiments on 3-phase transformer connections (Bank) to determine the efficiency.
4. **Determine** voltage regulation of a 3-phase synchronous generator using EMF and MMF methods by conducting O.C and S.C tests.
5. **Analyze** the performance of synchronous generator by connecting it to the infinite bus bar.

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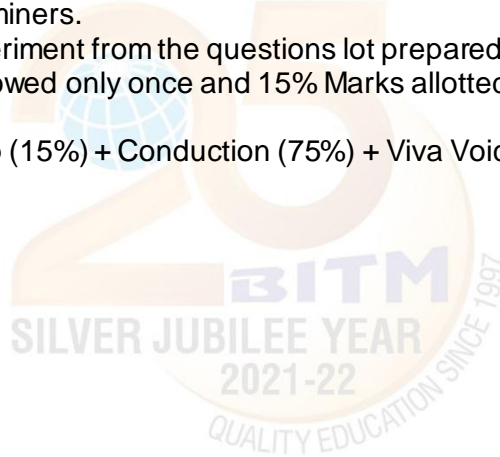
Assessment Details**Continuous Internal Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks		50

Semester End Evaluation (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
- 4 Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
5. Marks distribution: Write up (15%) + Conduction (75%) + Viva Voice (15%)



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III Semester**Name of the Laboratory:** Circuit Laboratory using Pspice (Ability Enhancement Course)

Course Code	21AEE38	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	02

Course Objectives:

1. Along with prescribed hours of teaching – learning process, provide opportunity to perform the experiments/programs at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
2. Provide unhindered access to perform whenever the students wish
3. Vary different parameters to study the behavior of the circuit without the risk of damaging equipment/device or injuring themselves.

List of Experiments:

SN	Experiments
1	Simulation and verification of Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2	Simulation and verification of Super Position theorem
3	Simulation and verification of Reciprocity theorem
4	Simulation and verification of Thevenin's and Norton's theorem.
5	Simulation and verification of Maximum Power Transfer theorem
6	Simulation and verification of Millman's theorem

Course outcomes:

1. **Analyze** Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. **Perform** Super Position theorem.
3. **Analyze** Reciprocity theorem.
4. **Conduct** Thevenin's and Norton's theorem.
5. **Analyze** Maximum Power Transfer theorem and Millman's theorem.

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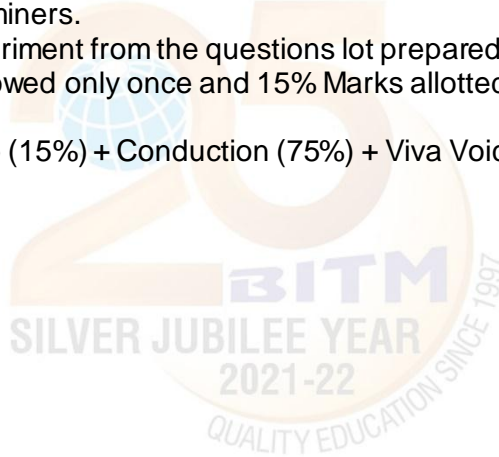
Assessment Details**Continuous Internal Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks		50

Semester End Evaluation (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
- 4 Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
5. Marks distribution: Write up (15%) + Conduction (75%) + Viva Voice (15%)



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Semester: III**Course Name:** Design Thinking & Innovation (Ability Enhancement Course)

Course Code	21DTI39	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	01	Exam Hours	02

Pre-requisites:

- Basic of design thinking process.

Course objectives:

1. To explain the concept of design thinking for product and service development
2. To explain the fundamental concept of innovation and design thinking
3. To discuss the methods of implementing design thinking in the real world.

Module – 1**PROCESS OF DESIGN**

Understanding Design thinking

Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping.

Teaching-Learning Process:**Pedagogy:** Chalk and Board, Power point presentations**Module - 2**

Tools for Design Thinking

Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design

Teaching-Learning Process:**Pedagogy:** Chalk and Board, Power point presentations, Case studies on design thinking for real-time interaction and analysis, Simulation exercises for collaborated enabled design thinking
Live examples on the success of collaborated design thinking

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Module – 3

Design Thinking in IT: Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Case studies on design thinking and business acceptance of the design.

Module – 4

DT For strategic innovations: Growth – Story telling representation – Strategic Foresight - Change – Sense Making – Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.

Teaching-Learning Process:

Pedagogy: Chalk and Board, Business model examples of successful designs, Presentation by the students on the success of design, Live project on design thinking in a group of 4 students

Module – 5

Design thinking workshop: Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, 8 hours design thinking workshop from the expert and then presentation by the students on the learning from the workshop

Course Outcomes:

1. Appreciate various design process procedure
2. Generate and develop design ideas through different technique
3. Identify the significance of reverse Engineering to Understand products
4. Draw technical drawing for design ideas

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Assessment Details

CIE :

Components		Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
Total Marks				50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

SEE:

Theory SEE will be conducted with common question paper for subject

The pattern of the question paper is MCQ. The time allotted for SEE is 02 hours.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	"Engineering Design"	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson	Cengage learning (International edition)	Second Edition, 2013
2	"The Design of Business: Why Design Thinking is the Next Competitive Advantage"	Roger Martin	Harvard Business Press	2009
Reference Books				
1	"Engineering Design Process"	Yousef Haik and Tamer M. Shahin	Cengage Learning	Second Edition, 2011
2	Solving Problems with Design Thinking - Ten Stories of What Works	Jeanne Liedtka, Andrew King, Kevin Bennett	Columbia Business School Publishing-Hardcover	20 Sep 2013

e-Resources:

1. www.tutor2u.net/business/presentations/. /productlifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Developmen
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. www.vertabelo.com/blog/documentation/reverse-engineering
7. <https://support.microsoft.com/en-us/kb/273814>
8. <https://support.google.com/docs/answer/179740?hl=en>
9. <https://www.youtube.com/watch?v=2mjSDIBaUIM>



Basavarajeswari Group of Institutions

ಬಳ್ಳಾರಿ ಜ್ಞಾನಗಂಗೋತ್ರಿ ಆಫ್ ಟೆಕ್ನಾಲಜಿ & ಮ್ಯಾನೇಜ್‌ಮೆಂಟ್, ಬಳ್ಳಾರಿ



BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under Visvesvaraya Technological University, Belagavi

(Recognized by Govt. of Karnataka & AICTE, New Delhi)

"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)



IV Semester



A Unit of T.E.H.R.D. Trust @, Ballari

An ISO 9001:2015 Certified Institution



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"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)

Semester: IV

Course Name: Digital System Design

Course Code (IPCC)	21EE42	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites:

- Number Systems
- Basic Arithmetic operations
- Boolean Algebra, theorems, formulas and functions
- Basic operation of logic gates and realization using basic gates
- Basic operations and applications of Flip-flop, shift register and counters

Course objectives:

1. To illustrate simplification of Algebraic equations using Karnaugh Maps and Quine - McClusky Techniques.
2. To design combinational logic circuits.
3. To design Decoders, Encoders, Digital Multiplexer, Adders, Subtractors and Binary Comparators
4. To describe Latches and Flip-flops, Registers and Counters.
5. To analyze Mealy, Moore Models and Synchronous Sequential Circuits.

Module - 1

Principles of Combinational Logic: Definition of combinational logic, canonical forms, Generation of switching equations from truth tables, Karnaugh maps-3,4,5 variables, Incompletely specified functions (Don't care terms) Simplifying Max term equations, Quine-McCluskey minimization technique, Quine-McCluskey using don't care terms, Reduced prime implicants Tables.

T1, 8 hour(RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning, Power point presentations, Videos.

Practical topics: Simplification and realization of Boolean expression.

Self-study: Boolean Algebra, theorems and simplification of Boolean expression using theorems.

Module - 2

Analysis and Design of Combinational logic: General approach to combinational logic design, Decoders, BCD decoders, Encoders using decoders and encoders as function generators, digital multiplexers demultiplexers, Using multiplexers as Boolean function generators, Adders and subtractors, Cascading full adders, Look ahead carry, Binary comparators.

T1, 8 hour (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Videos.

Practical topics: Realization of parallel adder/Subtractors, One/Two bit comparator, look ahead carry adder and comparators.

Self-study: Systems using multiplexers and demultiplexers.

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Module – 3

Flip-Flops: Basic Bi-stable elements, Latches, Timing considerations, Operation and truth table of SR, JK, T and D flip-flops. The master-slave flip-flops (pulse-triggered flip-flops): SR flip-flops, JK flip-flops. Edge triggered D flip-flops, Characteristic equations.

T2, 8 hour (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board

Practical topics: Truth table verification of Flip-Flops: SR, JK, D and T.

Self-study: Realization of various flip-flops using universal gates.

Module – 4

Flip-Flops Applications: Registers, binary ripple counters, synchronous binary counters, Counters based on shift registers, Design of a synchronous counter, Design of a synchronous mod-n counter using clocked T, JK, D and SR flip-flops.

T2, 8 hour (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning, Power point presentations.

Practical topics: Ring counter/Johnson counter mod-n counters.

Self-study: Asynchronous counter design.

Module – 5

Sequential Circuit Design: Mealy and Moore models, difference between Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, counter design.

T1, 8 hour (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning, Power point presentations.

Practical topics: Representation of State diagram for counters.

Self-study: Applications of Moore and Mealy models in digital systems.

PRACTICAL COMPONENT OF IPCC

Sl.No	List of Experiments
1	Simplification, realization of Boolean expressions using logic gates/Universal gates.
2	Realization of Half/Full adder and Half/Full Subtractors using logic gates.
3	Realization of parallel adder/Subtractors using IC7483
4	Realization of Binary to Gray code conversion and vice-versa.
5	Realization of One/Two bit comparator and study of IC7485 magnitude comparator.
6	Truth table verification of Flip-Flops: SR, JK, D and T (Using Universal gates).
7	Design and testing Ring counter/Johnson counter.
8	Realization of a synchronous MOD – N counter design using IC7476, IC7490, IC74192/193.

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Course Outcomes:

1. Analyze Combinational logic circuits and minimization techniques.
2. Implement Adder, Subtractor, Decoder, Encoders, Binary Comparators, Multiplexers, Demultiplexers and Code Converter.
3. Analyze Latches and Flip-Flops.
4. Design Counters and Shift registers using Flip-Flops.
5. Illustrate Melay, Moore Models and state diagrams for the given clocked sequential circuits.

Assessment Details

CIE :

CIE for the theory component of IPCC : 30 marks

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	18
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	12
	Total Marks for theory component A+B			30

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

CIE for the LAB component of IPCC : 20 marks

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	08
(ii)	Lab Journal Writing & Submission (B)	10%	02
(iii)	Lab Test (C)	30%	06
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	04
	Total Marks		20

Final CIE Marks = CIE for theory component + CIE for Lab component

SEE

SEE for IPCC Theory for 3 hours duration

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module. The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component)

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- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks - 20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Digital Logic Applications and Design	John M Yarbrough	Thomson Learning	2001
2	Digital Principles and Design	Donald D. Givone	McGraw Hill Education	Indian Edition, 2002
Reference Books				
1	Digital Design	Morris Mano	Prentice Hall of India	Third Edition
2	Digital Circuits and Design	D. P.Kothari and J. S Dhillon	Pearson	2016

e-Resources:

- Combinational Logic: <https://www.youtube.com/watch?v=sUutDs7FFeA>
- Logic Minimization Using K-Maps: <https://www.youtube.com/watch?v=ygm25sqgpgg>
- Introduction to Sequential Circuits: <https://www.youtube.com/watch?v=ibQBb5yEDIQ>
- Mealy and Moore Circuits: <https://www.youtube.com/watch?v=O3lf0Nr9to0>

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Semester: IV

Course Name: Power Electronics

Course Code	21EE43	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03

Pre-requisites:

- Fundamentals of Semiconductor devices
- Symbols, operation and characteristics of semiconductor devices.

Course objectives:

1. To describe the construction, characteristics and applications of power electronics devices.
2. To compare the performance of various power semiconductor devices.
3. To analyze various turn on, turn off and protection methods of thyristors.
4. To design of various single phase converters.
5. To evaluate the performance of choppers and inverters.

Module – 1

Introduction: Block diagram of Power Electronics, Applications of Power Electronics, Types of Power Electronic Circuits, Peripheral Effects.

Power Diodes: Characteristics, Reverse Recovery Characteristics, Diode Circuits with DC Source connected to R and RL load, Single-Phase Full-Wave Rectifiers with R load, Single-Phase Full-Wave Rectifier with RL Load

8 hours(RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning, Power point presentations, Videos.

Self-study: Symbol and characteristics of semiconductor devices

Module - 2

Power Transistors: Switching characteristics of BJT, Switching characteristics of Power MOSFET and Power IGBT. Isolation of Gate and Base Drives.

8 hours(RBT levels: L1, L2, L3, L4)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Videos.

Self-study: Symbol and characteristics of BJT, MOSFET and IGBT

Module – 3

Thyristors: Introduction, Thyristor Characteristics, Two-Transistor Model of Thyristor, Thyristor Turn On, Thyristor Turn-Off, Thyristor Types, Firing circuits, Series Operation of Thyristors, Parallel Operation of Thyristors, di/dt Protection, dv/dt Protection, Unijunction Transistor.

8 hours (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board

Self-study: Symbol and characteristics of Thyristor

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Module – 4

Controlled Rectifiers: Introduction, Single phase half wave circuit with R Load, Single-Phase Full Converters with RL Load, Single-Phase Dual Converters.

AC Voltage Controllers: Introduction, Principle of phase control & Integral cycle control, Single-Phase Full-Wave Controllers with Resistive Loads, Single-Phase Full-Wave Controllers with Inductive Loads.

8 hours (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning, Power point presentations.

Self-study: basic function of rectifiers and voltage controllers

Module – 5

DC-DC Converters: Introduction, principle of step down and step up chopper with RLE load, performance parameters, DC-DC converter classification.

DC-AC Converters: Introduction, principle of operation single phase bridge inverters, three phase bridge inverters.

8 hours (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning, Power point presentations..

Self-study: basic function of choppers and inverters

Course Outcomes:

1. **Describe** the construction, characteristics and applications of power electronics devices.
2. **Compare** the performance of various power semiconductor devices.
3. **Analyze** various turn on, turn off and protection methods of thyristors.
4. **Design** of various single phase converters.
5. **Evaluate** the performance of choppers and inverters.

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Assessment Details

CIE :

Components		Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
Total Marks				50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

SEE: The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. The question paper will have 10 full questions carrying 20 marks each.
2. There will be 2 full questions (with maximum of four sub questions) from each module.
3. The students will have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Power Electronics: Circuits Devices and Applications	Mohammad H Rashid	Pearson	4th Edition, 2014
Reference Books				
1	Power Electronics	P.S. Bimbhra	Khanna Publishers	5th Edition, 2012
2	Power Electronics: Converters, Applications and Design	Ned Mohan	Wiley	3rd Edition, 2014

e-Resources:

1. Introduction to power semiconductor devices : <https://youtu.be/1Auay7ja2oY>
2. Diode Rectifiers : <https://youtu.be/Dfdzz64gux8>
3. Introduction to the Thyristors : <https://youtu.be/K1715gsXOFA>
4. Controlled rectifier : <https://youtu.be/fOZ8bUrFJGk>
5. DC-DC converters : <https://youtu.be/8Ublt2U1Ydw>
6. DC to AC Voltage Controllers : <https://youtu.be/7CReXeMAXHA>

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Semester: IV

Course Name: Electrical Machines – II

Course Code	21EE44	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03

Pre-requisites:

- Fundamentals of AC and DC circuits.
- Constructional details of AC and DC motors.
- Construction of 3-phase induction motor

Course objectives:

1. To study the constructional features of motors and select a suitable drive for specific application.
2. To study the constructional features of 3-phase and 1-phase induction Motors.
3. To study different test to be conducted for the assessment of the performance characteristics of motors.
4. To study the speed control of DC motors and 3-phase induction motor by different methods.
5. To explain the construction and operation of synchronous motor and special motors.

Module – 1

DC Motors: Classification, Back emf, Torque equation, and significance of back emf, Characteristics of shunt, series & compound motors. Speed control of shunt and series motors. Applications of motors. DC motor starters – 3 point and 4 point.

Losses and Efficiency- Losses in DC motors, power flow diagram, efficiency, condition for maximum efficiency

8 hours (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Problem based learning, Power point presentations, Videos.

Practical topics: Speed control of DC shunt motor.

Self-study: Applications of DC motors and 4-point starter.

Module - 2

Testing of DC Motors: Direct & indirect methods of testing of DC motors-Brake test, Swinburne's test, Retardation test, Hopkinson's test, Field's test, merits and demerits of tests.

Three Phase Induction Motors: Review of concept and generation of rotating magnetic field, Principle of operation, construction, classification and types; squirrel-cage, slip-ring (No question shall be set from the review portion). Slip, Torque equation, torque-slip characteristic covering motoring, generating and braking regions of operation, Maximum torque, significance of slip.

8 hours (RBT levels: L1, L2, L3)

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Videos.

Practical topics: Testing of DC Machines.

Self-study: Comparison of various testing methods of DC Machines.

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Module – 3

Performance of Three-Phase Induction Motor: Phasor diagram of induction motor on no-load and on load, power flow diagram, equivalent circuit, losses, efficiency, No-load and blocked rotor tests. Performance of the motor from the circle diagram and equivalent circuit. Cogging and crawling. High torque rotors-double cage and deep rotor bars. Equivalent circuit and performance evaluation of double cage induction motor. Induction motor working as induction generator.

8 hours (RBT levels: L1, L2, L3)**Teaching-Learning Process:****Pedagogy:** Chalk and Board, Problem based learning, Power point presentations.**Practical topics:** No load and Blocked rotor test.**Self-study:** Double cage induction motor and induction generator.**Module – 4**

Starting and Speed Control of Three-Phase Induction Motors: Need for starter. Direct on line, Star-Delta, and autotransformer starting. Rotor resistance starting. Speed control by voltage, frequency, and rotor resistance methods

Single-Phase Induction Motor: Double revolving field theory and principle of operation. Construction and operation of split-phase, capacitor start, capacitor run, and shaded pole motors. Comparison of single phase motors and applications.

8 hours (RBT levels: L1, L2, L3)**Teaching-Learning Process:****Pedagogy:** Chalk and Board, Problem based learning, Power point presentations.**Practical topics:** Speed control of 3-phase induction motor from stator and rotor side.**Self-study:** Practical applications of 1-phase induction motor.**Module – 5**

Synchronous Motor: Principle of operation, Methods of starting synchronous motors, phasor diagrams, torque and torque angle, effect of change in load, effect of change in excitation, V and inverted V curves. Applications of Synchronous motor, hunting and damping.

Other Motors: Construction and operation of Universal motor, BLDC Motor, Switched Reluctance Motor (SRM) and stepper motors.

8 hours (RBT levels: L1, L2, L3)**Teaching-Learning Process:****Pedagogy:** Chalk and Board, Problem based learning, Power point presentations.**Practical topics:** Experiment on V and Inverted V-curves of synchronous motor.**Self-study:** Practical applications of special motors.**Course Outcomes:**

1. **Determine** the losses and efficiency of DC machines by direct and indirect tests.
2. **Analyze** the performance characteristics of 3- Φ induction motors.
3. **Discuss** the speed control methods of DC and AC motors.
4. **Compare** construction, operation, characteristics, and applications of 1- Φ induction motors and special motors.
5. **Analyze** the performance characteristics of synchronous motor.

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Assessment Details

CIE :

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

SEE: The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. The question paper will have 10 full questions carrying 20 marks each.
2. There will be 2 full questions (with maximum of four sub questions) from each module.
3. The students will have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electric Machines	D. P. Kothari, et al	McGraw Hill	4 th edition 2011
2	Electric Machines	Ashfaq Hussain	Dhanpat Rai & Co	2 nd edition, 2013
3	Theory of Alternating Current Machines	Alexander Langsdorf	McGraw Hill	2nd Edition, 2001
Reference Books				
1	Electrical Technology	J B Gupta	Pustak Kosh	2nd Edition
2	Theory of Alternating Current Machines	Alexander Langsdorf	McGraw Hill	2nd Edition, 2001
3	Principals of Electrical Machines	V.K Mehta, Rohit Mehta	S Chand	2nd edition, 2009
4	Electrical Machines	S.K.Sahadev	Cabridge University Press	ISBN:978-7-108-43106-4.

e-Resources:

1. **DC Motors:** <https://www.youtube.com/watch?v=1OfLgpFq6Rc>
<https://www.youtube.com/watch?v=Fqn7od-Z5Ww>
2. **Speed control of DC shunt motor:** <https://www.youtube.com/watch?v=5qzUm3PvWXA>
3. **Testing of DC Motors:** <https://www.youtube.com/watch?v=AbvW9rJfJso>
4. **Performance and speed control of 3-phase induction motor:**
<https://www.youtube.com/watch?v=XJIAQwFmiKw>
<https://www.youtube.com/watch?v=eMq9j0KY2Ak>
5. **Synchronous Motor:** <https://www.youtube.com/watch?v=b24jORRoxEc>
6. **Single phase induction motors:** <http://archive.nptel.ac.in/courses/108/102/108102146/>

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IV Semester**Name of the Laboratory:** Power Electronics Laboratory

Course Code	21EEL45	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03

Course Objectives:

1. To conduct experiments on semiconductor devices to obtain their static characteristics.
2. To study different methods of triggering the SCR
3. To study the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads.
4. To control the speed of a DC motor, universal motor and stepper motors.
5. To study single phase full bridge inverter connected to resistive load

List of Experiments:

SN	Experiments
1	Static Characteristics of SCR.
2	Static Characteristics of MOSFET and IGBT.
3	SCR turn on circuit using synchronized UJT relaxation oscillator.
4	SCR digital triggering circuit for a single phase controlled rectifier and ac voltage regulator.
5	Single phase controlled full wave rectifier with R load, R –L load
6	AC voltage controller using TRIAC and DIAC combination connected to R and RL loads.
7	Speed control of DC motor using single semi converter.
8	Speed control of universal motor using ac voltage regulator.
9	Speed control of a separately excited D.C. Motor using an IGBT or MOSFET chopper.
10	Single phase MOSFET/IGBT based PWM inverter.

Course outcomes:

1. Analyze the performance static characteristics of semiconductor devices.
2. Compare different methods of triggering an SCR
3. Evaluate the performance of single phase controlled full wave rectifier and AC voltage controller with Rand RL loads.
4. Perform the speed Control of a DC motor, universal motor and stepper motors
5. Analyze the performance of single phase full bridge inverter connected to resistive load.

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Assessment Details**Continuous Internal Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks		50

Semester End Evaluation (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
- 4 Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
5. Marks distribution: Write up (15%) + Conduction (75%) + Viva Voice (15%)



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IV Semester

Name of the Laboratory: Electrical Machine Laboratory - II

Course Code	21EEL46	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03

Course Objectives:

1. To perform tests on DC machines to determine their characteristics.
2. To control the speed of DC motor.
3. To conduct test for determination of the performance characteristics of DC machines
4. To conduct load test on single phase and three phase induction motors to determine the performance characteristics.
5. To conduct test on synchronous motor to draw the performance curves.

List of Experiments:

SN	Experiments
1	Load test on DC shunt motor to draw speed–torque and horse power–efficiency characteristics.
2	To obtain speed control of dc shunt motor using (a) Armature resistance control (b) Field control
3	Swinburne's Test on DC motor.
4	Regenerative test on DC shunt machines (or) Hopkinson's test of dc machine.
5	Retardation Test.
6	Load test on three phase induction motor.
7	No-load and Blocked rotor test on single phase induction motor to draw i) equivalent circuit and ii) circle diagram.
8	No-load and Blocked rotor test on three phase induction motor to draw i) equivalent circuit and ii) circle diagram
9	Load test on single phase induction motor to draw output versus torque, current, power and efficiency characteristics.
10	Conduct an experiment to draw V curves of the synchronous motor from synchronization of the alternator
11	Reverse rotation of 3-phase induction motor.
12	Speed control of 3-phase induction motor by stator supply voltage control method.

Course outcomes:

1. Conduct an experiment to control the speed of DC Shunt motor by armature and field control methods.
2. Pre-determine the losses and efficiency of DC machines by conducting direct and indirect loading tests.
3. Assess performance characteristics of DC shunt motor, 1- \emptyset induction motor and 3- \emptyset induction motor by performing load test.
4. Analyze the performance characteristics of 1- \emptyset and 3- \emptyset induction motors by conducting No-load and Blocked rotor tests.
5. Perform experiment on synchronous motor to draw V-curves and Inverted V-curves for different loads.

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Assessment Details**Continuous Internal Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
(ii)	Lab Journal Writing & Submission (B)	10%	05
(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks		50

Semester End Evaluation (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
- 4 Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
5. Marks distribution: Write up (15%) + Conduction (75%) + Viva Voice (15%)



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Semester: IV

Course Name: Biology for Engineers (Ability Enhancement Course)

Course Code	21ABE481	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	01	Exam Hours	02

Course objectives:

1. To familiarize the students with the basic biological concepts and their engineering applications.
2. To enable the students with an understanding of biodesign principles to create novel devices and structures.
3. To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
4. To motivate the students develop the interdisciplinary vision of biological engineering.

Module – 1

BIOMOLECULES AND THEIR APPLICATIONS (QUALITATIVE):

Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (DNA Vaccine for Rabies and RNA vaccines for Covid19, Forensics – DNA fingerprinting), Proteins (Proteins as food – whey protein and meat analogs, Plant based proteins), lipids (biodiesel, cleaning agents/detergents), Enzymes (glucose-oxidase in biosensors, lignolytic enzyme in bio-bleaching).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Module - 2

HUMAN ORGAN SYSTEMS AND BIO DESIGNS - 1 (QUALITATIVE):

Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics. Engineering solutions for Parkinson's disease). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signalling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

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Module – 3

HUMAN ORGAN SYSTEMS AND BIO-DESIGNS - 2 (QUALITATIVE):

Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems). Muscular and Skeletal Systems as scaffolds (architecture, mechanisms, bioengineering solutions for muscular dystrophy and osteoporosis).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Module – 4

NATURE-BIOINSPIRED MATERIALS AND MECHANISMS (QUALITATIVE):

Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Module – 5

TRENDS IN BIOENGINEERING (QUALITATIVE):

Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis. Self-healing Bioconcrete (based on bacillus spores, calcium lactate nutrients and biomineralization processes) and Bioremediation and Biomining via microbial surface adsorption (removal of heavy metals like Lead, Cadmium, Mercury, Arsenic).

Teaching-Learning Process:

Pedagogy: Chalk and Board, Power point presentations, Group Discussion of Case studies, Model Making and seminar/poster presentations

Course Outcomes:

1. Elucidate the basic biological concepts via relevant industrial applications and case studies.
2. Evaluate the principles of design and development, for exploring novel bioengineering projects.
3. Corroborate the concepts of biomimetics for specific requirements.
4. Think critically towards exploring innovative biobased solutions for socially relevant problems.

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Assessment Details

CIE :

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

SEE:

Theory SEE will be conducted with common question paper for subject

The pattern of the question paper is MCQ. The time allotted for SEE is 02 hours.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Human Physiology	Stuart Fox, Krista Rompolski	McGraw-Hill eBook	16th Edition, 2022
2	Biology for Engineers	Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K	Tata McGraw-Hill, New Delhi,	2012
3	Biology for Engineers	Arthur T. Johnson	CRC Press, Taylor and Francis	2011
Reference Books				
1	Biomedical Instrumentation	Leslie Cromwell	Prentice Hall	2011
2	Biology for Engineers	Sohini Singh and Tanu Allen	Vayu Education of India, New Delhi	2014

e-Resources:

1. VTU EDUSAT / SWAYAM / NPTEL / MOOCS / Coursera / MIT-open learning resource
2. <https://nptel.ac.in/courses/121106008>
3. <https://freevideolectures.com/course/4877/nptel-biology-engineers-other-non-biologists>
4. <https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-design-spring-2009>
5. <https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring-2006>
6. <https://www.coursera.org/courses?query=biology>
7. https://onlinecourses.nptel.ac.in/noc19_ge31/preview
8. <https://www.classcentral.com/subject/biology>
9. <https://www.futurelearn.com/courses/biology-basic-concepts>

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IV Semester**Name of the Laboratory:** Scilab for Electrical and Electronics Measurements (Ability Enhancement Course)

Course Code	21AEE482	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	02

Course Objectives:

1. Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments / programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
2. Provide unhindered access to perform whenever the students wish.
3. Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/ device or injuring themselves.

List of Experiments:

SN	Experiments
1	Design and Analysis of measurement of Resistance using Wheatstone and Kelvins double bridge.
2	Design and Analysis of measurement of Inductance using Schering and De-Sauty's Bridges.
3	Design and Analysis of measurement of Inductance using Maxwells and Anderson Bridges.
4	Design and Analysis of measurement of Frequency in Single and Three Phase Circuits.
5	Design and Analysis of measurement of Real Power, Reactive and Power Factor in Three Phase Circuits.
6	Design and Analysis of measurement of Energy in Three Phase Circuits.

Course outcomes:

1. Design Wheatstone and Kelvins double bridge to measure unknown resistance.
2. Design Schering, De-Sauty's, Maxwells and Anderson bridges to measure unknown inductance.
3. Analyze measurement of Frequency in Single and Three Phase Circuits.
4. Analyze measurement of Real Power, Reactive and Power Factor in Three Phase Circuits.
5. Determine measurement of Energy in Three Phase Circuits.

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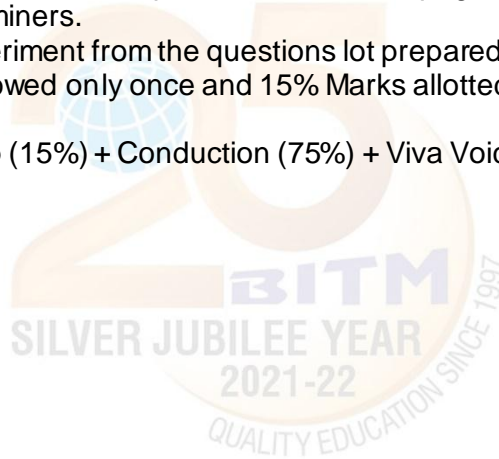
Assessment Details**Continuous Internal Evaluation (CIE):**

	Components	Weightage	Max. Marks
(i)	Lab Work: Conduction of Experiments (A)	40%	20
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(iii)	Lab Test (C)	30%	15
(iv)	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks		50

Semester End Evaluation (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
- 4 Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.
5. Marks distribution: Write up (15%) + Conduction (75%) + Viva Voice (15%)



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Semester: IV**Course Name:** Universal Human Values

Course Code	21UHV490	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	01	Exam Hours	02

Course objectives:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Module – 1

Introduction to Value Education
Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations

Teaching-Learning Process:

Pedagogy: Introduction to Value Education- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos.

Module - 2

Harmony in the Human Being
Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

Teaching-Learning Process:

Pedagogy: Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos

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Module – 3

Harmony in the Family and Society

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order

Teaching-Learning Process:

Pedagogy: Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos

Module – 4

Harmony in the Nature/Existence

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

Teaching-Learning Process:

Pedagogy: Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos

Module – 5

Implications of the Holistic Understanding – a Look at Professional Ethics

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

Teaching-Learning Process:

Pedagogy: Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos

Course Outcomes:

1. Holistic vision of life
2. Socially responsible behaviour
3. Environmentally responsible work
4. Ethical human conduct
5. Having Competence and Capabilities for Maintaining Health and Hygiene
6. Appreciation and aspiration for excellence (merit) and gratitude for all.

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Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

SEE:

Theory SEE will be conducted with common question paper for subject

The pattern of the question paper is MCQ. The time allotted for SEE is 02 hours.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books, New Delhi	2 nd Revised Edition, 2019
2	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G		
Reference Books				
1	Jeevan Vidya:, Jeevan	E K Parichaya, A Nagaraj	Vidya Prakashan, Amarkantak	1999
2	Human Values,	A.N. Tripathi	New Age Intl. Publishers, New Delhi	2004

e-Resources:

1. Value Education websites, <https://www.uhv.org.in/uhv-ii>, <http://uhv.ac.in>, <http://www.uptu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story
6. Gandhi A., Right Here Right Now, Cyclewala Productions
7. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw
8. https://fdp-si.aicte-india.org/8dayUHV_download.php
9. <https://www.youtube.com/watch?v=8ovkLRYXjE>
10. <https://www.youtube.com/watch?v=OgdNx0X923I>
11. <https://www.youtube.com/watch?v=nGRcbRpvGoU>
12. <https://www.youtube.com/watch?v=sDxGXOGYEKM>



Basavarajeswari Group of Institutions
BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT
Department of Management Studies

Date: 12-09-2022

CIRCULAR

All the Board of Studies (BOS) Members are hereby informed to attend the meeting on 14/09/2022 (Wednesday) @ 11 AM through online mode (Microsoft Teams), to discuss the following points as per the agenda.

Agenda:

- 1. Review and approval on Scheme & Syllabus of 3rd semester (Batch 2021-23)**
- 2. Review and approval on Scheme & Syllabus of 4th semester (Batch 2021-23)**

HOD-DMS



Basavarajeswari Group of Institutions
BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT
Department of Management Studies

14/09/2022

Proceedings of the BOS Meeting held on 14/09/2022

BOS Members Present for the meeting

S. No	Name of Internal BOS Member	Designation	signature
1	Dr. Janet Jyothi	Chairman & HOD	
2	Dr. Christopher Raj	Internal Member	
3	Dr. Shaheeda Banu S	Internal Member	
4	Dr. B.Anupama	Internal Member	

Special Invitees:

S.No.	Name	Designation	Signature
1	Dr. Yadavalli BasavaRaj	Principal, BITM, Ballari	
2.	Dr. R.N. Kulkarni	Prof. &HOD,CSE Dept., BITM, Ballari	
3.	Dr. Vidyavathi BM	Prof. & HOD, AI&ML Dept., BITM,Ballari	

S. No	Name of External BOS Member	Organization	
1	Smt. Seema Sali	Curator, Advanced Technology Solutions, IIMC	Attended online
2	Dr. P.V. Raveendra	Professor, Dept. of Management Studies, MS Ramaiah Institute of Technology, Bengaluru	
3	Dr.T. Manjunatha	Professor (Also Chairman, VTU BOS in MBA), Visvesvaraya Technological University BDT College of Engineering , Davanagere	
4	Mrs. Divya Acharya	Head HR - TCS Financial Solutions, Tata Consultancy Services.	
5	Mrs.Gayatri	Global Resource Management, CapGemini, Bangalore	
6	Mr.Narayana.p	Vice President HR, KFIL, Koppal	
7	Mr. Velu.V	Rtd General Manager-HR TATA Motors LTD	



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Minutes of the meeting

1. BOS meeting has been conducted to review the scheme & syllabus and finalize the courses and contents of 3rd & 4th sem for the academic year 2022-23 in online mode.
2. Dr. Janet Jyothi Dsouza, Chairman & HOD-DMS, has initiated the meeting by welcoming all Internal and External members of BOS.
3. HOD presented the Scheme of 3rd & 4th semester with specializations offered and three credits in each specialization:
 - **Data Analytics**
 - **Logistics & Supply chain Management**
 - **Marketing**
 - **Finance**
 - **Human Resource**
4. Panel Members approved three credits for each course and also mentioned to include practical element for practical oriented courses.
5. Stream Heads have presented syllabus content of courses in each specialization
6. Discussions carried on the review of courses in different specializations of 3rd & 4th semester.

Following are the suggestions provided for each specialization:

Data Analytics Specialization

- a) The panel suggested changing the subject names to 'Data Analytics for Managers', 'Python Programming for Managers', 'R Programming for Managers', 'Project Management', and 'Corporate Social and Web Analytics'.
- b) Panel members suggested incorporating the contents which are of Techno functional rather than pure technical.
- c) One hour lab/week to be included
- d) Practical Skill exercises and activities to be included.
- e) Panel members suggested to Include Knowledge Portal Creation as a content or module in Decision Support System course.
- f) Members suggested Excel exercises, Gantt chart to be included in Project Management course.

Marketing Specialization

- a) Panel members suggested to add some advanced topics in Retail Management concepts
- b) Skill Enrichment exercises and practical aspects are given with more importance.



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- c) Members suggested providing assignments on Cyber Security and Personal data security law to gain Knowledge on these aspects.
- d) Panel Members suggested incorporating other concepts apart from Agricultural Marketing in Rural marketing course.
- e) Members advised to relook in to course objectives of the courses and suggested to provide reference books to all the subjects.

Logistics & Supply chain Management

- a) Panel members suggest including the concept of IT in SCM and including book titled Supply Chain Management- Text and Cases Janat Shah, Pearson.
- b) Panel members emphasized on the change in the course names as:
 - 'Storage and Warehouse Management' to 'Warehouse Management'
 - 'Supply Chain and Risk Modeling Management' to 'Supply Chain Management and Risk Modeling'
 - 'Distribution Management for Global Supply Chain' to 'Global Supply Chain Management'
 - 'Exim Procedure and Documentation' to 'Export and Import Management'.
- c) Panel members suggested including concept of 'Lean Management' in Inventory Management.
- d) Members also suggest including 'process of storage of Goods' concepts in Warehouse Management course.

Finance Specialization

- a) The Investment Management course should include Investment process, sources of investment and economic investment in the Module 1. The content of technical analysis and fundamental analysis is sufficient for the discussion in module 3
- b) D-MAT Account should be added in module 1 of Financial markets and Services. The content of EXIM bank should be removed
- c) The Tax management course should be renamed as Direct taxation and Indirect taxation
- d) IT returns component should be added to get the practical component in direct taxation
- e) Financial engineering content should be added to Financial Modelling Course
- f) The course Banking and Insurance to be changed to Insurance and Risk Management and syllabus content should be revised accordingly
- g) In wealth Management course derivatives management content should be added
- h) The book The Scam by Debashis Basu and Sucheta Dalal should be added as reference book in Behavioural Finance Course
- i) Management Accounting Exposure content can be added in IFM Course



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Human Resource specialization

- a) Panel members suggested to include 'Resume, C.V' in the place of Bio Data and also advice to incorporate the concepts of Remote work, hybrid work and work from office in Talent Acquisition course.
- b) Members suggested to rename the courses as :
 - 'HR Analytics' to 'Human Resource Analytics'
 - 'HR Audit' to 'Human Resource Audit'
 - 'Industrial Relations & Labour Laws' to 'Employee Relations & Labour Laws'
 - 'Employee Talent Management' to 'Talent Management'
- c) Panel members suggested including concepts – 'Immersive Training or 360 Degree Training in Learning & Development course.
- d) Panel members suggested adding concepts on 'Indian Leaders, role of leader in crisis management' in Leadership subject.
- e) Members suggested changing 3rdModule title according to the contents in it and including the concept of 'Self-management' in Personal Growth & Interpersonal Effectiveness course.
- f) 'Role of PRO' needs to be included instead of PR role in Public Relations course.
- g) Panel members suggested adding other components of satisfaction along with salary factor and comparison-ratio in Compensation & Reward system subject.

CONCLUSION

Suggestions mentioned above were accepted by all the board members and decided to incorporate necessary corrections and suggestions in the respective courses of all the specializations.

Meeting ended with vote of thanks proposed by Dr. Janet Jyothi Dsouza, HOD-DMS, to all the panel members of the BOS.


HOD-DMS

Revision of Scheme and Syllabus of 1st and 2nd Sem 2022-2023

Dr. Christopher Raj D <christraj75@gmail.com>

Wed, Dec 21, 2022 at 4:06 PM

To: "Narayana P (KFIL)" <narayana.p@kirkloskar.com>, Narayana.polki@gmail.com, velu.venkatesh.10@gmail.com, Seema Sali <seemasali@gmail.com>, ravoendrapv@gmail.com, gaye.bharadwaj@gmail.com

21st Dec 2022

To,

**The Board of Studies Members
BITM, Ballari**

Respected Sir/Madam

Subject: Modification of the scheme and syllabus, batch 2022-2023....Regarding

As per the Principals Meeting with Vice Chancellor VTU, it is been informed to align with VTU MBA syllabus and scheme of 1st and 2nd-semester batch 2022-2023. As per the guideline BITM -MBA Department syllabus and the scheme has been aligned with the VTU,

Therefore, kindly find the enclosed documents of the Syllabus and Scheme of 1st and 2nd semesters, batch 2022-2023.

Request the honorable members to approve and give consent for the above subject.

Looking forward to your response

 Regards**Dr. Christopher Raj.D
BOS-BITM Member
Professor, DMS, BITM
Ballari 9880999862**--
Regards**Dr.Christopher Raj.D
Professor
DMS BITM Ballari
9880999862**

Vision:

'To be a leading B-school by nurturing dynamic leaders and managers through academic excellence, research and innovation'.

Mission:


To impart ethical and value based management education with pragmatic insights

To provide the conducive environment for developing leadership qualities

To inculcate culture of Entrepreneurship, innovation and Research

3 attachments

 **2022-2023-1st and 2nd Sem Scheme Autonomus.docx**
19K

 **2nd Sem schome and Syllabus 2022-2023.zip**
710K

 **1st Sem scheme and Syllabus 2022-2023.zip**
704K



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BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT
Department of Management Studies

23/12/2022

Letter of Acceptance

All the Members of Board of Studies (BOS) have accepted for the Ratification of the Subject codes for the academic year 2022-23 and subject codes have been changed accordingly.

Members of Board of Studies

S. No	Name of Internal BOS Member		Signature
1	Dr. Janet Jyothi Dsouza	Chairman & HOD	
2	Dr. Christopher Raj	Internal Member	
3	Dr. Shaheeda Banu S	Internal Member	
4	Dr. B. Anupama	Internal Member	

S. No	Name of External BOS Member		
1	Smt. SEEMA SALI	Curator, Advanced Technology Solutions, IIMC	Online Acceptance
2	Dr. P V RAVEENDRA	Professor, Dept. of Management Studies, MS Ramaiah Institute of Technology, Bengaluru	Online Acceptance
3	Dr. T MANJUNATHA,	Professor (Also Chairman, VTU BOS in MBA), Visvesvaraya Technological University BDT College of Engineering, Davanagere	Online Acceptance
4	Mrs. DIVYA ACHARYA	Head HR - TCS Financial Solutions, Tata Consultancy Services.	Online Acceptance
5	Mrs. GAYATRI	Global Resource Management, Cap Gemini, Bangalore	Online Acceptance
6	Mr. NARAYANA P,	Vice President HR, KFIL, Koppal	Online Acceptance
7	Mr. VELU .V	Rtd General Manager-HR TATA Motors LTD	Online Acceptance



Basavarajeswari Group of Institutions

ಬಳ್ಳಾರಿ ಇನ್‌ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಟೆಕ್ನಾಲಜಿ & ಮ್ಯಾನೇಜ್‌ಮೆಂಟ್, ಬಳ್ಳಾರಿ



BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under Visvesvaraya Technological University, Belagavi

(Recognized by Govt. of Karnataka & AICTE, New Delhi)

"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)



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SILVER JUBILEE YEAR
2021-22
QUALITY EDUCATION SINCE 1997



BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

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"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)

BE/B.Tech. Scheme of Teaching and Examinations-2022
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

MECHANICAL ENGINEERING

SILVER JUBILEE YEAR

2021-22

QUALITY EDUCATION SINCE 1997

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

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SN	Category
1	ASC-Applied Science Course.
2	ESC- Engineering Science Courses.
3	ETC- Emerging Technology Course.
4	PLC- Programming Language Course.
5	AEC- Ability Enhancement Course.
6	HSMC-Humanity and Social Science and management Course.
7	AEC- Ability Enhancement Course.
8	SDC- Skill Development Course.
9	IC – Integrated Course (Theory Course Integrated with Practical Course).
10	
11	
12	



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"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)

I Semester

Scheme of Teaching and Examination 2022-23

Outcome-Based Education(OBE) and Choice Based Credit System(CBCS) (Effective from the academic year 2022-23)

For Physics Group

I Semester (Mechanical Engineering Stream)

Sl. No	Course and Course Code		Course title	TD/PSB	Teaching Hours/Week				Examination			Credits	
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks		Total Marks
1	*ASC(IC)	22MATM11	Mathematics for MES-I	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	22PHYM12	Physics for MES	PHY	2	2	2	0	03+02	50	50	100	04
3	ESC	22EME13	Elements of Mechanical Engineering	Mechanical	If offered as theory course				03	50	50	100	03
					2	2	0	0					
					If offered as Integrated course								
					2	0	2	0					
4	ESC-I	22ESC14x	Engineering Science Course-I	Respective Engg Dept.	3	0	0	0	03	50	50	100	03
5	ETC-I	22ETC15x	Emerging Technology Course-I	Any Engineering Dept	3	0	0	0	03	50	50	100	03
	OR				PLC-I	22PLC15x	Programming language Course-I	2	0				
6	AEC	22ENG16	Communicative English	Humanities	1	0	0	0	01	50	50	100	01
7	HSMC	22KSK17/ 22KKB17	Sanskritika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
8	AEC/SDC	22IDT18	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
TOTAL										400	400	800	20

SDA-Skill Development Activities, TD/PSB- Teaching Department / Paper Setting Board, ASC-Applied Science Course, ESC- Engineering Science Courses, ETC- Emerging Technology Course, AEC- Ability Enhancement Course, HSMS-Humanity and Social Science and management Course, SDC- Skill Development Course, CIE-Continuous Internal Evaluation, SEE- Semester End Examination, IC – Integrated Course (Theory Course Integrated with Practical Course)

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Credit Definition:

1- hour Lecture (L) per week=1Credit
 2-hours Tutorial(T) per week=1Credit
 2- hours Practical / Drawing (P) per week=1Credit
 2-hous Skill Development Actives (SDA) per week = 1 Credit

04-Credits courses are to be designed for 50 hours of Teaching-Learning Session
 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions
 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session
 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session
 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXURE- I of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

*-22MATM11 Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers
 #-22PHYM12 SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination
ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).
All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

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(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC141	Introduction to Civil Engineering	3	0	0	22ETC15A	Smart Materials and Systems	3	0	0
22ESC142	Introduction to Electrical Engineering	3	0	0	22ETC15B	Green Buildings	3	0	0
22ESC143	Introduction to Electronics Engineering	3	0	0	22ETC15C	Operation and Maintenance of Solar Electric Systems	3	0	0
22ESC144	Introduction to Mechanical Engineering	3	0	0	22ETC15D	Introduction to Embedded System	3	0	0
22ESC145	Introduction to C Programming	2	0	2	22ETC15E	Introduction to Nano Technology	3	0	0
					22ETC15F	Introduction to Drone Technology	3	0	0
					22ETC15G	Introduction to Sustainable Engineering	3	0	0
					22ETC15H	Renewable Energy Sources	3	0	0
					22ETC15I	Waste Management	3	0	0
					22ETC15J	Emerging Applications of Biotechnology	3	0	0
					22ETC15K	Introduction to Internet of Things (IOT)	3	0	0
					22ETC15L	Introduction to Cyber Security	3	0	0
(PLC-I) Programming Language Courses-I									
Code	Title	L	T	P					
22PLC15A	Introduction to Web Programming	2	0	2					
22PLC15B	Introduction to Python Programming	2	0	2					
22PLC15C	Basics to JAVA programming	2	0	2					
22PLC15D	Introduction to C++ Programming	2	0	2					

- The student has to select one course from the ESC-I group.
- MES stream Students shall opt for any one of the courses from the ESC-I group **except, 22ESC144- Introduction to Mechanical Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-I or PLC-I group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

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II Semester

Scheme of Teaching and Examination 2022-23

Outcome-Based Education (OBE) and Choice Based Credit System(CBCS)

(Effective from the academic year 2022-23)

 For Physics Group(For the students who attend the 1st semester under Physics Group)

II Semester (Mechanical Engineering Stream)													
Sl. No	Course and Course Code		Course title	TD/PSB	Teaching Hours/Week				Examination				
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	22MATM21	Mathematics for MES-II	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	22CHE22	Chemistry for MES	Chemistry	2	2	2	0	03+02	50	50	100	04
3	ESC	22CED23	Computer-Aided Engineering Drawing	Mechanical	2	0	2	0	03	50	50	100	03
4	ESC-II	22ESC24x	Engineering Science Course-II	Respective Engg Dept.	3	0	0	0	03	50	50	100	03
5	PLC-II	22PLC25x	Programming language Course-II	Any Engineering Dept	3	0	0	0	03+02	50	50	100	03
	OR												
	ETC-II	22ETC25x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	22PWS26	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
7	HSMC	22KSK27/ 22KBK27	Sanskritika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		22ICO27	Indian Constitution										
8	AEC/SDC	22IDT28	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
		22SFH28	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

SDA-Skill Development Activities, TD/PSB- Teaching Department / Paper Setting Board, ASC-Applied Science Course, ESC- Engineering Science Courses, ETC- Emerging Technology Course, AEC- Ability Enhancement Course, HSMS-Humanity and Social Science and management Course, SDC- Skill Development Course, CIE-Continuous Internal Evaluation, SEE- Semester End Examination, IC – Integrated Course (Theory Course Integrated with Practical Course)

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*-22MATM21 Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers

#-22CHEM22- SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0)

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC241	Introduction to Civil Engineering	3	0	0	22ETC25A	Smart materials and Systems	3	0	0
22ESC242	Introduction to Electrical Engineering	3	0	0	22ETC25B	Green Buildings	3	0	0
22ESC243	Introduction to Electronics Engineering	3	0	0	22ETC25C	Operation and Maintenance of Solar ElectricSystems	3	0	0
22ESC244	Introduction to Mechanical Engineering	3	0	0	22ETC25D	Introduction to Embedded System	3	0	0
22ESC245	Introduction to C Programming	2	0	2	22ETC25E	Introduction to Nano Technology	3	0	0
					22ETC25F	Introduction to Drone Technology	3	0	0
					22ETC25G	Introduction to Sustainable Engineering	3	0	0
					22ETC25H	Renewable Energy Sources	3	0	0
					22ETC25I	Waste Management	3	0	0
					22ETC25J	Emerging Applications of Biotechnology	3	0	0
					22ETC25K	Introduction to Internet of Things(IoT)	3	0	0
					22ETC25L	Introduction to Cyber Security	3	0	0
(PLC-II) Programming Language Courses-II									
Code	Title	L	T	P					
22PLC25A	Introduction to Web Programming	2	0	2					
22PLC25B	Introduction to Python Programming	2	0	2					
22PLC25C	Basics of JAVA programming	2	0	2					
22PLC25D	Introduction to C++ Programming	2	0	2					

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- The student has to select one course from the ESC-II group.
- Mechanical Engineering stream Students shall opt for any one of the courses from the ESC-II group **except, 22ESC244-Introduction to Mechanical Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-II or PLC-II group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa



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I Semester

Scheme of Teaching and Examination 2022-23

Outcome-Based Education (OBE) and Choice Based Credit System(CBCS)

(Effective from the academic year 2022-23)

I Semester (Mechanical Engineering Stream)					(For Chemistry group)								
Sl.No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination			Credits	
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P	S					
1	*ASC(IC)	22MATM11	Mathematics for ME Streams-I	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	22CHEE12	Chemistry for ME Streams	Chemistry	2	2	2	0	03+02	50	50	100	04
3	ESC	22CED13	Computer Aided Engineering Drawing	Civil/Mech Enggdept	2	0	2	0	03	50	50	100	03
4	ESC-I	22ESC14x	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	22ETC15x	Emerging Technology Course-I/	Any Engg Dept	3	0	0	0	03	50	50	100	03
	OR				PLC-I	22PLC15x	Programming Language Course-I	2	0				
6	AEC	22PWS16	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
7	HSMS	22ICO17	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
		OR											
8	AEC/SEC	22SFH18	Scientific Foundations for Health	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
TOTAL										400	400	800	20

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SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**- Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE** -Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

***-22MATM11** Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers

#-22CHEM12- SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination **ESC or ETC of 03 credits Courses** shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0) Questions from the practical component shall be included in SEE, however, there is no SEE for practical component.

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

Credit Definition:

- 1-hour Lecture (L) per week=**1Credit**
- 2-2-hours Tutorial(T) per week=**1Credit**
- 3-hours Practical / Drawing (P) per week=**1Credit**
- 2-hous Skill Development Actives (SDA) per week = **1 Credit**

- 04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practicalsessions
- 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session
- 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXURE-I of Induction Programs notification of the University published at the beginning of the 1st semester.

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AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC141	Introduction to Civil Engineering	3	0	0	22ETC15A	Smart Materials and Systems	3	0	0
22ESC142	Introduction to Electrical Engineering	3	0	0	22ETC15B	Green Buildings	3	0	0
22ESC143	Introduction to Electronics Engineering	3	0	0	22ETC15C	Operation and Maintenance of Solar Electric Systems	3	0	0
22ESC144	Introduction to Mechanical Engineering	3	0	0	22ETC15D	Introduction to Embedded System	3	0	0
22ESC145	Introduction to C Programming	2	0	2	22ETC15E	Introduction to Nano Technology	3	0	0
					22ETC15F	Introduction to Drone Technology	3	0	0
					22ETC15G	Introduction to Sustainable Engineering	3	0	0
					22ETC15H	Renewable Energy Sources	3	0	0
					22ETC15I	Waste Management	3	0	0
					22ETC15J	Emerging Applications of Biotechnology	3	0	0
					22ETC15K	Introduction to Internet of Things (IOT)	3	0	0
					22ETC15L	Introduction to Cyber Security	3	0	0
(PLC-I) Programming Language Courses-I									
Code	Title	L	T	P					
22PLC15A	Introduction to Web Programming	2	0	2					
22PLC15B	Introduction to Python Programming	2	0	2					
22PLC15C	Basics to JAVA programming	2	0	2					
22PLC15D	Introduction to C++ Programming	2	0	2					

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- The student has to select one course from the ESC-I group.
- MES stream Students shall opt for any one of the courses from the ESC-I group **except, 22ESC144-Introduction to Mechanical Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-I or PLC-I group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa



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II Semester

Scheme of Teaching and Examination 2022-23

Outcome-Based Education (OBE) and Choice Based Credit System(CBCS)

(Effective from the academic year 2022-23)

II Semester (Mechanical Engineering Stream. (For the students who have attended Isemster under Chemistry Group)													
Sl.No	Course and CourseCode		Course Title	TD/PSB	Teaching Hours/Week				Examination			Credits	
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P	S					
1	*ASC(IC)	22MATM21	Mathematics for ME Streams-II	Maths	3	0	2	0	03	50	50	100	04
2	#ASC(IC)	22PHYM22	Physics for ME Streams	PHY	2	2	2	0	03+02	50	50	100	04
3	ESC	22EME23	Elements of Mechanical Engineering	Mechanical	If offered as theory course				03	50	50	100	03
					2	2	0	0					
4	ESC-II	22ESC24x	Engineering Science Course-II	Respective Engg Dept	If offered as Integrated course				03	50	50	100	03
					2	0	2	0					
5	PLC-II	22PLC25x	Programing Language Course-II	Any Engg Dept	2	0	2	0	03+02	50	50	100	03
					OR				03				
	ETC-II	22ETC25x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	22ENG26	Communicative English	Humanities	0	2	0	0	01	50	50	100	01
7	HSMC	22KSK27	Samskrutika Kannada/ Balake Kannada	Humanities	0	2	0	0	01	50	50	100	01
		22KKBK27											
		OR											
		22ICO27	Indian Constitution										
8	AEC/SDC	22IDT28	Innovation and Design Thinking	Any Dept	0	0	2	0	02	50	50	100	01
		OR											
			22SFH28						Scientific Foundations of Health				
TOTAL										400	400	800	20

SDA-Skill Development Activities, TD/PSB- Teaching Department / Paper Setting Board, ASC-Applied Science Course, ESC- Engineering Science Courses, ETC- Emerging

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Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE**-Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

*-**22MATM21** Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers

#-**22PHYM22** SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0),.

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC241	Introduction to Civil Engineering	3	0	0	22ETC25A	Smart materials and Systems	3	0	0
22ESC242	Introduction to Electrical Engineering	3	0	0	22ETC25B	Green Buildings	3	0	0
22ESC243	Introduction to Electronics Engineering	3	0	0	22ETC25C	Operation and Maintenance of Solar ElectricSystems	3	0	0
22ESC244	Introduction to Mechanical Engineering	3	0	0	22ETC25D	Introduction to Embedded System	3	0	0
22ESC245	Introduction to C Programming	2	0	2	22ETC25E	Introduction to Nano Technology	3	0	0
					22ETC25F	Introduction to Drone Technology	3	0	0
					22ETC25G	Introduction to Sustainable Engineering	3	0	0
					22ETC25H	Renewable Energy Sources	3	0	0
					22ETC25I	Waste Management	3	0	0
					22ETC25J	Emerging Applications of Biotechnology	3	0	0
					22ETC25K	Introduction to Internet of Things(IoT)	3	0	0
					22ETC25L	Introduction to Cyber Security	3	0	0
(PLC-II) Programming Language Courses-II									
Code	Title	L	T	P					
22PLC25A	Introduction to Web Programming	2	0	2					
22PLC25B	Introduction to Python Programming	2	0	2					
22PLC25C	Basics to JAVA programming	2	0	2					
22PLC25D	Introduction to C++ Programming	2	0	2					

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- The student has to select one course from the ESC-II group.
- Mechanical Engineering stream Students shall opt for any one of the courses from the ESC-II group **except, 22ESC244-Introduction to Mechanical Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-II or PLC-II group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa



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Semester: I**(COMMON TO ALL BRANCHES)****Course Title: Computer Aided Engineering Drawing**

Course Code	22CAED13/23	CIE Marks	50
Teaching Hours/Week (L:T:P)	2:0:2	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites: Knowledge of basic geometrical shapes and instruments, measurement, unit conversions

Course objectives:

- Understand drawing as a communication mode
- Expose students to standards and conventions followed in preparation of engineering drawings
- Develop the ability of conveying the engineering information through drawings
- Acquire the knowledge of generating the orthographic views of lines, planes and solids.
- Understand the development of surfaces and isometric projections.
- To make them understand the relevance of engineering drawings to different engineering domains

Module – 1

Introduction to Sketching: Principles of Engineering Graphics and their significance, Drawing Instruments and their uses, BIS conventions, free hand sketching, Drawing sheets, Fundamentals of Scales, Introduction to Software (solid edge): Creation of 2D/3D environment, selection of drawing sheet size and scale, different commands, Dimensioning rules, Line Conventions.

Introduction to Orthographic Projections, planes of projection, reference line and conventions employed, First and Third angle of projection,

Orthographic Projections of points situated in all four quadrants.

Orthographic Projection of straight lines located in first quadrant with inclined to VP and HP. Problems on applications of straight lines without traces.

Orthographic Projection of plane surfaces (First angle projection only) Projection of regular plane surfaces- triangle, square, rectangle, pentagon, hexagon and circular laminae in simple positions resting on HP/ VP and inclined to HP/ VP using change of position method. (No problems on punched and composite plates).

10 Hours

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Module - 2

Orthographic Projection of Solids: Introduction, Projections of right regular solids- prisms & pyramids (triangle, square, rectangle, pentagon and hexagon), cones, cubes (hexahedron) and tetrahedron, solids resting on HP ONLY

10 Hours**Module – 3**

Isometric Projection: Introduction, Isometric scale, Isometric projection of- simple plane figures, individual solids and combination of two simple solids, Conversion of Isometric to orthographic views. Problems on applications of Isometric projection of simple Engineering components and conversion to orthographic projections (Mechanical, electrical and electronic components for CIE only).

10 Hours**Module - 4**

Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular prisms, pyramids, cylinders and cones resting with base on HP only. Development of lateral surfaces of Sphere, frustums and truncation. Problems on applications of Development of lateral surfaces viz, funnel, tray, transition pieces, connecting two ducts

10 Hours**Module – 5**

Engineering Applications of Engineering Graphics: Sketching and drawing simple Mechanisms, wiring and lighting diagrams, Basic building Drawings, Electronic Drawing- PCB Drawings. Introduction to Development of Computer Graphical Packages

10 Hours**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

CO1	Understand the basics of Engineering graphics and to implement the principles of orthographic projections of points, lines and planes,
CO2	Analyze and draw the orthographic projections of solids.
CO3	Visualize three dimensional objects and to draw Isometric projection
CO4	Develop the lateral surfaces of solids
CO5	Visualize the components used in Engineering disciplines.

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Assessment Details

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks) and that for SEE minimum passing marks is 35% of the maximum marks (18 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Examination / Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The Alternate Assessment Tools are Quiz, Assignments, Presentations, Open Book, Self E-Learning and Model Making.

Semester End Examination (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. The question paper will have 8 full questions from module-1 to module-4 as per below tabled

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Preparatory sketching (b)
Module 1	20	13	07
Module 2	30	19	11
Module 3	25	16	09
Module 4	25	16	09
Total	100	64	36
Consideration of SEE Marks		Total of (a) + (b) ÷ 2 = Final SEE marks	

weightage details.

2. The students will have to answer 4 full questions, selecting one full question from each module.

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Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Drawing: Plane and Solid Geometry	Bhatt, N.D	53rd Edition, Charotar Publishing House Pvt. Limited, Gujarat	2019
2	Engineering Graphics	Gopalakrishna K.R	32nd Edition, Subash Stores, Bangalore	2005
3				
Reference Books				
1	A Textbook of Engineering Drawing	Dhawan R. K	3/e, S. Chand Publishing	2019
2	A Textbook of Engineering Graphics	Venugopal K., and Prabhuraj	New Age International Publishers	2014
3	Engineering Drawing	Parthasarathy N. S., Vela Murali,	Oxford University Press	2015

E-Resources:

- <https://www.youtube.com/watch?v=p62LPzFqGQw>: Engineering Graphics and Design - Intro, IIT Delhi
- <https://youtu.be/26-RdMraMAY>: Orthographic Projections, NPTEL
- <https://youtu.be/DW7dpKdxVrA>: Orthographic Projections, NPTEL
- <https://www.youtube.com/watch?v=AoNIOxnxDO0&list=PLlhUrsYr8yHx7TVB51jN3HZV yW3R6RiBq>
- <https://www.youtube.com/watch?v=7JpSSBVeSpl>
- <https://www.youtube.com/watch?v=66R4esOwuAg&list=RDCMUCNQHebTzfRahptcsmuOVufg&index=4>

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Semester: I/II
(ETC-I/II) Emerging Technology Courses-I/II
(Mechanical Engineering stream)
Course Name: INTRODUCTION TO SUSTAINABLE ENGINEERING

Course Code	22ETC15g/25g	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites:
Course Learning Objectives:

- To familiarize the students to the area of sustainability and concepts of sustainability engineering.
- To enable students with an understanding of principles and frame work of sustainable engineering
- To provide students with an understanding of Life Cycle Assessment tool in sustainable engineering.
- To provide students with understanding of integration of sustainability with design. Teaching-Learning Process.

Module – 1

Sustainable Development and Role of Engineers: Introduction, Why and What is Sustainable Development, THE SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering

Sustainable Engineering Concepts: Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy

08 Hours

Module - 2

Sustainable Engineering and Concepts, Principles and Frame Work: Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering.

Tools for sustainability Assessment: Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental

08 Hours

Module – 3

Fundamentals of Life Cycle Assessment

Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, Strength and Limitations of LCA.

08 Hours

Module - 4

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Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment: Introduction, Environmental Life Cycle Costing, Social Life Cycle Assessment, Life Cycle Sustainability, LCA Applications in Engineering: Environmental Product Declarations and Product Category Rules, Carbon and Water Foot Printing, Energy systems, Buildings and the Built Environment, Chemical and Chemical Production Food and Agriculture

Introduction to Environmental Economics: Introduction – What Is Environmental Economics?, Valuing the Environment, Market-based Incentives (or Economic Instruments) for Sustainability

08 Hours

Module – 5

Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process – Sustainable Process Design, Sustainable Production Design.

08 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Elucidate the basics of sustainable development, sustainable engineering and its role in engineering
CO2	Application of Sustainable Engineering Concepts and Principles in Engineering
CO3	Apply the Principle, and methodology of Life Cycle Assessment Tool to engineering systems.
CO4	Outline the concept of integration methods of sustainability to Engineering Design
CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

Assessment Details:

CIE:

(Preferred pattern of the all test are similar to the SEE pattern, however; teacher may follow the CIE test pattern of other engineering courses)

Two assignments each of 10 Marks

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Three Unit Tests each of 20 Marks (duration 01 hour)

First test at the end of 5th week of the semester

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Second test at the end of the 10th week of the semester

Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

First assignment at the end of 4th week of the semester

Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours) t the end of the 13th week of the semester.

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.

The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Introduction to Sustainability for Engineers	Toolseeram Ramjeawon	CRC Press	1stEdn., 2020
2	Sustainability Engineering: Concepts, Design and Case studies,	Prentice Hall		1stEdn, 2015
3	System Analysis for sustainable Engineering: Theory and applications, ,	Ni bin Chang	McGraw Hill Publications	1stEdn., 2010
Reference Books				
1	Engineering for Sustainable development: Delivery a sustainable development goals, ,	UNESCO	International Centre for Engineering Education, France,	1stEdn., 2021
2	Introduction to Sustainable Engineering	Rag. R.L. and Ramesh Lakshmi Dinachandran,	PHI Learning Pvt. Ltd.	2ndEdn, 2016

Web links and Video Lectures (e-Resources):

- VTU/EDUSAT/SWAYAM/NPTEL/MOOC.
- <https://npTEL.ac.in/courses/127105018>
- <https://npTEL.ac.in/courses/107103081/www.macfound.org>
- <https://unesdoc.unesco.org/>
- <https://unesdoc.unesco.org/ark:/48223/pf0000375644.locale=en>
- <https://engineeringforoneplanet.org/>

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Semester: I/II
(ETC-I/II) Emerging Technology Courses-I/II
(Mechanical Engineering stream)
Course Name: SMART MATERIALS AND SYSTEM

Course Code	22ETC15a/25a	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3:0:0:0	SEE Marks	50
Total Hours of Teaching-Learning	40	Total Marks	100
Credits	03	Exam Hours	03

Pre-requisites: Knowledge of Basic mathematics and sciences.
Course objectives:

1. To develop the students ability to learn emerging materials.
2. To make students to learn prefabricated building components
3. To understand the Actuators deployed in smart materials and shape memory alloys
4. To learn building information modeling for building design
5. To learn the concepts of 3-D printing

Teaching-Learning Process These is sampling Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby sites to give brief information about the Civil Engineering structures.
3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
4. Encourage collaborative (Group) Learning in the class.
5. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
10. Individual teachers can devise innovative pedagogy to improve teaching-learning.

Module – 1

Emerging Materials Honey comb structure (Carbon composites), Nano-materials, engineered polymers, emerging sustainable by products (Fly ash and GGBS) and construction chemicals.

Alternative Assessment Activities:

1. Demonstration of emerging materials properties.
2. Laboratory demonstration and Experiments on solid materials.

08 Hours

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Module - 2

Prefabricated/ Manufactured building components Definition, types of prefabricated/ manufactured building components and infrastructure, modular coordination, standardization, materials, systems, production, transportation and installation.

Alternative Assessment Activities:

1. *Demonstration of manufactured components*
2. *Video demonstration prefabricated/ manufactured building*

08 Hours

Module – 3

Smart Materials: Definition, Principles of Piezo-electricity, materials (Polymers and Ceramics), sensors (Piezo-electric sensor, strain gauge, shear sensor) smart composites, Overview **Magneto rheological Fluids, Magnetostrictive and shape memory Materials.**

Alternative Assessment Activities:

1. *Demonstration of Piezo-electricity, materials*
2. *Laboratory demonstration and Experiments.*

08 Hours

Module - 4

Actuators, Piezoelectric Ceramic, Functional Gradient

Introduction, Actuators, Piezoelectric Ceramics, Functionally Graded Materials.

Electroceramics: Introduction Electroceramics and Smart Systems Electromechanical Actuators, Actuator Materials

Alternative Assessment Activities:

1. *Demonstration of various smart materials.*
2. *Laboratory Demonstrations and Practical Experiments*

08 Hours

Module – 5

3-D Printing Importance, Historic development, advantages, common terminologies, classification, Process chain, 3 – D modeling, Data conversion and transmission, checking and preparation, Building, Post processing, Applications

Alternative Assessment Activities:

1. *Demonstration of 3D Models.*
2. *Laboratory Demonstrations and Practical Experiments*

08 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Make use emerging materials for construction
CO2	Decide the proper prefabricated building component
CO3	Use smart materials and methods in building construction
CO4	Use smart materials and shape memory alloys in building actuators
CO5	Prepare 3-D modeling and manufacture building component

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

Two Unit Tests each of 30 Marks (duration 01 hour) First test after the completion of 30-40 % of the syllabus• Second test after completion of 80-90% of the syllabus• One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

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Suggested Learning Resources:

Text Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Essentials of Materials Science and Engineering,	Donald R. Askeland and Pradeep P. Fulay	Cengage Learning	2009,
2	Smart Materials Volume 1 And Volume 2	I Schwartz, Mel M.	A Wiley-Interscience Publication John Wiley & Sons, Inc. The <i>Encyclopedia of Smart Materials is available Online at</i> www.interscience.wiley.com/reference/esm	ISBN 0-471-17780-6 (cloth : alk.paper)
3	Materials Science and Engineering	Callister Jr, W.D., Rethwisch, D.G.,	Hoboken, NJ: Wiley	10th Ed., 2018

Reference Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Materials 1: An Introduction to Properties, Application and Design	Jones, D.R.H., and Ashby, M.F	Butterworth-Heinemann	4th Ed., 2011
2	Engineering Materials 2: An Introduction to Microstructure and Processing	. Jones, D.R.H., and Ashby, M.F	Butterworth-Heinemann	4th Ed., 2012
3	Physical Metallurgy Principles	Abbaschian, R., Abbaschian, L., Reed-Hill, R. E	Cengage Learning	4th Ed., 2009

Web links and Video Lectures (e-Resources): YouTube Videos.

- Activity Based Learning (Suggested Activities in Class)/ Practical Based learning Site visits to understand the prefabricated building components.
- Visit to Smart material manufacturing facilities
- Visit to 3-D printing facility

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Semester: I/II

Engineering Science Course-I/II

Course Name: INTRODUCTION TO MECHANICAL ENGINEERING

Course Code	22ESC144/244	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	3	Exam Hours	03
Total Hours of Pedagogy	40	Total Marks	100

Course Learning Objectives

- To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
- Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
- To know the concept of IC engines and Future Mobility vehicles.
- To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications

To acquire a basic understanding role of Mechanical Engineering in the Robotics and Automation in industry.

Teaching-Learning Process

Adopt Problem Based Learning (PBL), which fosters students Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
- Arrange visits to show the live working models other than laboratory topics.
- Adopt collaborative (Group Learning) Learning in the class.

Module – 1

Introduction to Emerging Technologies

Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Energy Sources and Power Plants: Review of energy sources; Construction and working of Hydel power plant, Thermal power plant, Solar power plant by photovoltaic (PV) cell, Wind power plant.

08 Hours

Module - 2

Energy and I C Engine

Introduction to IC Engines: Components and Working Principles, 4-Stroke Petrol and Diesel Engines, Application of IC Engines.

Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles

08 Hours

Module – 3

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Machine Tool Operations:

Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest,

Drilling Machine: Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring,

Milling Machine: Working, milling methods(Up milling down milling) operations milling: plane milling, end milling and slot milling.

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC,

08 Hours

Module - 4

Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, graphite, and polymer. Shape Memory Alloys.

Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.

08 Hours

Module - 5

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.

Automation in industry: Definition, types – Fixed, programmable and flexible automation , advantages and disadvantages.

Evolution of technologies; Introduction to Industrial revolution, Fourth industrial revolution (IR 4.0) Industrial IOT definition, merit, demerit and application.

08 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Explain the concepts of Role of Mechanical Engineering and Evolution of technologies
CO2	Explain the Working Principle of Energy sources and IC engines
CO3	Describe the Machine Tool Operations and advanced Manufacturing process. and various Metal Joining Processes
CO4	Describe the advanced Manufacturing process and EV vehicles.
CO5	Explain the Concepts of evolution technologies automation and Robotics

Assessment Details

CIE:

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

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Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

(Preferred pattern of the all test are similar to the SEE pattern, however; teacher may follow the CIE test pattern of other engineering courses)

Two assignments each of 10 Marks

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Three Unit Tests each of 20 Marks (duration 01 hour)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours) t the end of the 13th week of the semester.

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.

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□ The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.

□ **There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.**

Suggested Learning Resources :

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Design	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson	Cengagelearning	Second Edition, 2013
2	The Design of Business	Roger Martin	Harvard Business Press	2009
3	Design Thinking: Understand – Improve – Apply	Hasso Plattner, Christoph Meinel and Larry Leifer	Springer	2011.
Reference Books				
1	Design Thinking for Strategic Innovation	Idris Mootee	John Wiley & Sons	Second Edition, 2011.
2	Engineering Design Process	Yousef Haik and Tamer M.Shahin	CengageLearning	1st edition, 2012

E-Resources:

- www.tutor2u.net/business/presentations/. /product lifecycle/default.html
- https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
- www.bizfilings.com > Home > Marketing > Product Development
- <https://www.mindtools.com/brainstm.html>
- <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competitor>
- www.vertabelo.com/blog/documentation/reversengineering
- <https://support.microsoft.com/en-us/kb/273814>
- <https://support.google.com/docs/answer/179740?hl=en>
- <https://www.youtube.com/watch?v=2mjSDiBaUIM> thevirtualinstructor.com/foreshortening.html
- <https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>
- <https://dschool.stanford.edu/use-our-methods/>
- <https://www.interaction-design.org/literature/article/stages-in-the-design->

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thinking-process

13. <http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49 8.

14. <https://www.nngroup.com/articles/design-thinking/>

15. <https://designthinkingforeducators.com/design-thinking/>

16. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

<http://dschool.stanford.edu/dgift/>



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Semester: I**Engineering science course**Course Name: **ELEMENTS OF MECHANICAL ENGINEERING**

Course Code	22EME13/23	CIE Marks	50
Teaching Hours/Week (L: T:P)	1:0:0	SEE Marks	50
Credits	3	Exam Hours	03
Total Hours of Pedagogy	40	Total Marks	100

Course Learning Objectives

- To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
- Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
- To know the concept of IC engines and Future Mobility vehicles.
- To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications

To acquire a basic understanding role of Mechanical Engineering in the Robotics and Automation in industry.

Teaching-Learning Process

Teaching-Learning Process

Adopt Problem Based Learning (PBL), which fosters students' Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
- Arrange visits to show the live working models other than laboratory topics.
- Adopt collaborative (Group Learning) Learning in the class.

Module – 1**Introduction to Mechanical Engineering (Overview only):**

Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Steam Formation and Application:

Modes of heat transfer, Steam formation, Types of steam, Steam properties and applications of steam (simple numerical problems).

Energy Sources and Power Plants:

Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant and Wind power plant.

08 Hours

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Module - 2

Machine Tool Operations:

Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swiveling the compound rest,

Drilling Machine: Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring,

Milling Machine: Working methods of milling (up milling and Down milling), milling operations: plane milling, end milling and slot milling.

(No sketches of machine tools, sketches to be used only for explaining the operations).

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.

08 Hours

Module - 3

Introduction to IC Engines: Components and working principles, 4-Stroke Petrol and Diesel engines, Application of IC Engines, performance of IC engines (Simple numerical).

Introduction to Refrigeration and Air Conditioning: Principle of refrigeration, Refrigerants, and their desirable properties. Working principle of VCR and VAR refrigeration system, working principle of room air conditioner & Applications of air Conditioners.

08 Hours

Module - 4

Mechanical Power Transmission:

Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)

Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive)

Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames), TIG welding, MIG welding, Thermit welding, Laser beam welding and Electron beam welding processes

08 Hours

Module - 5

Insight into future mobility technology; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles.

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Robot anatomy, Applications of Robots in material handling, processing and assembly and inspection.

08 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Acquire a basic understanding about scope of mechanical engineering, fundamentals about steam and nonconventional energy sources.
CO2	Acquire a basic knowledge about conventional and advanced manufacturing processes.
CO3	Acquiring a basic understanding about IC engines, propulsive devices, and air-conditioner
CO4	Acquiring a basic knowledge about power transmission and joining processes.
CO5	Acquiring a basic insight into future mobility and mechatronics and robotics.

Assessment Details:

CIE:

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools (AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

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(Preferred pattern of all tests are like the SEE pattern, however; teacher may follow the CIE test pattern of other engineering courses)
Two assignments each of 10 Marks

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Two assignments each of 10 Marks

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- First assignment at the end of 4th week of the semester
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There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

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2	The Design of Business	Roger Martin	Harvard Business Press	2009
3	Design Thinking: Understand – Improve – Apply	Hasso Plattner, Christoph Meinel and Larry Leifer	Springer	2011.
Reference Books				
1	Design Thinking for Strategic Innovation	Idris Mootee	John Wiley & Sons	Second Edition, 2011.
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E-Resources:

17. www.tutor2u.net/business/presentations/. /Product lifecycle/default.html
18. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
19. www.bizfilings.com > Home > Marketing > Product Development
20. <http://www.mindtools.com/brainstm.html>
21. <https://www.quicksprout.com/. /How-to-reverse-engineer-your-competitor>
22. www.vertabelo.com/blog/documentation/reversengineering
23. <https://support.microsoft.com/en-us/kb/273814>
24. <https://support.google.com/docs/answer/179740?hl=en>
25. <https://www.youtube.com/watch?v=2mjSDlBaUIM>thevirtualinstructor.com/foreshortening.html
26. <https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>
27. <https://dschool.stanford.edu/use-our-methods/>
28. <https://www.interaction-design.org/literature/article/stages-in-the-design-thinking-process>
29. <http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49 8.
30. <https://www.nngroup.com/articles/design-thinking/>
31. <https://designthinkingforeducators.com/design-thinking/>
32. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
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Ballari Institute of Technology and Management, Ballari
Department of Mechanical Engineering

Circular

Date: 24.08.2023

In the view of Department 4th Board of Studies meeting, all the concerned faculty are here by informed to attend the meeting on 25.08.2023 at 10.30 am, HOD chamber.


HOD

Agenda:

1. To finalize the 21 Scheme and Syllabus of the V and VI semesters for the academic year 2023-24.
2. To finalize the 22 Scheme and Syllabus of the III and IV semesters for the academic year 2023-24

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

Date: 25/08/2023

PROCEEDINGS OF 4th BOARD OF STUDY MEETING HELD ON 25th AUGUST, 2023

Venue: HOD Chamber, Ground Floor, C.V.RAMAN Block

Time: 10:30 AM

Mode: Hybrid

Platform: Teams

Agenda:

At the outset, the Chairman welcomed all the Honorable members for the 4th meeting of Board of Studies (UG) for discussing and finalizing the Scheme and Syllabus for B.E. 3rd year 21 scheme and 2nd year 22 scheme of Mechanical Engineering.

1. To Consider and approve the scheme and syllabus of “**V Semester**” for 3rd Year UG Course for the Academic Year 2023-24 under 21 Scheme.
2. To Consider and approve the scheme and syllabus of “**VI Semester**” for 3rd Year UG Course for the Academic Year 2023-24 under 21 Scheme.
3. To Consider and approve the scheme and syllabus of “**III Semester**” for 2nd Year UG Course for the Academic Year 2023-24 under 22 Scheme.
4. To Consider and approve the scheme and syllabus of “**IV Semester**” for 2nd Year UG Course for the Academic Year 2023-24 under 22 Scheme.
5. Any other matter with the permission of the chair
6. Vote of thanks.

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

List of External and Internal Members of the BOS:

S. No.	Name of the Member	Designation
1	Dr. V. Venkata Ramana	Chairman
2	Dr. Yadavalli Basavaraj	Member
3	Dr. Raghavendra Joshi	Member
4	Dr. B. Ganesh	Member
5	Dr. H.M. Anil Kumar	Member
6	Dr. Raju Jadar	Special Invitee
7	Mr. Sunil Kataria	External Member
8	Dr. Jayant Kittur,	External Member
9	Mr. Ganapathy Bhatta	External Member
10	Mr. Subodh Kumar	External Member
11	Mr. Vijeesh Kumar	External Member
12	Dr. Rameshwar Sah	External Member
13	Department Faculty	Member

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

Suggestions:

1. To Consider and approve the scheme and syllabus of “V Semester” for 3rd Year UG Course for the Academic Year 2023-24 under 21 Scheme.

The suggestions given by the BOS panel are listed below,

Course Name	Production Technology II
Suggestions	1. Chapter title's need to be refined (remove word - introduction) 2. Capstan and Turret lathe not recommended 3. Emphasis should be more on Milling, Boring machine tools 4. Introduce basics of CNC in module 5

Course Name	Composite Materials
Suggestions	Include natural fibre composites, carbon fibers in module 1, rule of mixtures in module 4 and exclude Drop- Weight Impact Test from module 5.

Course Name	Finite Element Methods -
Suggestions	Recommended a reference book entitled “Practical Finite Element Analysis” by Nithin S Gokhale

Course Name	Hydraulics and Pneumatics
Suggestions	1. Recommended to modify the title of the subject as “Fluid Power Engineering”, and insisted to make this course as important elective (Industry Requirement). 2. Suggested for reduction in the module 1 content and enhance the content of module 2, 3 and adjust the number of hours per module. 3. Teach pneumatics part first and then hydraulics part.

Course Name	NON-CONVENTIONAL ENERGY SOURCES
Suggestions	1. Suggested to adjust the content, teaching hours pertaining to Solar Radiation of module 1, 2. 2. Include Storage, transportation, and risks involved in hydrogen energy.

Course Name	MACHINESHOP PRACTICE LAB
Suggestions	1. Emphasis to be made more on the Milling operations, Tools.

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

2. To Consider and approve the scheme and syllabus of “VI Semester” for 3rd Year UG Course for the Academic Year 2023-24 under 21 Scheme.

The suggestions given by the BOS panel are listed below,

Course Name	MANAGEMENT AND ENTREPRENEURSHIP
Suggestions	1. To include “Identification of critical path” in module 5 project preparation.

Course Name	MACHINE DESIGN
Suggestions	1. To include “Reduction, high speed gear box” in module 5 worm gears.

Course Name	MECHATRONICS
Suggestions	1. Suggested to give some prerequisite on Basics on Electrical Circuits before teaching PLC.

Course Name	Industrial Safety
Suggestions	1. To include Work Safety : working on elevated heights / location, and in confined space

3. To Consider and approve the scheme and syllabus of “III Semester” for 2nd Year UG Course for the Academic Year 2023-24 under 22 Scheme.

Course Name	
Suggestions	NIL

4. To Consider and approve the scheme and syllabus of “IV Semester” for 2nd Year UG Course for the Academic Year 2023-24 under 22 Scheme.

Course Name	
Suggestions	NIL

- General Suggestions:**
1. Articulation matrix for every subject should be added in the syllabus.
 2. Check for typographical errors and alignment
 3. Create opportunity for students for Self-Learning
 4. Standard Ratio for subjects: 4 - Manufacturing – Subjects, 2 – Design Subjects, 1 - Thermal - Subject

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

List of External and Internal Members of the BOS:

S. No.	Name of the Member	Designation
1	Dr. V. Venkata Ramana	Chairman <i>vy</i>
2	Dr. Yadavalli Basavaraj	Member <i>Online</i>
3	Dr. Raghavendra Joshi	Member <i>Raj</i>
4	Dr. B. Ganesh	Member <i>Ganesh</i>
5	Dr. H.M. Anil Kumar	Member <i>AK</i>
6	Dr. Raju Jadar	Special Invitee <i>RJ</i>
7	Mr. Sunil Kataria	External Member <i>S.K.</i>
8	Dr. Jayant Kittur,	External Member <i>Online</i>
9	Mr. Ganapathy Bhatta	External Member <i>Online</i>
10	Mr. Subodh Kumar	External Member <i>Online</i>
11	Mr. Vijeesh Kumar	External Member <i>Online</i>
12	Dr. Rameshwar Sah	External Member <i>R.S.</i>
13	Department Faculty	Member <i>Online</i>



Basavarajeswari Group of Institutions

ಬಳ್ಳಾರಿ ಇನ್‌ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಟೆಕ್ನಾಲಜಿ & ಮ್ಯಾನೇಜ್‌ಮೆಂಟ್, ಬಳ್ಳಾರಿ



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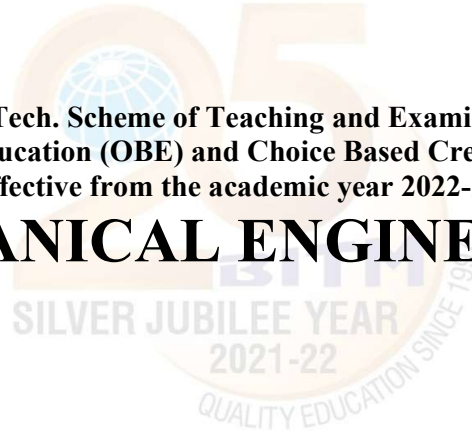
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BE/B.Tech. Scheme of Teaching and Examinations
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

MECHANICAL ENGINEERING



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"Jnana Gangotri" Campus, #873/2, Ballari-Hosapete Road, Near Allipura, Ballari-583 104 (Karnataka)

Scheme of Teaching and Evaluation for B.E Programs

With effect from the academic year 2021-22

Total Credits for B.E.: 160

Credits Distribution as per NEP 2020

SEM	HS	BS	ES	PC	PE	AEC	OE	PW	INT	SE	UHV	TOTAL
1	2	7	10	-	-	1	-	-	-	-	-	20
2	2	7	10	-	-	1	-	-	-	-	-	20
3	1	3	-	12	-	2	-	-	-	-	-	18
4	1	3	-	12	-	3	-	-	2	-	1	22
5	1	-	-	11	3	2	3	-	-	-	-	20
6	3	-	-	8	3	1	3	2	2	-	-	22
7	-	-	-	7	3	-	3	8	-	-	-	21
8	-	-	-	3	-	-	-	-	13	1	-	17
TOTAL	10	20	20	53	9	10	9	10	17	1	1	160

SN	Category
1	HS: Humanities and Social Sciences including Management courses
2	BS: Basic Science courses
3	ES: Engineering Science courses
4	IPCC: Integrated Professional core courses
5	PC: Professional core courses
6	PE: Professional Elective courses relevant to chosen specialization/branch
7	OE: Open Elective subjects offered by other departments
8	AEC: Ability Enhancement Courses
9	PW: Project work
10	SE: Seminar
11	INT: Internship in industry
12	UHV: Universal Human Values

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III Semester

Scheme of Teaching and Examination 2022-23

SL	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
						L	T	P			CIE	SEE	Total
1	BSC	21MAT31	Applied Engg. Mathematics-I	Mathematics	Mathematics	2	2	0	3	3	50	50	100
2	IPCC	21ME32	Production Technology-I	Department of ME	Department of ME	3	0	2	4	3	50	50	100
3	PCC	21ME33	Material Science & Metallurgy	Department of ME	Department of ME	2	2	0	3	3	50	50	100
4	PCC	21ME34	Mechanics of Materials	Department of ME	Department of ME	2	2	0	3	3	50	50	100
5	PCC	21MEL35	Material Testing Laboratory	Department of ME	Department of ME	0	0	2	1	3	50	50	100
6	PCC	21MEL36	Foundry & Forging Laboratory	Department of ME	Department of ME	0	0	2	1	3	50	50	100
7	HSMC	21KSK37/47	Sanskritika Kannada	Humanities	Humanities	0	2	0	1	-	100	----	100
			Balake Kannada								50	50	
		OR	21CIP37/47								Constitution of India and Professional Ethics	2	
8	AEC	21AME381	Introduction to CAD	Department of ME	Department of ME	0	0	2	1	2	50	50	100
						For AEC as lab course							
						0	2	0					
9	AEC	21DTI39	Design Thinking and social innovation	Department of ME	Department of ME	0	2	0	1	2	50	50	100
Total									18		500/450	400/450	900
Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs													
10	NCMC	21MATDIP31	Additional Mathematics - I	Mathematics	-	2	2	0	0	-	100	-	100

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE

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IV Semester

Scheme of Teaching and Examination 2022-23

SL	Course category	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks			
						L	T	P			CIE	SEE	Total	
1	BSC	21MAT41	Applied Engg. Mathematics-II	Mathematics	Mathematics	2	2	0	3	3	50	50	100	
2	IPCC	21ME42	Mechanical Measurements & Metrology	Department of ME	Department of ME	3	0	2	4	3	50	50	100	
3	PCC	21ME43	Fluid Mechanics	Department of ME	Department of ME	2	2	0	3	3	50	50	100	
4	PCC	21ME44	Engineering Thermodynamics	Department of ME	Department of ME	2	2	0	3	3	50	50	100	
5	PCC	21MEL45	Computer Aided M/c Drawing	Department of ME	Department of ME	0	0	2	1	3	50	50	100	
6	PCC	21MEL46	Fluids Mechanics Lab	Department of ME	Department of ME	0	0	2	1	3	50	50	100	
7	HSMC	21KSK37/47	Samskrutika Kannada	HSMC	HSMC	0	2	0	1	--	100	---	100	
			Balake Kannada											
		OR												
		21CIP37/47	Constitution of India and Professional Ethics							2	50	50		
8	AEC	21SSA480	Soft skills and basic aptitude	Humanities	Humanities	1	2	0	2	2	50	50	100	
9	AEC	21AXX48X	Ability Enhancement Course	Department of ME	Department of ME	0	0	2	1	2	50	50	100	
														For AEC as lab course
														For AEC as theory course
10	UHV	21UHV490	Universal Human Values			1	0	0	1	2	50	50	100	
11	INT	21INT491	Summer Internship - I	Evaluation By the appropriate authorities		Completed during the intervening period of II and III semesters. Lateral entry students have to attend the internship during the intervening period of III and IV semesters			2	---	100	--	100	
Total									22		600/650	5E+05	1100	
Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs														
12	NCMC	21MATDIP41	Additional Mathematics - I	Mathematics	-	2			0	-	100	-	100	

ABILITY ENHANCEMENT COURSE

1	21ABE481	Biology for Engineers
2	21AME482	Introduction to Computer Graphics

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Semester: III

(COMMON TO ME & CIVIL)

Course Name: INTEGRAL TRANSFORMS & NUMERICAL METHODS

Course Code	21MCM31	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites:

- Basic formulae of differentiation, partial differentiation, Integration
- Differential equations
- Periodic function

Module – 1

Fourier Series

Introduction to infinite series, Periodic functions, Dirichlet's conditions. Fourier series of periodic functions with period 2π . Fourier series of even and odd functions. Fourier series of arbitrary period $2l$. Half range Fourier series. Practical harmonic analysis.

Self-Study: Convergence and Divergence of series.

08 Hours

Module - 2

Infinite Fourier Transforms

Infinite Fourier transforms, definition, Fourier Sine and Cosine transforms. Inverse Fourier transforms, Inverse Fourier Cosine and Sine transforms. Problems.

Self-Study: Leibnitz rule for differentiation under integral sign.

08 Hours

Module – 3

Numerical Solution of first-Order ODEs

Taylor's series method, Modified Euler's method, Runge-Kutta method of order four, Milne's Predictor and Corrector formula, Adam's – Bashforth formula (No derivations only formulae).

Self-Study: Solution of ODE using Picard's method

08 Hours

Module - 4

Numerical Solution of Simultaneous and Second-Order ODEs

Simultaneous differential equations: Picard's method, Runge-Kutta method. (No derivations only formulae).

Second-order differential equations: Runge-Kutta method and Milne's Predictor and Corrector method. (No derivations only formulae).

Self-Study: Solution of ODE by analytical method.

08 Hours

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Module – 5

Z-Transforms and Calculus of Variations

Z-Transform's definition, Z-transforms of standard functions. Damping and shifting rules, Problems. Inverse Z-transforms and applications to solve difference equations.

Calculus of Variations

Variation of a function, functional, Euler's equation. Standard variational problems. Applications of Calculus of Variations, Geodesics, Hanging cable (chain) problem.

Self-Study: Initial and final value theorem.

08 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO2	Use Fourier transforms to analyze problems involving continuous-time signals.
CO3	Solve first order ODE arising in engineering problems using single step numerical methods.
CO4	Solve second order ODE arising in engineering problems using single step numerical methods.
CO5	Apply Z- Transform techniques to solve difference equations, Determine the extremals of functional using calculus of variations to solve problems arising in dynamics of rigid bodies and vibrational analysis.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint).2016
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11th Edition.2010
2	Calculus	George. B. Thomas	Pearsons edn.Inc	13th Edition.2014
3	A Text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	Latest edition

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Semester: III

Course Name: PRODUCTION TECHNOLOGY -I

Course Code	21ME32	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03
Total Number of pedagogy hours	40 (T) + 20 (P)	Total Marks	100

Pre-requisites: Knowledge of Basic sciences and Techniques.

Module – 1

Introduction & basic materials used in foundry: Introduction: Definition, Classification of manufacturing processes. Metals cast in the foundry-classification, factors that determine the selection of a casting alloy. Introduction to casting process & steps involved

Patterns: Definition, classification, materials used for pattern, various pattern allowances and their importance.

Sand moulding: Types of base sand, requirement of base sand. Binder, Additive's definition, need and types; Moulding machines- Jolt type, squeeze type and Sand slinger.

Study of important moulding process: preparation of sand moulds. Green sand, core sand, dry sand, sweep mould, CO₂ mould, shell mould, investment mould, plaster mould, cement bonded mould.

Cores: Definition, need, types. Method of making cores,

Concept of gating (top, bottom, parting line, horn gate) and risers (open, blind) Functions and types. Pressurized and non-pressurized gating systems, gating ratio, simple volume calculations.

08 Hours

Module - 2

Melting furnaces: Classification of furnaces, Gas fired pit furnace, Resistance furnace, Coreless induction furnace, electric arc furnace, constructional features & working principle of cupola furnace.

Casting using metal moulds: Gravity die casting, pressure die casting, centrifugal casting, squeeze casting, slush casting, thixo-casting, and continuous casting processes. Casting defects, their causes and remedies.

08 Hours

Module – 3

METAL FORMING PROCESSES

Metal Forming Processes: Introduction, Hot and Cold working processes. Variables affecting metal forming processes. Fundamentals of metal working, Analysis of bulk forming processes like Forging: operations, processes, defects, expressions for forging pressure and loads. Simple numerical problems. Rolling, types of rolling mills, expressions and calculations in rolling load, torque, power etc. Extrusion: types of extrusion processes, extrusion of seamless tubes

Wire drawing, tube drawing, drawing equipment's and dies.

Other sheet metal processes: Sheet metal forming processes die and punch assembly, Blanking, piercing, bending, Compound and Progressive die. High Energy rate forming processes: Explosive forming, electro hydraulic forming, electro-magnetic forming.

08 Hours

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Module – 4

JOINING PROCESSES

Operating principle, basic equipment, merits and applications of Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding - Gas metal arc welding – Submerged arc welding, atomic hydrogen welding.

Advance welding processes: Resistance welding processes, friction stir welding (FSW), Thermit welding, Laser beam welding, electron beam welding, and explosive welding.

08 Hours

Module – 5

Weldability and thermal aspects: Concept of weldability of materials; Thermal Effects in Welding, structure of welds, Distortion, shrinkage and residual stresses in welded structures heat affected zone; Welding defects and remedies.

Principles of Soldering, Brazing and adhesive bonding. Inspection methods: methods used for casting and welding, magnetic particle inspection, ultrasonic, radiography, eddy current, holography.

08 Hours

PRACTICAL COMPONENT OF IPCC

Sl. No.	Experiments
1	Introduction to Arc welding tools and welding equipment, Preparation of welded joints using Arc Welding equipment L-Joint, T-Joint, Butt joint, V-Joint, Lap joints on M.S. flats
2	Soldering/Brazing/
3	Introduction to Molding sand and Core sand
4	Introduction to foundry tools and other equipment's.
5	Introduction to forging tools and other equipment's.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Select appropriate primary manufacturing process and related parameters for obtaining initial shape and size of components.
CO2	Design and develop adequate tooling linked with casting, welding and forming operations.
CO3	Appreciate the effect of process parameters on quality of manufactured components.
CO4	Demonstrate various skills in preparation of moulding sand for conducting tensile, shear and compression tests using Universal sand testing machine.
CO5	Demonstrate skills in preparation of forging models involving upsetting, drawing and bending operations and Demonstrate skills in preparation of Welding models.

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Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Principles of foundry technology,	P L Jain,	4th edition, Tata McGraw Hill,	2006.
2	'Welding and Welding Technology'	Little R. L.	Tata McGraw Hill Publishing Company Limited, New Delhi	1989
3	Principles of Metal Casting	Richard w. heine, carl Rloper, Philip C. Rosenthal	Tata McGraw Hill education pvt. Limited Company,	1976
4	Mechanical Metallurgy	G.E. Dieter	Tata McGraw Hill Publishing Company Limited,	2001
5	Production Technology	O.P. Kanna &Lal.	Dhanpat Rai publications	2012
Reference Books				
1	Manufacturing process-1	Dr. Radhakrishna	Sapna book house, 5 th revised edition	2009
2	Process and materials of manufacturing	Roy A Lindberg	Pearson Edu, 4 th edition	2006
3	Manufacturing Technology-Foundry, Forming and Welding,	P. N. Rao.	Tata McGraw Hill, 3 rd Ed.,	2003
4	Welding technology	O.P. Khanna	Dhanpat Rai publications	1980
5	Elements of Workshop Technology (Vol.1andVol.2)	Hazra Choudhry and Nirzar Roy	Media Promoters and Publishers Pvt. Ltd.	2010

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Semester: III

Course Name: MATERIAL SCIENCE AND METALLURGY

Course Code	21ME33	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites: Knowledge of Basic mathematics and sciences.

Module – 1

Mechanical Behaviour: Stress- Strain diagram showing ductile and brittle behaviour of materials, Linear and non-linear elastic behaviour and properties, mechanical Properties in plastic range, Concept of offset yield strength and ductility,

Solids: crystalline solids and non-crystalline solids, deformation of single crystal by slip and twinning. Atomic diffusion, Fick's laws of Diffusion, Factors affecting the Diffusion, Fracture and its types.

Creep: High temperature and high pressure. Description of the phenomenon with examples, 3 stages of creep properties, stress relaxation Concept.

Fatigue: types of fatigue loading with examples, Mechanism of fatigue, Fatigue properties, Fatigue testing and S-N diagram.

08 Hours

Module - 2

Solidification and phase diagram: Mechanism of solidification, Homogeneous and Heterogeneous nucleation. Crystal Growth, cast metal structures, Phase diagram.

Solid solutions: Substitution and Interstitial solid solution, Hume rothary rule, Intermediate phase, construction of equilibrium diagram involving complete and partial solubility, lever rule, Gibb's phase rule, critical radius of nucleation, Iron-carbon system, Fe-Fe₃C diagram, invariant reactions, different phases. Introduction to alloy steels – HSS and SS. Effect of alloying elements. Mechanism of strengthening in metals.

08 Hours

Module - 3

Heat Treating of metals: Definition and Importance of Heat Treatment, Annealing and its types, Normalizing, Hardening, Tempering, Martempering, Austempering, hardenability, TTT curves, Continuous Cooling Transformation curves.

Surface hardening methods: Carburizing, Cyaniding Nitriding, flame hardening and induction hardening, age hardening of aluminum and copper alloys. Ferrous and non-ferrous materials: Properties composition and use of grey cast iron, malleable iron, SG iron and steel. Copper alloys-brasses and bronzes, aluminum alloys Al-Cu, Al-Si, Al-Zn alloys.

08 Hours

Module – 4

Polymers and Ceramics: Types, Structure, Properties and applications

Composite materials: Definition, classification, type of matrix materials and reinforcements, advantages and application of composites.

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Processing of Composites: Layup and curing, fabricating process, open and closed mould process, hand layup technique; structural laminate bag molding, production procedures for bag molding; filament winding, pultrusion, pulforming, thermo-forming, injection molding, blow molding.
Metal Matrix Composites (MMC's): Reinforcement materials, types, characteristics and selection, base metals selection. Need for MMC's and its application.
Carbon fiber composites: definition classification and applications

08 Hours

Module – 5

Smart Materials: Piezoelectric Materials, Electro-strictive Materials, Magneto-strictive Materials, Magneto-electric Materials. Magneto-rheological Fluids, Electro-rheological Fluids, Shape Memory Materials, Fiber-Optic Sensors. Nano materials and their applications. Characterization of powders: (Particle Size & Shape Distribution), Powder Shaping: Particle Packing Modifications, Lubricants & Binders, Powder Compaction & Process, Sintering and Application of Powder Metallurgy
Microscopy: Introduction to construction and working principle, the necessity of characterization using SEM and TEM techniques, Diffraction: Fundamentals of Diffraction, Bragg's law, X-ray diffraction pattern of crystalline and amorphous material.

08 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Examine the micro structure, defects, diffusion and mechanical properties of various materials.
CO2	Analyze various phases of metals and alloys through phase diagrams, effect of alloying elements, properties and application of ferrous and non-ferrous metals.
CO3	Recommend appropriate heat treatment processes for suitable applications
CO4	Suggest suitable engineering materials for different applications
CO5	Apply characterization techniques for structure and property analysis using SEM.

Suggested Learning Resources:

Text Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Materials Science and Engineering	Callister Jr, W.D., Rethwisch, D.G.,	Hoboken, NJ: Wiley	10th Ed., 2018
2	Materials Selection in Mechanical Design	Ashby, M. F	Butterworth-Heinemann.	4th Ed., 2010
3	Introduction to Physical Metallurgy	Avner, S.H	McGraw Hill Education	2nd Ed., 2017

Reference Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Materials 1: An Introduction to	Jones, D.R.H., and Ashby, M.F	Butterworth-Heinemann	4th Ed., 2011

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	Properties, Application and Design			
2	Engineering Materials 2: An Introduction to Microstructure and Processing	Jones, D.R.H., and Ashby, M.F	Butterworth-Heinemann	4th Ed., 2012
3	Physical Metallurgy Principles	Abbaschian, R., Abbaschian, L., Reed-Hill, R. E	Cengage Learning	4th Ed., 2009



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Semester: III

Course Name: MECHANICS OF MATERIALS

Course Code	21ME34	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites: Engineering Mechanics

Module – 1

Stresses and Strains: Introduction, Properties of materials, Stress, Strain and Hooke's law, Stress strain diagram for brittle and ductile materials, True stress and strain, Calculation of stresses in straight, Stepped and tapered sections. Principle of super position.

Composite sections: Stresses due to temperature change, Shear stress and strain, Lateral strain and Poisson's ratio, Elastic constants and relations between them.

08 Hours

Module - 2

Analysis of Stress and Strain: Introduction to three-dimensional state of stress, Stresses on inclined planes, Principal stresses and maximum shear stress, Principal angles, Shear stresses on principal planes, Maximum shear stress, Mohr circle for plane stress conditions.

Thick & Thin Cylinders: Hoop's stress, maximum shear stress, circumferential and longitudinal strains. Lames equations.

08 Hours

Module – 3

Shear Force and Bending Moment: Type of beams, Loads and reactions, Relationship between loads, shear forces and bending moments, Shear force and bending moments of cantilever beams, Pin support and roller supported beams subjected to concentrated loads, uniformly distributed constant / varying loads. Concept of shear center.

Stresses in Beams: Bending and shear stress distribution in rectangular, I and T section beams.

08 Hours

Module – 4

Deflection of Beams: Introduction, differential equation for deflection, equations for deflections, slope and moments, Methods: Double integration method for cantilever and simply supported beams for point loads, UDL and couple, Macaulay's method.

Torsion: Introduction, pure torsion, assumptions, derivation of torsional equations, polar modulus, torsional rigidity/stiffness of shafts, power transmitted by solid and hollow circular shafts.

08 Hours

Module – 5

Columns: Buckling and stability, Critical load, Columns with pinned ends, Columns with other support conditions, Effective length of columns, Rankine's and Secant formula for columns.

Introduction to Strain Energy: Strain energy due to axial, shear, bending, torsion and impact load. Castigliano's theorem I and II and their applications.

08 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Interpret simple, compound, thermal stresses and strains their relations and strain energy.
CO2	Analyze structural members for stresses, strains and deformations.
CO3	Examine the structural members subjected to bending and shear loads.
CO4	Investigate shafts subjected to twisting loads.
CO5	Analyze the short columns for stability.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Mechanics & Strength of Materials	K Raghavendra, 1 st edition	CBS Publishers & Distributors Pvt. Ltd., Delhi	2019
2	Mechanics of Materials	J M Gere, B J Goodno, 8 th edition	Cengage Learning	2013
3	Mechanics of Materials	Ferdinand Beer, Russell Johnston, John Dewolf, David Mazurek	McGraw Hill Education (India) Pvt. Ltd	Latest edition
4	Strength of Materials	S. S. Rattan 2 nd edition	Tata McGraw Hill	2008
5	Strength of Materials	R K Rajput	S. Chand and Company Pvt. Ltd	2014
6	Strength of Materials	R. Subramanian	Oxford press	2005
Reference Books				
1	Strength of Materials	S. S. Bhavikatti, 4 th edition	Vikas Publishing House-Pvt. Ltd.,	2013
2	A Text book of Strength of Materials	R. K. Bansal	Laxmi Publications	2010
3	Strength of Materials	W. A. Nash, 4 th edition	Schaum's Outline Series,	2007
4	Mechanics of Materials	R C Hibbeler	Pearson	Latest edition

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Semester: III**Course Name: MATERIAL TESTING LABORATORY**

Course Code	21MEL35	CIE Marks	50
Teaching Hour / Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03
Total Number of Pedagogy Hours	20	Total Marks	100

Pre-requisites: Knowledge of Basic mathematics and sciences.**Part-A**

1. Specimen preparation for macro and micro structural examinations and study the macrostructure and microstructure of a given Cast Iron, Mild steel, Aluminium and Copper/Brass specimens sample metal/ alloys
2. To determine the hardness values of Mild Steel/ Aluminium, Copper/Brass and Cast Iron by Rockwell hardness testing machine.
3. To determine the hardness values of Mild Steel/ Aluminium, Copper/Brass and Cast Iron by Brinell's Hardness testing machine.
4. To determine the hardness values of Mild Steel/ Aluminium, Copper/Brass and Cast Iron by Vickers Hardness testing machine.
5. To conduct a wear test on Mild steel/ Cast Iron/Aluminium/ Copper to find the volumetric wear rate and coefficient of friction
6. Study the heat treatment processes (Hardening and tempering) of steel/Aluminium specimens
7. To perform the non-destructive testing's (**Open-Ended Experiment**)
 - a) Dye Penetration
 - b) Magnetic particle detection

Part-B

1. To determine the impact strength of Cast Iron, Mild Steel/Brass/ Aluminium and to observe the necking using Charpy impact test.
2. To determine the tensile strength, modulus of elasticity, yield stress, % of elongation and % of reduction in area of Cast Iron, Mild Steel/Brass/ Aluminium and to observe the necking.
3. To determine the compressive strength, of Cast Iron, Mild Steel/Wood/ Aluminium and to observe the necking.
4. To determine the bending strength, of Cast Iron/Mild Steel/Brass/ Aluminium and to observe the necking.
5. To determine the shear strength, of Cast Iron, Mild Steel/Brass/ Aluminium and to observe the necking.
6. To determine the torsional strength, of Cast Iron, Mild Steel/Brass/ Aluminium and to observe the necking.

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Identify the structure of materials - crystallography, microstructure, defects, and diffusion.
CO2	Analyze various phases of metals and alloys with phase diagrams.
CO3	Select suitable heat treatment process based on material properties
CO4	Suggest suitable engineering materials for different application
CO5	Apply characterization techniques for structure and property analysis using SEM.



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Semester: III

Course Name: FOUNDRY AND FORGING LAB

Course Code	21MEL36	CIE Marks	40
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	60
Credits	01	Exam Hours	03
Total Number of Pedagogy Hours	20	Total Marks	100

Pre-requisites: Knowledge of Basics sciences and Techniques.

Experiments

PART A

I. Testing of Molding sand and Core sand.

Preparation of sand specimens and conduction of the following tests:

1. Compression, Shear and Tensile tests on Universal Sand Testing Machine.
2. Permeability test
3. Sieve Analysis to find Grain Fineness Number (GFN) of Base Sand
4. Clay content determination on Base Sand.

PART B

II. Foundry Practice:

Use of foundry tools and other equipment for Preparation of molding sand mixture.

1. Preparation of green sand molds kept ready for pouring in the following cases:
2. Using two molding boxes (hand cut molds).
3. Using patterns (Single piece pattern Split pattern and match plate pattern).
4. Incorporating core in the mold. (Core boxes).
5. Preparation of one casting (Aluminum or cast iron-**Open-Ended Experiments**)

III. Forging Operations: Use of forging tools and other forging equipment.

1. Calculation of length of the raw material required to prepare the model considering forging losses.
2. Preparing minimum three forged models involving upsetting, drawing, bending and other forging operations.
3. Preparation of simple forging model using power hammer (**Open-Ended Experiments**)

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Carry out experimental procedures to evaluate different properties of sand samples.
CO2	Identify various foundry and forging tools & equipments.
CO3	Prepare different types of sand mould using foundry tools and operations.
CO4	Design sand moulds as per the given drawing.
CO5	Prepare forging models using appropriate tools and equipment.

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Semester: III / IV

Course Name: CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW

Course Code	21CIP37/47	CIE Marks	50
Teaching Hours/Week (L:T:P)	1-0-0	SEE Marks	50
Credits	01	Exam Hours	02
Total Hours of Pedagogy	15	Total Marks	100

Module – 1

Introduction to Indian Constitution

The Making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India. Fundamental Rights. Directive Principles of State Policy (DPSP). Fundamental Duties.

03 Hours

Module - 2

Union Executive and State Executive:

Parliamentary System, Federal System, Union Executive – President, Prime Minister, Union Cabinet, Parliament – Union Legislature, Lok Sabha and Rajya Sabha types of bills. Union judiciary Supreme Court of India.

03 Hours

Module – 3

Elections, Amendments and Emergency Provisions Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments - Methods in Constitutional Amendments. Important Constitutional Amendments. Amendments – 7,9,10,12,42,44, 61, 73,74, ,75, 86, and 91,94,95,100,101,118. Emergency Provisions, types of Emergencies and its consequences. Special Provisions (Articles 370,371,371J) for some States

03 Hours

Module – 4

Professional / Engineering Ethics: Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics. Role morality. What is profession characteristic of profession? The NSPE board of Professional ethics. Engineering ethics as preventive ethics. Responsible Engineer. Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. What is conflict of interest? Honesty integrity and reliability. IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.

03 Hours

Module – 5

Internet Laws, Cyber Crimes and Cyber Laws: Internet and Need for Cyber Laws, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000. Cybercrimes and enforcement agencies.

03 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Demonstrate constitutional knowledge and legal literacy.
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers
CO3	Understand the cybercrimes and cyber laws for cyber safety measures

Suggested Learning Resources:**Text Books**

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Constitution of India, Professional Ethics and Human Rights Shubham Singles	Charles E. Haries, and et al	Cengage Learning India	2018
2	Introduction to the Constitution of India	Durga Das Basu	Prentice –Hall	2008
3	Engineering Ethics	M. Govindarajan, S. Natarajan, V. S. Senthilkumar	Prentice –Hall	2004

Reference Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Cyber Security and Cyber Laws	Alfred Basta and et al	Cengage Learning India	2018

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Semester: III

Name of the Laboratory: INTRODUCTION TO CAD

Course Code	21AME381	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	02
Total Number of pedagogy hours	15	Total Marks	100

Pre-requisites: Knowledge of Basic mathematics and Engineering Drawing.

PART-A

Introduction to Auto CAD: File management, User interface, Basic settings, Navigation bar, Steering wheel, View port

Draw Setting & Condition: Units, Limits, UCS icon Function keys & its work

Drawing Tools: Line, polyline, Circle, arc Rectangle, polygon Ellipse, Elliptical arc, spline, Spline Edit, Xline, Ray, Points Measure, Divide, Region Wipeout, Helix, Donut, Revision cloud, hatch, Gradient

Modify Tools: Move, copy, Rotate, scale Stretch, fillet, chamfer Erase, offset, explode Array, polar Array, path array Trim, extend, mirror, edit polyline, edit spline, edit hatch Edit array, break, break at point Blend vertex, joint, overkill, lengthen

Annotations Dimensions: dimension setting, Linear dimension, Aligned dimension, Angular dimensions, arc length, Radius Diameter.

PART-B

Conversion of pictorial views into orthographic projections of simple machine parts.
Conversion of orthographic views in to isometric view of simple machine parts. **(Open-Ended Experiments)**

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions
CO2	To improve their visualization skills and make component sketching.
CO3	Apply elements of mechanical drafting such as layers, dimensions, drawing formats in projects with a focus on ANSI industry standards.
CO4	Utilize the precision of Auto CAD as a drafting and design tool used in the mechanical design and manufacturing industries.
CO5	Engage in lifelong learning using sketching and drawing as communication tool.

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Semester: III

Course Name: **DESIGN THINKING & INNOVATION**

Course Code	21DTI39	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	1	Exam Hours	02
Total Hours of Pedagogy	15	Total Marks	100

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Module – 1

PROCESS OF DESIGN

Understanding Design thinking: Shared model in team-based design – Theory and practice in Design thinking – Explore presentation Signers across globe – MVP or Prototyping

5-Hours

Module - 2

Tools for Design Thinking

Real-Time design interaction captures and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design

5-Hours

Module – 3

Design Thinking in IT

Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping

5-Hours

Module – 4

DT For strategic innovations

Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model

5-Hours

Module – 5

Design thinking workshop

Design Thinking Workshop Empathize, Design, Ideate, Prototype and Test

5-Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Understand the design thinking process.
CO2	Identify and assess opportunities through customer needs analysis.
CO3	Create clear product specifications based on customer needs that are desirable, feasible, and viable.
CO4	Generate and evaluate new product and service concepts through applied creativity.
CO5	Implement a proven 4-step method for planning and executing a prototype.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Design	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson	Cengagelearning	Second Edition, 2013
2	The Design of Business	Roger Martin	Harvard Business Press	2009
3	Design Thinking: Understand – Improve– Apply	Hasso Plattner, Christoph Meinel and Larry Leifer	Springer	2011.
Reference Books				
1	Design Thinking for Strategic Innovation	Idris Mootee	John Wiley & Sons	Second Edition, 2011.
2	Engineering Design Process	Yousef Haik and Tamer M.Shahin	CengageLearning	1st edition, 2012

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Semester: III

Course Name: Additional Mathematics-I

Course Code	21MATDIP31	CIE Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	--
Credits	00	Exam Hours	00

Pre-requisites: Algebraic formulae, Differentiation, Integration, Trigonometric formulae

Module – 1

Linear Algebra

Introduction-Rank of matrix by elementary row operations- Echelon form. Consistency of system of linear equations, Solution of linear equations-Gauss elimination method. Eigen values and Eigen vectors of a square matrix. Problems.

Self-Study: Gauss Jordan Method

08 Hours

Module - 2

Differential Calculus:

Review of successive differentiation-Illustrative examples. Maclaurin's series expansions-Illustrative examples. Partial Differentiation: Euler's theorem-problems on first order derivatives only. Total derivatives-differentiation of composite functions. Jacobian of order two-problems.

Self-Study: Taylor's series expansion.

08 Hours

Module – 3

Vector Differentiation:

Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and Vector point functions. Gradient, Divergence and Curl- Simple problems. Solenoidal and irrotational vector fields-Problems.

Self-Study: Angle between two surfaces

08 Hours

Module – 4

Integral Calculus:

Review of elementary integral calculus. Reduction formulae for $\sin^n x, \cos^n x$ (with proof) and $\sin^m x \cos^n x$ (without proof) and evaluation of these with standard limits-Examples. Double and triple integrals-Simple problems.

Self-Study: Change of Order of Integration.

08 Hours

Module – 5

Ordinary Differential Equations:

Introduction-Solutions of first order and first-degree differential equation: exact, Equation reducible to exact. Linear differential equations and Bernoulli's equation.

Self-Study: Homogeneous differential equations

08 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Make use of matrix theory for solving system of linear equations and compute eigen values and eigen vectors.
CO2	Learn the notion of partial differentiation to calculate the rate of change of multivariate functions and solve problems related to composite functions and Jacobians.
CO3	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors.
CO4	Apply the concept of integration and variables to evaluate multiple integrals and their usage in computing the area and the volumes.
CO5	Solve first order linear differential equations analytically using standard methods.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint).2016
3	Additional Mathematics-1	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed., 2019.
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11th Edition.2010

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Semester: IV (COMMON TO CIVIL & ME)

Course Name: COMPLEX ANALYSIS, PROBABILITY & STATISTICAL METHODS

Course Code	21MCM41	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites:

- Basic formulae of differentiation, partial differentiation, Integration.
- Complex numbers.
- Statistics and probability.

Module – 1

Complex Analysis

Review of a function of a complex variable, limits, continuity and differentiability. Analytic function, Cauchy-Riemann equations in Cartesian and polar forms and consequences. Construction of analytic functions by Milne-Thompson method, problems. Conformal Transformation-Introduction, Bilinear transformation.

Complex Integration

Line integral of a complex function, Cauchy's theorem and Cauchy's integral formula and problems.

Self-Study: Conformal Transformation: Discussion of transformations:

$$w = e^z, w = z^2, w = z + 1/z \quad (z \neq 0).$$

08 Hours

Module - 2

Optimization: Basic concepts, classification of optimization problems. Linear programming problem (LPP). Formation of LPP. Graphical method and Simplex method to solve linear LPP.

Self-Study: Duality Theory.

08 Hours

Module – 3

Statistical Methods: Correlation and regression, Karl Pearson's coefficient of correlation and rank correlation, problems. Regression analysis, lines of regression, problems.

Curve Fitting: Curve fitting by the method of least squares, fitting the curves of the forms $y = ax + b$, $y = ax^b$ and $y = ax^2 + bx + c$.

Self-Study: Angle between two regression lines, problems.

08 Hours

Module – 4

Probability Distributions: Random Variables (discrete and continuous), probability mass and density functions, problems. Binomial, Poisson and normal distributions, problems (derivations for mean and standard deviation for Binomial and Poisson distributions only)-Illustrative examples.

Self-Study: Exponential distribution.

08 Hours

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Module – 5

Joint Probability Distributions: Joint Probability distribution for two discrete random variables, expectation, covariance and correlation.

Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, Student's t-distribution and Chi-square distribution as a test of goodness of fit.

Self-Study: Point estimation and interval estimation.

08 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Explain the idea of analyticity, potential fields, residues and poles of complex potentials in Field Theory and Electromagnetic theory.
CO2	Apply the graphical and simplex method to solve the LPP.
CO3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO4	Applying discrete and continuous probability distributions in analysing the probability models arising in engineering field.
CO5	Construct joint probability distributions and demonstrate the validity of testing hypothesis.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint).2016
3	Operations Research	S.D.Sharma	Kedarnath & Ramanath	17 th edition
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11th Edition.2010
2	Calculus	George. B. Thomas	Pearsons edn.Inc	13th Edition.2014
3	A Text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	Latest edition

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Semester: IV

Course Name: Mechanical Measurements and Metrology

Course Code	21ME42	CIE Marks	50
Teaching Hour / Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03
Total Number of Pedagogy Hours	40 (T) + 20 (P)	Total Marks	100

Pre-requisites: Knowledge of Basic mathematics and sciences.

Module – 1

Introduction to Metrology,

Introduction to metrology & measurements, definition, objectives and classification of metrology, standards of length- material standards, wave length standard, sub division of standards. Line and end standard, end bars, numerical problems on calibration of end bars.

Linear and Angular Measurements

Vernier Calipers and Micrometer, slip gauges, wringing phenomena, and numerical problems on building of slip gauges. Angular Measurements Bevel protractor, sine bar, angle gauges, numerical on building of angles, autocollimator, measurement of straightness, squareness.

8 Hours

Module - 2

Systems of Limits, Fits, Tolerance & Gauging

Definitions Tolerance, tolerance analysis (Addition & Subtraction of tolerances), principle of interchangeability and selective assembly. Class and Grade of tolerance, limits & fits -Applications, types of fits Numerical on limits, fits & tolerance. Hole basis and Shaft basis system, Classification of gauges, Taylor's principle, design of GO, NO GO gauges, wear allowance on gauges, types of gauges- plain plug gauges, ring gauges, snap gauge, limit gauge, simple problems

Comparators

Introduction to comparators, classification, characteristics, Mechanical comparators – Dial Indicator, Johnson Mikrokator, Sigma comparator, Electrical Comparator - LVDT, Optical Comparator - Zeiss ultra-optimizer, Pneumatic comparator – Principle of back pressure, Solex comparator.

8 Hours

Module – 3

Screw thread Measurement

Screw thread terminology, Measurements of major, minor and effective diameters by 2 wire, 3 wire & best size wire methods. Measurement of pitch and angle of screw threads, Tool maker's microscope, profile projector.

Gear tooth measurement

Tooth thickness measurement using constant chord method, addendum, and base tangent method, pitch measurement, concentricity and run out, involute profile and Gear roll tester for composite error.

8 Hours

Module – 4

Measurement System and Basic Concepts

Definitions - accuracy, precision, calibration, threshold, sensitivity, hysteresis, repeatability, linearity, loading effect, system-response-time delay, errors in measurement, Generalized measurement system.

Transducers Intermediate & Terminating Devices

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Primary & secondary transducers, Electrical transducers, Mechanical, Electronic transducers, relative comparison. Mechanical systems - Inherent problems, Electrical Intermediate Modifying devices – Current, Voltage circuits, Amplifiers, terminating devices - CRO, Oscillographs, XY Plotter

8 Hours

Module – 5

Measurement of Force, Torque & Pressure

Measurement of Force (Analytical Balance, Proving ring, Load cell) Torque & Pressure, types of dynamometers – Prony brake, Rope brake dynamometers, Pirani gauge, Mc leod gauge, Bridgeman gauge.

Temperature & Strain Measurements

Theory of Strain gauges, gauge factor, electrical resistance type, Preparation and Mounting of strain gauges, Methods of strain measurement. Temperature compensation, resistance thermometers, thermo couple, laws of thermo couple, Pyrometer, Optical Pyrometer.

8 Hours

Practical Component of IPCC

List of Experiments

1. Calibration of Pressure Gauge
2. Calibration of Thermocouple
3. Calibration of LVDT
4. Calibration of Load cell
5. Determination of modulus of elasticity of a mild steel specimen using strain gauge.
6. Measurements using Toolmakers Microscope, Optical Projector
7. Measurement of angle using – Sine Bar, Sine Center, Bevel Protractor methods
8. Measurement of alignment using autocollimator
9. Measurement of cutting tool forces using Lathe Tool Dynamometer, Drill Tool Dynamometer (**Open-Ended Experiment**)
10. Measurement of Screw thread Parameters using 2 wire and 3 wire method
11. Measurement of Gear tooth Profile using Gear tooth Vernier (**Open-Ended Experiment**)
12. Calibration of Micrometer using Slip Gauges
13. Measurement using Optical Flats

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Comprehend the objectives of metrology, methods of measurement, and standards of measurement & apply concepts of linear and angular measurements.
CO2	Apply concepts of tolerance, limits of size, fits, geometric and position tolerances, gauges and their design
CO3	Illustrate the working principle of different comparators and assess various parameters of screw threads and gear.
CO4	Analyze and Differentiate measurement systems - transducers, intermediate modifying devices and terminating devices.
CO5	Evaluate the functioning of force, torque, pressure, strain and temperature measuring devices.

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Suggested Learning Resources:

Text Books				
Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Metrology	R.K. Jain	Khanna Publishers	2009
2	Engineering Metrology and Measurements	Bentley	Pearson Education	
3	Engineering Metrology	Gupta I.C	Dhanpat Rai Publications	
4	Engineering Metrology and Measurements	N.V. Raghavendra and L.Krishnamurthy	Oxford University Press.	
5	Metrology	Mahajan	Danpath Rai publications	
6	Mechanical Measurements	Beckwith Marangoni and Lienhard	Pearson Education	6th Ed., 2006
7	Instrumentation, Measurement and Analysis	B C Nakra, K KChaudhry	McGraw-Hill	4th Edition

Reference Books				
Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Industrial Instrumentation	Alsutko, Jerry. D.Faulk, Thompson	Asia Pvt. Ltd.	2002
2	Measurement Systems	Ernest O. Doebelin & Dhanish N. Manik	6th editions, Mc GRAW Hill Book Co.	2011
3	Mechanical Measurements and Instrumentation	Er. R K Rajput	S K Kataria & Sons Publications	2012

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Semester: IV

COURSE NAME: FLUID MECHANICS

Course Code	21ME43	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites:

1. Vector Calculus
2. Engineering Mechanics

Module – 1

PROPERTIES OF FLUIDS: Introduction, properties of fluids, Density, Specific gravity, Vapour pressure, Viscosity, Surface Tension; compressibility, bulk modulus, Cavitation, Capillarity, classification of fluids, numericals.

Pressure Measurement: Pascal's law, hydrostatic Law, absolute, gauge, atmospheric and vacuum pressures, manometer (simple and differential), numericals.

08 Hours

Module - 2

Fluid Statics and Buoyancy Concepts of center of pressure along a horizontal plane, vertical plane and inclined plane surface submerged in static fluid, numericals.

Buoyancy, center of buoyancy, meta center and meta centric height (analytical method), numericals.

Fluid Kinematics: Velocity of fluid particle, types of fluid flow, description of flow, continuity equation, Coordinate free form, acceleration of fluid particle, rotational & irrotational flow, Laplace's equation in velocity potential and Poisson's equation in stream function, flow net. numericals.

08 Hours

Module - 3

Fluid Dynamics; Introduction. Forces acting on fluid in motion. Euler's equation of motion along a streamline. Integration of Euler's equation to obtain Bernoulli's equation, Application of Bernoulli's theorem such as venturi-meter, orifice meter, rectangular and triangular notches, numericals.

Impact of jets: Force exerted on stationary and moving plates- vertical, inclined and curved (symmetrical), numericals

08 Hours

Module – 4

FLOW THROUGH PIPES: Frictional loss in pipe flow, major energy losses and minor energy losses in pipe flow, Darcy- equation for loss of head due to friction in pipes, Chezy's equation for loss of head due to friction in pipes, hydraulic gradient and total energy line. numericals

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Introduction to Boundary Layer Theory: Flow over a flat plate: Boundary layer thickness, Displacement, Momentum and Energy thickness, Flow separation concept, drag and lift force and numericals

08 Hours

Module – 5

Dimensional analysis: Introduction, derived quantities, dimensions of physical quantities, dimensional homogeneity, Rayleigh's method, Buckingham Pi-theorem, dimensionless numbers, similitude, types of similitude, numericals.

Compressible Flows: Introduction, thermodynamic relations of perfect gases, internal energy and enthalpy, speed of sound, pressure field due to a moving source, basic Equations for one-dimensional flow, stagnation and sonic properties, normal and oblique shocks, numericals.

08 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Describe various properties of fluids for analyzing fluid flow applications.
CO2	Apply the concepts of fluid mechanics, pressure distribution and buoyancy to determine the static forces of the fluids.
CO3	Analyze various Pipe losses.
CO4	Analyze external & internal flows for evaluating various flow-parameters.
CO5	Perform dimensional analysis to formulate mathematic model.

Suggested Learning Resources:

Text Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	A text book of Fluid Mechanics and Hydraulic Machines	Dr. R K Bansal	Laxmi Publications (P) Ltd,	
2	Fluid Mechanics, Hydraulics and Fluid Machines	Ramamrutham,	Dhanpat Rai Publications.	
3	Introduction to Fluid Mechanics	Fox and MacDonald	Wiley India.	8th Edition
4	Fundamentals of Fluid Mechanics	Munson, Young, Okiishi, Huebsch	Wiley publications	6th Edition,
5	Fluid Mechanics- Fundamentals & Applications	Yunus A Cengel and John A Cimbala	Tata McGraw Hill.	3rd Edition

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Semester: IV

Course Name: ENGINEERING THERMODYNAMICS

Course Code	21ME44	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites: Knowledge of Basic mathematics and sciences.

Module – 1

Fundamental Concepts & Definitions: Thermodynamic definition and scope, Microscopic and Macroscopic approaches. Some practical applications of engineering thermodynamic Systems, Characteristics of system boundary and control surface, examples. Thermodynamic properties; definition and units, intensive, extensive properties, specific properties, pressure, specific volume, Thermodynamic state, state point, state diagram, path and process, quasi-static process, cyclic and non-cyclic; processes; Thermodynamic equilibrium; definition, mechanical equilibrium; diathermic wall, thermal equilibrium, chemical equilibrium, zeroth law of thermodynamics: Temperature; scales, thermometry, Importance of temperature measuring instruments. Design of Thermometers. **(self-study only not for SEE)**

Work and Heat: Mechanics, definition of work and its limitations. Thermodynamic definition of work; examples, sign convention. Displacement work; as a part of a system boundary, as a whole of a system boundary, expressions for displacement work in various processes through p-v diagrams. Heat; definition, units and sign convention. Problems.

First Law of Thermodynamics: Joules experiments, equivalence of heat and work. Statement of the First law of thermodynamics, extension of the First law to non - cyclic processes, energy as a property, Extension of the First law to control volume; steady flow energy equation (SFEE), important applications.

8 Hours

Module – 2

Second Law of Thermodynamics: Limitations of first law of thermodynamics, Thermal reservoir, heat engine and heat pump: Schematic representation, efficiency and COP. Reversed heat engine, schematic representation, importance and superiority of a reversible heat engine. Kelvin - Planck statement of the Second law of Thermodynamics; PMM I and PMM II, Clausius statement of Second law of Thermodynamics, Equivalence of the two statements; Carnot cycle, Carnot principles. Problems

Entropy: Clausius inequality, Statement- proof, Entropy- definition, a property, change of entropy, entropy as a quantitative test for irreversibility, principle of increase in entropy, entropy as a coordinate. Numerical problems

8 Hours

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Module – 3

Introduction and Review of Ideal and Real gases: Ideal gas mixtures, Daltons law of partial pressures, Amagats law of additive volumes, Evaluation of properties of ideal gases. Real gases: introduction, Van-Der Waal's equation, Van-Der Waal's constants in terms of critical properties. (self-study only not for SEE)

Combustion thermodynamics: Theoretical (Stoichiometric) air for combustion of fuels, excess air, actual combustion. Exhaust gas analysis. A/F ratio, energy balance for a chemical reaction, enthalpy of formation, enthalpy and internal energy of combustion, adiabatic flame temperature, combustion

I.C.Engines: Classification of IC engines, Combustion of SI engine and CI engine, Detonation and factors affecting detonation, Performance analysis of I.C Engines, Heat balance, Morse test.

8 Hours

Module – 4

Pure substance: P-T and P-V diagrams, triple point and critical points. Sub-cooled liquid, saturated liquid, mixture of saturated liquid and vapour, saturated vapour and superheated vapour states of pure substance with water as example. Enthalpy of change of phase (Latent heat). Dryness fraction (quality), T-S and H-S diagrams, representation of various processes on these diagrams. Steam tables and its use. Throttling calorimeter, separating and throttling calorimeter.

Vapour Power Cycles: Carnot vapour power cycle, simple Rankine cycle, actual vapour power cycles, ideal and practical regenerative Rankine cycles, open and closed feed water heaters, Reheat Rankine cycle and characteristics of an Ideal working fluid in vapour power cycles.

8 Hours

Module – 5

Gas power cycles: Air standard cycles-Otto cycle, Diesel cycle and Dual cycle, computation of thermal efficiency and mean effective pressure, comparison of Otto, Diesel & Dual cycles.

Gas turbine Cycles: Introduction and classification of gas turbine, gas turbine (Brayton) cycle; description and thermal analysis and methods to improve thermal efficiency of gas turbines, Jet Propulsion-Turbo jet, Ram jet Turbo prop and Rocket engine.

8 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Describe the fundamental concepts and principles of engineering thermodynamics.
CO2	Apply the governing laws of thermodynamics for different engineering applications.
CO3	Interpret behaviour of pure substances and its application to practical problems.
CO4	Analyse the various thermodynamic process, cycles and results.
CO5	Apply thermodynamic concept to analyze performance of Gas power cycle and gas turbines.

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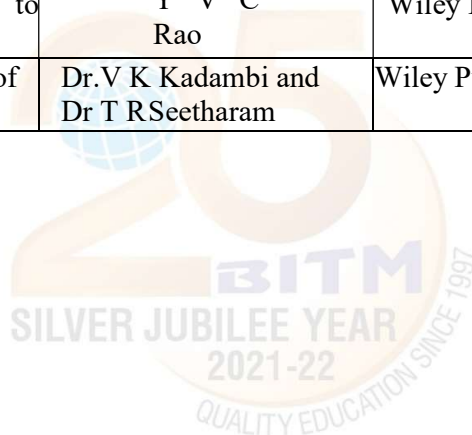
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Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Basics and applied thermodynamics	P K Nag	Tata McGraw Hill Publications	2017
2	A text book of Engineering Thermodynamics	R K Rajput	Laxmi Publications	2019
3	Thermodynamics, An Engineering Approach	Yunus A Cengel	Tata McGraw Hill Publications	2019
Reference Books				
1	Engineering Thermodynamics	J B Jones and G A Hawkins	John Wiley	1986
2	An Introduction to Thermodynamics	Y V C Rao	Wiley Eastern	2003
3	Applications of Thermodynamics	Dr.V K Kadambi and Dr T R Seetharam	Wiley Publications	2018



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SEMESTER - IV

Course Name: **COMPUTER AIDED MACHINE DRAWING**

Course Code	21MEL45	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03
Total Number of Pedagogy Hours	20	Total Marks	100

Pre-requisites: Engineering Drawing, Awareness of how various mechanical components function.

PART-A

Module – 1

Introduction: Review of basic concepts of Engineering Visualization.

Geometrical Dimensioning and Tolerances (GD&T): Introduction, Fundamental tolerances, Deviations, Methods of placing limit dimensions, machining symbols, types of fits with symbols and applications, geometrical tolerances on drawings. Standards are followed in the industry.

Conversion of pictorial views into **orthographic projections** of simple machine parts.

02 Hours

Module – 2

Thread Forms: Thread terminology, sectional views of threads. ISO Metric (Internal & External), BSW, square, Acme, and American Standard thread.

Fasteners: Hexagonal-headed bolt and nut with washer (assembly), square-headed bolt and nut with washer (assembly), simple assembly using stud bolts with nut and lock nut.

03 Hours

PART-B

Module – 3

Riveted joints: Single and double riveted lap joints, Butt joints with single/double cover straps (Chain and zigzag using snap head riveters).

Welded Joints: Lap, Butt, T-shape (**Open-Ended Exercise**)

03 Hours

Module – 4

Assembly of Joints, Couplings using a 2D environment

Joints: Cotter joint (socket and spigot), Knuckle joint (pin joint) for two rods.

Couplings: Protected type flange coupling, Pin (bush) type flexible coupling, and Oldham's coupling.

04 Hours

PART-C

Module – 5

Assembly of Machine Components (with GD&T) using a 3D environment

1. Plummer Block (Pedestal Bearing)
2. Machine vice
3. I.C. Engine Connecting rod
4. Screw Jack (bottle type)
5. Lathe Square Tool Post
6. Tailstock of Lathe

08 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Interpret the Machining and surface finish symbols on the component drawings.
CO2	Demonstrate the role of limits and tolerance on the machine parts using 2D environment.
CO3	Exhibit the importance of functional and visualization aspects of part drawings.
CO4	Illustrate various machine components through drawings.
CO5	Interpret assembly drawings as per the conventions using 3D modeling.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Machine Drawing	K R Gopal Krishna	Subhash	2005
2	Machine Drawing	K L Narayan	New Age International	3 rd and 2006
Reference Books				
1	Machine Drawing	N D Bhatt	Charotar Publishing House Pvt. Ltd	50 th and 2014
2	Machine Drawing	P S Gill	S K Kataria and sons	2013
3	Machine Drawing	Ajeet Singh	Tata McGraw-Hill	2012



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Semester: IV
Course Name: FLUID MECHANICS LAB

Course Code	21MEL46	CIE Marks	50
Teaching Hour / Week (L:T:P)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03
Total Number of Pedagogy Hours	20	Total Marks	100

Pre-requisites: Measurements and Instrumentation, Fluid mechanics

PART-A

- Determination of Coefficient of Friction of flow through a pipe.
- Determination of Minor losses in the pipe.
 - ❖ Head loss due to bend
 - ❖ Head loss due to EL-bow
 - ❖ Head loss due to sudden contraction.
 - ❖ Head loss due to sudden enlargement.
- To verify Bernoulli's equation by demonstrating the relationship between pressure head and kinetic head. **(Open-Ended Experiment)**
- Impact of Jets – Flat, Inclined and Curved vanes
- Calibration of collecting tank by volumetric method. **(Open-Ended Experiment)**

PART-B

- Calibration of Venturimeter to evaluate the coefficient of discharge
- Discharge measurement using Orifice meter.
- Calibration of triangular notch to evaluate the coefficient of discharge.
- Calibration of rectangular notch to evaluate the coefficient of discharge.
- To determine coefficient of discharge of vertical Orifice **(Open-Ended Experiment)**.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO 1	Determine flow measurements and classify minor losses.
CO 2	Apply Pipe friction formula to determine major losses.
CO 3	Evaluate the performance of pipe to determine the co-efficient of friction.
CO 4	Estimate the data in determining forces of various types in impact of jets.
CO 5	Perform experiments on flow measurements.

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Semester: III / IV

Course Name: CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW

Course Code	21CIP37/47	CIE Marks	50
Teaching Hours/Week (L:T:P)	1-0-0	SEE Marks	50
Credits	01	Exam Hours	02
Total Hours of Pedagogy	15	Total Marks	100

Module – 1

Introduction to Indian Constitution

The Making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India. Fundamental Rights. Directive Principles of State Policy (DPSP). Fundamental Duties.

03 Hours

Module - 2

Union Executive and State Executive:

Parliamentary System, Federal System, Union Executive – President, Prime Minister, Union Cabinet, Parliament – Union Legislature, Lok Sabha and Rajya Sabha types of bills. Union judiciary Supreme Court of India.

03 Hours

Module – 3

Elections, Amendments and Emergency Provisions Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments - Methods in Constitutional Amendments. Important Constitutional Amendments. Amendments – 7,9,10,12,42,44, 61, 73,74, ,75, 86, and 91,94,95,100,101,118. Emergency Provisions, types of Emergencies and its consequences. Special Provisions (Articles 370,371,371J) for some States

03 Hours

Module – 4

Professional / Engineering Ethics: Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics. Role morality. What is profession characteristic of profession? The NSPE board of Professional ethics. Engineering ethics as preventive ethics. Responsible Engineer. Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. What is conflict of interest? Honesty integrity and reliability. IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.

03 Hours

Module – 5

Internet Laws, Cyber Crimes and Cyber Laws: Internet and Need for Cyber Laws, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000. Cybercrimes and enforcement agencies.

03 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Demonstrate constitutional knowledge and legal literacy.
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers
CO3	Understand the cybercrimes and cyber laws for cyber safety measures

Suggested Learning Resources:

Text Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Constitution of India, Professional Ethics and Human Rights Shubham Singles	Charles E. Haries, and et al	Cengage Learning India	2018
2	Introduction to the Constitution of India	Durga Das Basu	Prentice –Hall	2008
3	Engineering Ethics	M. Govindarajan, S. Natarajan, V. S. Senthilkumar	Prentice –Hall	2004

Reference Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Cyber Security and Cyber Laws	Alfred Basta and et al	Cengage Learning India	2018

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Semester: IV**Course Name: SOFT SKILLS AND BASIC APTITUDE**

Course Code	21SSA480	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:2:0	SEE Marks	50
Credits	2	Exam Hours	02
Total Hours of Pedagogy	30	Total Marks	100

Pre-requisites:

- Basic Conversational English
- Fundamentals of Mathematics
- Basic Knowledge of Reasoning

Module – 1**Communication Skills**

Basic Tools of Communication, Listening Skills, Body Language, Voice, Verbal Language, Conversations in Professional Setting

06 Hours**Module – 2****Presentation Skills**

Zero Presentation, Individual Presentations, Feedback, Types of Introductions, Captivating the Audience, Interaction Methods, Signing off.

06 Hours**Module – 3****Verbal & Numerical Ability**

Vocabulary is Fun, Root Words, Sentence Structures, Bouncing, Similar and Opposite Words, Common Errors, Number System, Factors and Multiples.

06 Hours**Module – 4****English Language**

Phonetic and Non-phonetic Languages, sounds in English, IPA, Syllables, Word Stress, Stress patterns in Indian languages vs English, Pausing and Rhythm in English, Sentence Structures, Bouncing, Common Errors

06 Hours**Module – 5****Verbal Ability and Verbal Reasoning**

Similar and Opposite words, Number and Alphabet Series, Human Relations, Direction Tests, Coding Decoding, Clocks and Calendars

06 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Demonstrate communicative ability in a professional environment
CO2	Articulate one's ideas and demonstrate them to an audience
CO3	Transform one's English Vocabulary and Language Structure
CO4	Interpret international phonetic symbols, stress patterns, and enhance English speech
CO5	Identify patterns, determine the problem-solving process & validate solutions

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Reasoning N' Reasoning - Verbal & Non-verbal Reasoning	Dr. Ravi Chopra	Galgotia	1994
2	Magical Book on Quicker Math	M. Tyra	BSC	I Edition, 2018
3	Communicate with Confidence	Diana Booher	Mc-Graw-Hill	Nov 2011
Reference Books				
1	Cambridge Advanced Learner's Dictionary	Cambridge University Press	CBS	IV Edition, 2013
2	A Modern Approach to Verbal and Non-verbal Reasoning	R S Agarwal	S Chand	II Edition, 2018
3	Word Power Made Easy	Norman Lewis	Goyal Publishers	IV Edition, 2014
4	Speak with Confidence	Diana Booher	Mc-Graw-Hill	I Edition, 2002

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Semester: IV

Course Name: BIOLOGY FOR ENGINEERS

Course Code	21ABE481	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	01	Exam Hours	02
Total Hours of Pedagogy	15	Total Marks	100

Module – 1

BIOMOLECULES AND THEIR APPLICATIONS (QUALITATIVE):

Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (DNA Vaccine for Rabies and RNA vaccines for Covid19, Forensics – DNA fingerprinting), Proteins (Proteins as food – whey protein and meat analogs, Plant based proteins), lipids (biodiesel, cleaning agents/detergents), Enzymes (glucose-oxidase in biosensors, lignolytic enzyme in bio-bleaching).

06 Hours

Module – 2

HUMAN ORGAN SYSTEMS AND BIO DESIGNS - 1 (QUALITATIVE):

Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics. Engineering solutions for Parkinson's disease). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signalling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators).

06 Hours

Module – 3

HUMAN ORGAN SYSTEMS AND BIO-DESIGNS - 2 (QUALITATIVE):

Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems). Muscular and Skeletal Systems as scaffolds (architecture, mechanisms, bioengineering solutions for muscular dystrophy and osteoporosis).

06 Hours

Module – 4

NATURE-BIOINSPIRED MATERIALS AND MECHANISMS (QUALITATIVE):

Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).

06 Hours

Module – 5

TRENDS IN BIOENGINEERING (QUALITATIVE):

Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing,

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Bioimaging and Artificial Intelligence for disease diagnosis. Self- healing Bioconcrete (based on bacillus spores, calcium lactate nutrients and biomineralization processes) and Bioremediation and Biomining via microbial surface adsorption (removal of heavy metals like Lead, Cadmium, Mercury, Arsenic).

06 Hours**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

CO1	Elucidate the basic biological concepts via relevant industrial applications and case studies.
CO2	Evaluate the principles of design and development, for exploring novel bioengineering projects.
CO3	Corroborate the concepts of biomimetics for specific requirements.
CO4	Think critically towards exploring innovative biobased solutions for socially relevant problems.



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Semester: IV

Course Name: INTRODUCTION TO COMPUTER GRAPHICS

Course Code	21AME482	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	01	Exam Hours	02
Total Number of Pedagogy Hours	15	Total Marks	100

Pre-requisites:

Mathematics – Linear algebra

Computer fundamentals

Module - 1

Types and Mathematical Representation of Curves:

Curve representation. Parametric representation of Analytic Curves: Lines, Circles, Ellipse, Bezier curves, B-spline curves

03 Hours

Module - 2

Scan Conversion: Drawing Algorithms: DDA algorithm, Bresenham's integer line algorithm, Bresenham's circle algorithm: mid-point line and circle algorithms.

03 Hours

Module – 3

2D Transformations: Representation of points & lines. Transformations: translation, scaling, rotation, reflection and concatenations. Rotation about an arbitrary point and an arbitrary line.

03 Hours

Module – 4

Visual Realism-I: Introduction, hidden line removal, Visibility of object views, Visibility techniques: minimax test, Surface test, Silhouettes, Homogeneity test, Sorting, Coherence.

03 Hours

Module – 5

Data Exchange and Animation: Evolution of data exchange, IGES, PDES. Conventional animation: key frame, In-betweening, Line testing, Painting, Filming. Computer animation, Entertainment and engineering animation.

03 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Develop expertise in generation of curves.
CO2	Apply algorithms for drawing 2D images.
CO3	Analyze transformation on 2D images.
CO4	Explain the projection and hidden surface removal algorithms.
CO5	Interpret the concepts of data exchange and animation.

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Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	CAD/CAM	Ibrahim Zeid	Tata McGraw Hill.	
2	CAD / CAM Principles and Applications	P N Rao	Tata McGraw-Hill	3rd 2015 Edition,
3	CAD/CAM/CIM	Dr. P. Radhakrishnan	New Age International New Delhi.	3rd edition
4	Mathematical Elements of Computer Graphics	Roger Adams, J. Alan Adams	Mc-Graw Hill, 2 nd edition	2017
5	Computer Graphics	Schaums outlines	Mc-Graw Hill	2015



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Semester: IV

Course Name: UNIVERSAL HUMAN VALUES: UNDERSTANDING HARMONY & ETHICAL HUMAN CONDUCT

Course Code	21UHV490	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	1	Exam Hours	02
Total Number of Pedagogy Hours	15	Total Marks	100

Module – 1

Introduction to Value Education Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations

03 Hours

Module - 2

Harmony in the Human Being

Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

03 Hours

Module – 3

Harmony in the Family and Society

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order

3-Hours

Module – 4

Harmony in the Nature/Existence

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

03 Hours

Module – 5

Implications of the Holistic Understanding – a Look at Professional Ethics

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

03 Hours

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COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Develop personality with responsibilities and self-respect.
CO2	Build real world skills like communication, lifelong-learning and problem-solving.
CO3	Create harmonious relationship among faculty and students.
CO4	Provide an organized philanthropic service to the society through activities.
CO5	Create awareness on health, yoga, human relationships, universal peace, environment, society and nation.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books	2nd Revised Edition New Delhi, 2019
2	The Teachers manual	-	-	-
Reference Books				
1	Jeevan Vidya: Ek Parichaya	A Nagaraj	Jeevan Vidya Prakashan, Amarkantak	1999
2	Human Values	A.N. Tripathi	New Age Intl. Publishers, New Delhi	2004
3	The Story of Stuff (Book)	-	-	-
4	The Story of My Experiments with Truth	Mohandas Karamchand Gandhi	-	-
5	Small is Beautiful	E. F Schumacher	-	-
6	Slow is Beautiful	Cecile Andrews	-	-
7	Economy of Permanence	J C Kumarappa	-	-

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Semester: IV

Course Name: **ADDITIONAL MATHEMATICS-II**

Course Code	21MATDIP41	CIE Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	--
Credits	00	Exam Hours	00

Pre-requisites: Differentiation, Integration, Trigonometric formulae, Differential equations.

Module – 1

Higher Order ODE's

Linear Differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators. [Particular integral restricted to $\phi(x) = e^{ax}$, $\sin ax$, $\cos ax$ for $f(D)y = \phi(x)$]

Self-Study: Finding particular Integral for $\phi(x) = x^m$

08 Hours

Module - 2

Partial Differential Equations (PDE's):

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct by integration. Homogeneous PDE involving derivative with respect to one independent variable only.

Self-Study: Method of separation of variables

08 Hours

Module – 3

Laplace Transform:

Definition, Laplace transforms of elementary functions. Laplace transform of $e^{at}f(t)$, $t^n f(t)$ (without proof). Laplace transform of Periodic functions (statement only) and Unit-step function- problems.

Inverse Laplace Transform: Definition, Inverse Laplace Transform of standard functions. Inverse transform by Partial fraction Method. Apply the concepts of Laplace Transforms to find the solution of linear differential equations.

Self-Study: Convolution Theorem

08 Hours

Module – 4

Numerical Methods:

Solution of algebraic and transcendental equations by Newton-Raphson method and Secant method.

Interpolation: Newton's Forward and Backward Interpolation formulae, Newton's divided difference formula, Lagrange's Interpolation formula-problems.

Numerical Integration: Simpson's 1/3rd and 3/8th rule (without proof) - problems.

Self-Study: Weddle's Rule

08 Hours

Module – 5

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Probability:

Introduction, sample space and events. Axioms of probability. Addition & multiplication theorems. Conditional probability, Baye's theorem. Problems.

Self-Study: Applications Baye's theorem

08 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
CO2	Construct a variety of partial differential equations and solution by various methods.
CO3	Use Laplace Transform and inverse Laplace Transform in solving differential /integral equation arising in network analysis, control systems and other fields of engineering.
CO4	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
CO5	Use the concepts of probability in different probability distribution.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S.Grewal	Khanna Publishers	43 rd Ed.2015
2	Advanced Engineering Mathematics	E. Kreyszig	Jhon willy & Sons	10 th Ed. (Reprint).2016
3	Additional Mathematics-2	Dr. Pandurangappa	Sanguine Technical Publishers	4 th Ed., 2019.
Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill	11th Edition.2010

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Pedagogy / Teaching-Learning Process (which are appropriately selected):

1. Adopt different type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations.
2. Disquisition method for Problem Solving.
3. Arrange visits to show the live working models other than laboratory topics.
4. Adopt collaborative Learning (Group Learning) in the class.
5. Adopt Problem Based Learning (PBL), which fosters students 'Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

Assessment Details for IPCC

Continuous Internal Evaluation (CIE): CIE for the theory component of IPCC is 30 marks

Sl. No.	Components	Number	Weightage	Max. Marks
1	Tests (A)	3*	60%	18
2	Alternate Assessment Tools (AAT) (B)	3-4	40%	12
Total Marks for theory component A+B				30

CIE for the LAB component of IPCC: 20 marks

Sl. No.	Components	Weightage	Max. Marks
1	Lab Work: Conduction of Experiments (A)	40%	08
2	Lab Journal Writing & Submission (B)	10%	02
3	Lab Test (C)	30%	06
4	Open-Ended Experiments / Mini Lab Projects (D)	20%	04
Total Marks			20

Final CIE Marks = CIE for theory component + CIE for Lab component

Semester End Examination (SEE)

SEE for IPCC Theory for 3 hours duration

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module. The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component)
- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

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Assessment Details for PCC

CIE:

Tests (A): Topics taught by Lecture hours need to be assessed and this will contribute to 30 marks.

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools (AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

Semester End Examination (SEE)

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

ABILITY ENHANCEMENT COURSE (AEC):

Assessment Details of CIE

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	30
(ii)	Alternate Assessment Tools (AAT) (B)	3	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

Semester End Examination (SEE): SEE Guidelines for the Courses

- 21CIP37/47 - Constitution of India, professional Ethics and Cyber Law
- 21DTI39 - Design Thinking and Innovation
- 21SSA480 - Soft Skills and Basic Aptitude
- 21ABE481 - Biology for Engineers
- 21AME482 - Introduction to Computer Graphics
- 21UHV490 - Universal Human Values
 - SEE will be conducted with common question papers for the subject.
 - SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 100 marks which will be scaled down to 50 marks.
 - Duration of the examination is 02Hours

FOR THE COURSES:

- 21MATDIP31 / 41 – Additional mathematics I and II

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b. 21KSK37/47 – Samskrutika Kannada

c. 21KBK37/47 - Balake Kannada

Continuous Internal Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3	60%	60
(ii)	Alternate Assessment Tools (AAT) (B)	3	40%	40
	Total Marks			100

Semester End Examination (SEE): There is no SEE for the above Courses

Alternate Assessment Tools (AAT)

The following are the Alternate Assessment Tools (AAT) and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem-based learning.

Assessment Details for PRACTICAL

Continuous Internal Evaluation (CIE)

	Components	Weightage	Max. Marks
1.	Lab Work: Conduction of Experiments (A)	40%	20
2.	Lab Journal Writing & Submission (B)	10%	05
3.	Lab Test (C)	30%	15
4.	Open-Ended Experiments / Mini Lab Projects (D)	20%	10
	Total Marks		50

Semester End Examination (SEE)

Semester end examination (SEE) will be conducted for 100 marks and proportionally reduced to 50 marks.

The pattern of SEE and scheme of evaluation:

Sl. No.	Components	Max. Marks
1	One Experiment from Part – A	30
2	One Experiment from Part – B	50
3	Viva – Voce	20
	Total	100

Question paper pattern:

- All the experiments are included for the external practical examination.
- There will be two parts A, B one question from each section need to be answered.
- **Part A** carries 40% and **Part B** carries 60%
- **Marks distribution: Procedure** (20%) + **Execution** (60%) + Viva Voce (20%)
- Students can pick one experiment from the questions lot prepared by the examiners.

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- Change of experiment is allowed only once and 50% marks allotted to the procedure part to be made zero.

FOR THE COURSE:**a. 21MEL45 – Computer Aided Machine Drawing**

SEE question paper will be set for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

1. The question paper will have 4 full questions.

- a) Two full questions from **Module-4** carrying 40 marks each. For each question 20 marks are allocated for Solution and sketching, and 20 marks for computer display and printout.
- b) Two questions from **Module-5** carrying 60 marks each. For each question 20 marks are allocated for Solution and sketching, and 40 marks for computer display and printout.
- c) **Modules 1 to 3** are for CIE component only.

2. The students will have to answer 2 full questions, selecting one full question from each module.