1.1.2 & 1.2.2

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

PROCEEDINGS OF 1st BOARD OF STUDY MEETING HELD ON 27th November, 2021

Venue / Mode: **ONLINE**

Time: **11:00 AM**

At the outset, the Chairman welcomed all the Honorable members for the 1st meeting of Board of Studies (UG) for discussing and finalizing the Scheme and Syllabus for B.E. 1st year common to all Branches for the subjects:

1. **Problem Solving through C Programming - 21PSP13/21PSP23**
2. **C Programming Lab - 21CPL18 / 21CPL28**

Agenda 1	To Consider and approve the scheme and syllabus of **"Problem Solving through C Programming -21PSP13/21PSP23"** for 1st Year UG Course for the Academic Year 2021-22.	
	Module 1: Introduction to Computers	What is a computer, Characteristics of computers, Generations of computers, Classification of computers, Applications of computer, basic organization of computer Input & output devices, Classification of computer software, Advantages of computer networks, Network topologies, Types of network, Networking devices, Algorithm, Flowcharts, pseudocode, Generation of programming languages.
	Suggestions	• Dr. U P Kulkarni, Mr. Sunder K S, Suggested to reduce the contents of Module-I by specifying only the headings and also suggested to incorporate the topics on Operating system, Compilers and Assemblers.
	Action Taken	**Suggestions are incorporated and the contents are modified as follows:** **Introduction to Computer-** Hardware, Software, Operating system, Compilers, Problem solving using Algorithms and Flowchart.
	Module 2: Introduction to C Language	Introduction, Structure of C program, Writing the first C program, Files used in a C program, Compiling and Executing C program, Keywords, Identifiers, Basic data types in C, Variables, Constants, Input / Output statements in C, Operators in C, Type Conversion & Type casting, Programming examples.
	Suggestions	--
	Action Taken	--
	Module 3: Decision control and Looping statements	Conditional Branching statements, Iterative statements, Nested loops, break, continue and **goto** statement.

	Suggestions	• **Mr. Sunder K S**, suggested to incorporate the Loop optimization Techniques.
	Action Taken	Regarding Loop optimization Techniques, it will be discussed with the faculty members handling the course and necessary things will be taught in the course.
	Module 4: Arrays and Functions	Introduction, Declaration of 1D arrays, Accessing elements of an array, Storing values in arrays, Calculating the length of array, Two dimensional arrays, String Concepts, C Strings, String Input/Output functions, Array of strings, String manipulation functions **Functions-** Need for functions, Function declaration/Function prototype, Function definition, Function call, Return Statement, Passing Parameters to the function, Recursive Functions
	Suggestions	• Dr. U P Kulkarni, Mr. Sunder K S, Dr. Rajan M A Suggested to reduce the contents of Module-IV by specifying only the headings.
	Action Taken	**Suggestions are incorporated and the contents are modified as follows:** **Introduction to Storage classes, Arrays-** usage of arrays and strings in solving problems **Functions-** usage of functions in solving the problems.
	Module 5: Structures, Preprocessor directives and Pointers	Introduction to Structures, Nested structures, Array of structures, Structures & Functions, Introduction to Pointers, Declaring pointer variables, Pointer expressions& pointer arithmetic, Passing arguments to functions using pointers, pointer and arrays, Types of Pre-processor directives, #define, #include, #undef, #line, Conditional directives, Introduction to files
	Suggestions	• Dr. U P Kulkarni, Mr. Sunder K S, Dr. Rajan M A Suggested to reduce the contents of Module-IV by specifying only the headings.
	Action Taken	**Suggestions are incorporated and the contents are modified as follows:** **Structures, Pre-processor directives, Pointers and Files –** usage of Structures, Pre-processor directives, Pointers and Files in solving problems.
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		• 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 Principal for the necessary Infrastructure.

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

Agenda 2	To Consider and approve the scheme and syllabus of "C Programming Lab- **21CPL18 / 21CPL28** for 1st Year UG Course for the Academic Year 2021-22.	
	Experiments / Programs	• **List of Programs** need to be executed in the regular lab and Semester End Examination as per the DRAFT COPY
	Suggestions	**All the BoE members suggested the following points:** • List of Programs should not be mentioned • Concept wise programs should be discussed in the Regular labs • For each program, the functionality should be mentioned and Test cases should be specified
	Action Taken	• Programs for the lab records and lab Examinations are open ended **[No fixed list of programs]** • Faculty members handling Labs will be informed to discuss about the Test cases, Expected Input, Output, Functionality and Applications for each program.

Agenda 3	**Total Credit Adjustment.**	
	• The Total credit adjustment was discussed in the Joint Board of Studies Meeting held on 15/11/2021. The same was shared to all the Members.	

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

FINAL COPY

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

PROBLEM SOLVING THROUGH C PROGRAMMING			
Course Code	21PSP13/23	CIE Marks	50
Teaching Hours/week (L:T:P:S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

1. Demonstrate the basic structure and functionalities of a Computer
2. To prepare students to create logic and write a program at basic level of 'C'.
3. To enable the students to write Test Cases related to performance issues of the application or program.
4. To enable the students to take up courses at advanced level.

MODULE-1

Introduction to Computer- Hardware, Software, Operating system, Compilers and Assemblers. Problem solving using Algorithms and Flowchart

[8 hours]

MODULE-2

Introduction to C Language- Introduction, Structure of C program, Writing the first C program, Files used in a C program, Compiling and Executing C program, Keywords, Identifiers, Basic data types in C, Variables, Constants, Input / Output statements in C, Operators in C, Type Conversion & Type casting, Programming examples.

[8 hours]

MODULE-3

Decision Control& Looping Statements-Conditional Branching statements, Iterative statements, Nested loops, break, continue and **goto** statement.

[8 hours]

MODULE-4

Introduction to Storage classes, Arrays- usage of arrays and strings in solving problems **Functions-** usage of functions in solving the problems

[8 hours]

MODULE-5

Structures, Pre-processor directives, Pointers and Files –usage of structure, Pre-processor directives, Pointers and Files in solving problems

[8 hours]

Course Outcomes

On completion of this course, students will be able to:

CO1: Identify and name the hardware components of Computer.
CO2: Apply programming constructs of C language to solve the real world problem
CO3: Write a program to emphasis uses of arrays by implementing solutions to problems like searching and sorting
CO4: Write a program to emphasis uses of structures, pointers and files in implementing solutions
CO5: Design and Develop Solutions to problems using modular programming constructs using functions

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Theory Semester End Exam (SEE) is conducted for 100 marks (3 hours duration).

Continuous Internal Evaluation

- **Methods recommended:** IA Test (40 marks) and 10 marks for assignments or Quiz or Online course.

Prescribed Books

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition.
2. Behrouz A. Forouzan, Richard F. Gilberg, "A Structured Programming Approach Using C", 3rd Edition, Cengage publication.
3. Brain W Kernighan and Dennis M Ritchie, The C Programming Language, Prentice Hall of India.
4. E Balaguruswamy, programming in ANSCII C, 7th Edition, Tata McGraw-Hill.

Web links and Video Lectures (e-Resources)

1. e-learning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/ -MOOC courses can be adopted for more clarity in understanding the topics and varieties of problem solving methods.

FINAL COPY

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

COMPUTER PROGRAMMING LABORATORY			
Course Code	21CPL18/28	CIE Marks	50
Teaching Hours/week (L:T:P:S)	0:0:3:0	SEE Marks	50
Total Hours	40	Total Marks	100
Credits	01	Exam Hours	03

Course Objectives

This course (21CPL18/28) will enable students to:

1. Analyse problem statements and identify appropriate solutions
2. Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
3. Develop an algorithm and programs using constructs of C programming language
4. Reporting the observations

Laboratory Programs

1. Familiarization with computer hardware and networking devices, Demonstration of IDE for writing programs.

Part - A

Write an Algorithm / Flowchart and Program to perform

2. Problem related to variable /identifiers.
3. Problem related to Input and Output statements
4. Problem related to Conditional statements
5. Problem related to looping statements
6. Problem related to jump statements
7. Problem related to Arrays
8. Problem related to Strings
9. Problem related to Functions
10. Problem related to Pointers
11. Problem related to Structures
12. Problem related to Files

Part – B (Practical-Based Learning)

A problem statement for each batch is to be generated in consultation with the co-examiner and the student should develop an algorithm, program and execute the program for the given problem with appropriate outputs.

Course Outcome (Course Skill Set)

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

1. Define the problem statement and identify the need for computer programming.
2. Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming.
3. Develop algorithm, flowchart and write programs to solve the given problem.
4. Demonstrate use of functions, recursive functions, arrays, strings, structures and

pointers in problem solving.
5. Document the inference and observations made from the implementation.

Assessment Details

Continuous Internal Evaluation (CIE)

70% CIE marks awarded in case of practical shall be based on the weekly evaluation of laboratory journals/ reports after the conduction of every experiment and 30% marks for one practice test for practical-based learning.

Semester End Evaluation (SEE)

1. All laboratory experiments (Part A) 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.
   For ***PART B***examiners should frame a question for each batch, the student should develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem.
3. Weightage of marks for PART A is 80% and for PART B is 20%
4. Change of experiment is allowed only once for part A and 15% Marks allotted to the procedure part to be made zero. However, PART B question is mandatory (change of question is not allowed).
5. Marks distribution: procedure (15%) + execution (70%) + viva voce (15%)

PART A (12+56+12 = 80) AND FOR PART B (3+14+3 = 20)

Suggested Learning Resources

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition.
2. Herbert Schildt, C: The complete reference, McGraw Hill, 4th Edition, 2017

Weblinks and Video Lectures (e-Resources)

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/
3. https://www.mentorrbuddy.com/student/

PROCEEDINGS OF 1st BOARD OF STUDY MEETING HELD ON 20th Nov 2021

Dated: 20 /11/2021

Venue: Online Meeting (Microsoft Teams)

Time: 10:00 AM

Members Present

S. No	Name of the Member	Designation	Organization
1	Dr. K M Sadyojatha	Chairman	Professor & Head ECE - B.I.T.M. Ballari
2	Dr. V C Patil	Member	Professor ECE - B.I.T.M. Ballari
3	Dr. U Eranna	Member	Professor ECE - B.I.T.M. Ballari
4	Dr. Naseerudin	Member	Assoc. Prof. ECE - B.I.T.M. Ballari
5	Dr. Fareduddin J S	Member	Assoc. Prof. ECE - B.I.T.M. Ballari
6	Dr. William Thomas	Member	Assoc. Prof. ECE - B.I.T.M. Ballari
7	Mr. Premchand D R	Member	Asst. Prof. ECE - B.I.T.M. Ballari
8	Dr. Patil Ramana Reddy	Member	Professor & Head, Dept. of E&CE, JNTU, CEA, Anantapur.
9	Dr. Subhash Kulkarni	Member	Principal, PESIT, Banglore South Campus, Bengaluru.
10	Dr. Seshachalam	Member	Professor, Dept. of E&CE, BMSCE, Bengaluru.
11	Mr. Krishna Kumar M	Member	Vice President, Global Talent acquisition, CYENT Bengaluru.
12	Mr. Reddy Sridhar	Member	Robert Bosch, Bengaluru
13	Mr. Jayaprakash Yangal	Member	Director- Talent Acquisition, MIRAFA Technologies
14	Mr. Ishwarayya Mathapati	Member	Senior Member, Technical KPIT Cummins Info Systems Ltd.

At the outset, the Chairman welcomed all the Honorable members for the 1st meeting of Board of Studies (UG) for discussing and finalizing the Scheme and Syllabus for B.E. 1st year common to all Branches for the subjects:

1.Basic Electronics - 21ELN14/24

Agenda 1

To Consider and approve the scheme and syllabus of **"Basic Electronics – 21ELN14/24"** for 1st Year UG Course for the Academic Year 2021-22.

Module	1. Electronic Circuits 2. Logic Circuits 3. Embedded Systems, Sensors and Interfacing & Communication Interface 4. Introduction to Analog and Digital Communication 5. Wireless mobile communication, Satellite Communication, Optical Fiber Communication & Microwave Communication
Suggestions	1. Advised to re distribute the contents of Module 1 & Module 2 so as to maintain the balancing between Analog & Digital circuits. 2. Suggested to include Fundamental topic "Role of RLC passive components in the design of Electronic Circuits" as a part of module1/Module2. 3. Recommended to encourage students to undergo practical hands on through Electronic Welcome kit for better realization of the subject as an ad on activity. 4. Suggested to consider the incorporation of topics like application specific protocols (CAN, I^2C etc) in place of communication Interface as a part of module 3. 5. Suggested to restructure the module 4 contents and include topics relevance to consumer Electronics/ Bio Medical Electronics/ Smart Health Management/ IoT applications. 6. Committee has suggested including applications of Vehicular Communication / Automotive Electronics in place of Microwave Communication as a part of Module 5. 7. Insisted to adopt suitable Pedagogical methods so as to inculcate at least 30% of L3 components mapping to CIE through task based learning, Mini project, hands on skill development activity. 8. Committee members also suggested modifying the Course title, since the proposed course content covering some of the advanced topics beyond the basic electronics.
Action Taken	As per the suggestions of the members, "Role of RLC passive components in the design of Electronic Circuits" is included as a part of module1. Application specific protocols (CAN, I^2C etc) are added in place of communication Interface as a part of module 3. Module 4 is restructured and the consumer Electronics/ Bio Medical Electronics/ Smart Health Management are introduced as self study topics. The Course title is also modified (**"Electronics & Communication Fundamentals and Applications"**) as per the suggestions and recommendations of the committee. Further planning is ongoing for activities for L3 components.

Agenda 2

Total Credit Adjustment

The Total credit adjustment was discussed in the Joint Board of Studies Meeting held on 20/11/2021. The same was shared to all the Members.

Signature of the Members

S. No.	Name of the Member	Designation	Signature
1	Dr. K M Sadyojatha	Chairman	
2	Dr. V C Patil	Member	
3	Dr. U Eranna	Member	
4	Dr. Naseerudin	Member	
5	Dr. Fareduddin J S	Member	
6	Dr. William Thomas H M	Member	
7	Mr. Premchand D R	Member	
8	Dr. Patil Ramana Reddy	Member	
9	Dr. Subhash Kulkarni	Member	
10	Dr. Seshachalam	Member	
11	Mr. Krishna Kumar M	Member	
12	Mr. Reddy Sridhar	Member	
13	Mr. Jayaprakash Yangal	Member	
14	Mr. Ishwarayya Mathapati	Member	

Re: Syllabus for approval

SESHACHALAM D <dschalam.ece@bmsce.ac.in>

To Prof. Sadyojatha K M <sadyojatha@bitm.edu.in>

Approved Sir.

On Tue, 30 Nov 2021, 4:08 pm Prof. Sadyojatha K M, <sadyojatha@bitm.edu.in> wrote:

sir,

Please find attached the syllabus for approval.

Renaming of the subject is pending.

We are considering to rename the subject as

'**Electronics and Communication Fundamentals and applications**'

Kindly comment on the title and request you to approve the contents of the syllabus in your reply mail.

Thanking you sir

Sincerely yours

Sadyojatha K M

Re: Minutes of Meeting-BOS, E&CE, BITM, Ballari Regarding..

PATIL RAMANA REDDY <prrjntu@gmail.com>

To: Prof. Sadyojatha K M <sadyojatha@bitm.edu.in>

Sir
The syllabus may be approved

--
Dr.PRamana Reddy,
Professor,
ECE Department,
JNTUACE, Anantapur
Mobile: 9440272866

Re: Syllabus for Approval reg.,

PESIT Bangalore South Campus <sskul@pes.edu>

To: Prof. Sadyojatha K M <sadyojatha@bitm.edu.in>

Dear Dr. Sadyojatha,
Looking forward to seeing this as a model syllabus with complete deliverables in a highly supportive way for students to catch up with an exciting and encouraging way.

My approval is there for this syllabus which has seen hard efforts from your entire Team at BITM.

Best Wishes

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 Thu, Dec 2, 2021 at 1:34 PM Prof. Sadyojatha K M <sadyojatha@bitm.edu.in> wrote:

Dear sir,

Please find attached the modified syllabus as per the recommendations of the honorable members.

Kindly reply with your approval.

Thanking you

Sincerely yours

Dr K M Sadyojatha

Re: Syllabus for approval

Ishwar Mathapati <ishwarayya.m@gmail.com>

To Prof. Sadyojatha K M <sadyojatha@bitm.edu.in>

Dear Sir,

In the mobile communications section you can add an overview of 5G as well, it's just brief overview

Rest all looks ok

All the best Sir !!

Thanks,
Ishwar

On Wed, 1 Dec 2021 at 11:42, Prof. Sadyojatha K M <sadyojatha@bitm.edu.in> wrote:

> Dear Ishwar,
>
> Please find attached the modified syllabus as per the recommendations of the honorable members.
>
> Kindly reply with your approval.
>
> Thanking you
>
> Sincerely yours
>
> Dr K M Sadyojatha

Re: Syllabus for approval

Sridhar Reddy <rsri011@gmail.com>

Wed 1 Dec 2021 11:55 AM

To: Prof. Sadyojatha K M <sadyojatha@bitm.edu.in>

Dear Sir,

Approved.

Regards,
Sridhar

On Wed, 1 Dec, 2021, 11:40 am Prof. Sadyojatha K M, <sadyojatha@bitm.edu.in> wrote:

Dear Sridhar,

Please find attached the modified syllabus as per the recommendations of the honorable members.

Kindly reply with your approval.

Thanking you

Sincerely yours

Dr K M Sadyojatha

Ballari Institute of Technology and Management

Department of Electrical and Electronics Engineering

Minutes of board of studies meeting

24-11-2021

Board of Studies meeting of Electrical and Electronics department was held on 24th November 2021 at 10:30 A.M.

Members present :

S.No.	Name		Signature
1	Dr. B.S. Khened H.O.D	Chairman	
2	Dr. Manjunath Sharma Assoc Prof. EEE Department ,N.I.T.K. Suratkal	V.T.U.Nominee	Attended online
3	Dr. Ramesh L Chakrasali, Prof. Dept. EEE SDM College of Engineering, Dharwad	Member	Attended online
4	Dr. Suresh Jangamshetty, Prof., Dept. of EEE, Basaveswara Engg., College, Bagalkote	Member	Attended online
5	Brig. Y.V.R.Vijay Ex. C.O.O., Suzelo	Member 9/67617817	Attended online
6	Mr. Mahalinga Swamy, Senior Manager, SEMB Corp Gayathri Power Complex, Nellore.	Member	Attended online
7	Dr. Sharana Reddy	Member	
8	Dr.Ragavendra P	Member	
9	Dr.AbdulKhadar. A	Member	
10	Mrs.Arathi P B	Member	

11	Mr.Md.Anwar	Member	
12	Mr.Shridhar S M	Member	
13	Mr.Y.Kamal Kishore	Member	
14	Mr Narasimhulu K	Member	
15	Mrs Sujatha	Member	
16	Mrs Parvathi	Member	
17	Mr Harish Kumar G	Member	
18	Mr Santosh B M	Member	
19	Mr Vijaya Krishna	Member	
20	Mr Chandan K R	Member	
21	Mr Vijay Kumar M K	Member	
22	Mrs Pushpalatha Kumari	Member	
23	Mrs Rajyalakshmi	Member	
24	Mrs Shantala H	Member	

Members absent

S.No.	Name	
1	Mr. SHIVARAJAPPA, Asst. Engineer, KPCL, RTPS, Raichur	Member
2	Mr. R S HIREMATH, CEO, Flexitron - Bangalore	Member

Chairman welcomed all the honorable members to the meeting and following discussions were made.

Agenda 1 : : To finalize the contents of syllabus of Fundamentals of Electrical Engineering (theory) and Basic Electrical Engineering (lab) of B.E. I / II semester.

The contents of the syllabus was discussed and following suggestions were given by members.

1. To introduce the concept of power triangle in analysis of single phase A.C. systems.
2. To include safety measures to prevent electric shock.

3. To remove measurement of three phase power using two watt meter method both in theory and lab. It was suggested to use trivector method for measurement of power.
4. To include transformers and induction motors in one module and to include alternators and D.C. machines in another module.

Agenda 2 Total credits adjustment

Total credits adjustment was discussed in the Joint Board of Studies meeting held on 15-11-21. The same was shared with the members.

The meeting ended with vote of thanks to all the members.

BASIC ELECTRICAL SCIENCE LABORATORY

LIST OF EXPERIMENTS

01	Study the effect of open and short circuit in simple circuits.
02	Verification of KCL and KVL for DC circuits.
03	Measurement of current, power and power factor of various lamps.
04	Measurement of electrical energy using energy meter of a single phase AC system.
05	Measurement of resistance and inductance of a choke coil using three voltmeter method.
06	Determination of phase and line quantities in three phase star and delta connected loads.
07	Measurement of three phase power using two wattmeters.
08	Load test on a single phase transformer.
09	Two-way and three-way control of lamp and formation of truth table.
10	Measurement of earth resistance.

Demonstration Experiments (for CIE only)

01 Study of all types of machines, wall sockets, connecting wires, and Electrical components.

Course Learning Outcomes:

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

CO 1: Realize the concepts of open circuit, short circuit, KCL & KVL in a DC circuit.
CO 2: Determine the resistance, inductance & impedance, power factor of different types of loads and energy consumed in a 1-Ø AC circuit.
CO 3: Determine the phase, line quantities & power in 3-Ø star & delta connected systems.
CO 4: Evaluate the performance of transformers.
CO 5: Realize the concepts of electrical wiring, circuit protecting devices & earthing.

Proposed Syllabus :
Approved by BOS members of EEE department & faculty handling basic electrical engineering (on. 9-7-2021)

1. Dr B.S. Khened
2. Dr Abdul Khader
3. Dr. Sharan Reddy
4. Dr P. Raghavendra Reddy
5. Prof Arati P' B
6. " Sridhar Sag
7. " Md Anwar
8. " Harish Kumar G

			Alexa Community – India, Tech-Lead at TIETO EVRY
		2	**Mr. MADHUSUDHAN RAO R.D** Regional Manager, IBM Career Education Program, Software Group, India-South Asia IBM, Bengaluru

DEPT. OF MECHANICAL ENGINEERING.

S. No.	Category	Nomination of the Committee	Name of the person
1	Head of the Dept.	Chairperson	**Dr. YADAVALLI BASAVARAJ** Professor & HOD – Mechanical Engg.
2	Faculty Members at different levels veering different specializations	Members 1	**Dr. RAGHAVENDRA JOSHI,** BE, M.Tech., Ph.D., (Machine Design)
		2	**Dr. V.V. RAMANA** BE, M.Tech., Ph.D., (Production Mgmt.)
		3	**Dr. U.M. DAIVAGNA** BE, M.Tech., Ph.D., (Manufacturing)
		4	**Dr. H.M. ANIL KUMAR** BE, M.Tech., Ph.D., (CIM)
		5	**Dr. RAJU JADDAR** BE, M.Tech., Ph.D., (Thermal)
		6	**Prof. VISHNU PRASAD B** BE, M.Tech. (Ph.D.) (Thermal Power Engg.)
3	Subject Experts from outside the College nominated by Academic Council	Members 1	**Mr. SUNIL KATARIA** Executive Vice President, JSW Steels Ltd., Toranagallu (Karnataka)
		2	**Dr. SHARANA PRABHU,** Director, Rajiv Gandhi Institute of Steel Technology, OPJ Centre, JSW Complex, Toranagallu
4	Expert from outside college, nominated by Vice-Chancellor	Member	***To be nominated (Request sent to VTU)***
5	Representative from industry / corporate sector / allied area relating to placement nominated by Academic Council	Member	**Mr. VEERABHADRA RAO,** Sr. Manager / Human Resources Safran Engineering Services India.
6	Postgraduate meritorious alumnus nominated by Principal Member	Member	**Mr. SUBODH KUMAR,** Asst. Manager, JSW Steels Ltd., Toranagallu
7	Co-opted members	Member 1	**Mr. CHETAN** Manager, Harita TechServ Ltd., Bangalore
		2	**Dr. B. GANESH,** Assoc. Prof. Dept. of ME, BITM-Ballari

DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING.

S. No.	Category	Nomination of the Committee	Name of the person
1	Head of the Dept.	Chairperson	**Dr. B.S. KHENED** Professor & HOD – EEE, B.E. – EEE, M.Tech in PE, Ph.D., (Sensors)
2		Members 1	**Dr. SHARAN REDDY** B.E. in EEE, M.Tech in Energy Systems,

	Faculty Members at different levels veering different specializations		Ph.D. (PE & Drives)
		2	**Dr. ABDUL KHADAR** B.E in EEE, M.Tech in PE, Ph.D., (Smart Grids)
		3	**Prof. ARATHI P.B** B.E. in EEE, M.Tech in Digi. Electronics
		4	**Prof. SRIDHAR S.M.** B.E. in Instrumentation, M.Tech in VLSI Design & Embedded Systems
		5	**Prof. MD ANWAR** B.E. in EEE. M.Tech in Power Electronics
		6	**Dr. RAGHAVENDRA REDDY** B.E. in EEE, M.Tech in PS & PE, Ph.D. (Power Systems and Smart Grids)
3	Subject Experts from outside the College nominated by Academic Council	Members 1	**Dr. RAMESH L CHAKRASALI,** Prof. Dept. EEE SDM College of Engineering, Dharwad
		2	**Dr. SURESH JANGAM SHETTY,** Prof., Dept. of EEE, Basaveswara Engg., College, Bagalkote
4	Expert from outside college, nominated by Vice-Chancellor	Member	***To be nominated (Request sent to VTU)***
5	Representative from industry/ corporate sector/ allied area relating to placement nominated by Academic Council	Member	**Mr. RAJAMOHAN NARASIMHAN,** General Manager – HR, JSW Steels Ltd., Toranagallu
6	Postgraduate meritorious alumnus nominated by Principal Member		**Mr. SHIVARAJAPPA,** Asst. Engineer, KPCL, RTPS, Raichur
7	Co-opted members	Member 1	**Mr. MAHALINGA SWAMY,** Senior Manager, SEMB Corp Gayathri Power Complex, Nellore.
		2	**Mr. R S HIREMATH,** CEO. Flexitron - Bangalore

DEPT. OF CIVIL ENGINEERING.

S. No.	Category	Nomination of the Committee	Name of the person
1	Head of the Dept.	Chairperson	**Dr. H MAHABALESHWARA** Professor & HOD – CIVIL, B.E., M.E. (Water Resources Engg.), Ph.D. (Inter Linking of Rivers)
2	Faculty Members at different levels veering different specializations	Members 1	**Dr. T. H. PATEL** B.E., M.Tech in Environmental Engineering, Ph.D., (Environmental Engg.)
		2	**Mr. B. BASAVARAJ** B.E. – Civil, M.Tech in Structural Engg.
		3	**Mr. A.H. RAVICHANDRA** B.E. in Civil, M.Tech in Geo Technical Engineering
		4	**Mr. SHIVA KUMAR** B.E. in Civil, M.Tech in Structures
		5	**Mr. JAYARAM SHETTY** B.Sc. Geology, M.Sc. in Geology
		6	**Mr. S.V. PATIL** B.E. – Civil, M.Tech in Highway Engineering
3	Subject Experts from outside the College nominated by Academic Council	Members 1	**Dr. S V DINESH** Prof & HOD, Dept. of Civil Engg. Siddaganga Institution of Technology, Tumkur (Karnataka)

From: Dr. Suresh Jangamshetti (suresh718@gmail.com)

To: bskhened@yahoo.co.in

Date: Saturday, 17 July, 2021, 02:26 pm IST

To,
Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.

Sir,
Sub: Consent letter. Reg
With reference to the subject cited above, I hereby give my consent to be on BoS of your department. Keep me updated about the BoS meetings in advance, so that I can plan accordingly to participate in the meetings.

Glad to note about UGC committee visit. My good wishes are with the institute and thereby the department in getting the autonomous status extended.

Stay **S**afe **H**ealthy **J**olly**... SHJ**

Dr. Suresh H. Jangamshetti
Senior Member IEEE & Fulbright Alumni,
Prof. & Head, Department of Electrical & Electronics,
Basaveshwar Engineering College (Autonomous),
Bagalkot-587102, Karnataka State, INDIA

[Consultant for Wind-Solar Energy Systems: "*Conserve Today to Consume Tomorrow*"]

On Sat, Jul 17, 2021 at 1:36 PM Basavaraj Khened <bskhened@yahoo.co.in> wrote:

Dear Sir,

Ballari Institue of Technology and Management, Ballari was established in 1997. With 24 years of educational excellence, institute is accreditated by NAAC with A+ graded with effect from 1st Feb 2021 for a period of 5 years. In lieu of this we have applied for autonomous status that will enable us to take our institution to the next level. We are proposing your name for Board of Studies in Electrical and Electronics Engineering. We have a scheduled UGC inspection visit to grant fresh autonomous status in the month of July 2021. Hence I request you to give your consent to be the member of Board of Studies by replying to this email with your Name, Designation, Organisation and Contact information.
With kind regards

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.
Cell no. 9845845644

Re: Incorporating your valuable suggestions in the curriculum and requesting for approval.

Manjunatha Sharma K <manjunatha.sharma@gmail.com>
Mon 29-11-2021 11:44
To: Prof. Khened B.S <khened@bitm.edu.in>

Dear Sir,

Approved the syllabus.

My bank details are as below :

Name : Manjunatha Sharma K

Account Number : 10175379152
IFSC Code :SBIN0002273
Bank : State Bank of India
Branch : Surathkal

With best wishes,
Manjunatha Sharma

On Sat, Nov 27, 2021 at 11:46 AM Prof. Khened B.S <khened@bitm.edu.in> wrote:

> With reference to above subject, I thank all the Board of Studies members for attending the online meeting and giving valuable inputs. we have incorporated your valuable suggestions in our curriculum.
>
> I am herewith attaching the revised syllabus of Fundamentals of Electrical Engineering (theory) and Basic Electrical Engineering Lab of B.E. I/II semester for your approval.
>
> I request you to approve the same and provide me the bank details for remitting the sitting fee .
>
> Thanking you,
>
> Your's faithfully,
> Dr. B.S.Khened
> Chairman,
> BOS (E&E Engg. Board)
> Ballari Institute of Technology and Management, Ballari.

--

Re: Incorporating your valuable suggestions in the curriculum and requesting for approval.

Ramesh Chakrasali <pratisatu@yahoo.co.in>
Sat 27-11-2021 22:28

To: Prof. Khened B.S <khened@bitm.edu.in>

Dear sir,
I approve the syllabi of Fundamentals of Electrical Engineering (theory) and Basic Electrical Engineering(Laboratory) courses of I/II semester common to all branches.
Regards
Dr. Ramesh L. Chakrasali
SDMCET, Dharwad

On Saturday, 27 November, 2021, 11:46:10 am IST, Prof. Khened B.S <khened@bitm.edu.in> wrote:

With reference to above subject, I thank all the Board of Studies members for attending the online meeting and giving valuable inputs. we have incorporated your valuable suggestions in our curriculum.

I am herewith attaching the revised syllabus of Fundamentals of Electrical Engineering (theory) and Basic Electrical Engineering Lab of B.E. I/II semester for your approval.

I request you to approve the same and provide me the bank details for remitting the sitting fee .

Thanking you,

Your's faithfully,
Dr. B.S.Khened
Chairman,
BOS (E&E Engg. Board)
Ballari Institute of Technology and Management, Ballari.

Re: Meeting link

Dr. Suresh Jangamshetti <suresh718@gmail.com>
Mon 29-11-2021 17:23
To: Prof. Khened B.S <khened@bitm.edu.in>

Dear Dr.Khened,
Good afternoon.
I scanned through the BoS in EE document of your institute. I appreciate your efforts in framing the curriculum to suit the NEP2020. **I hereby approve the proceedings of the meeting** and look forward to smooth implementation of the same.

Stay **S**afe **H**ealthy **J**olly**... SHJ**

Dr. Suresh H. Jangamshetti
Senior Member IEEE & Fulbright Alumni,
Prof. & Head, Department of Electrical & Electronics,
Basaveshwar Engineering College (Autonomous),
Bagalkot-587102, Karnataka State, INDIA

[Consultant for Wind-Solar Energy Systems: "*Conserve Today to Consume Tomorrow*"]

On Tue, Nov 23, 2021 at 1:09 PM Prof. Khened B.S <khened@bitm.edu.in> wrote:

> Dear sir,
> as informed earlier, Board of Studies meeting is scheduled tomorrow at 10.30 AM. The meeting link is given below. You are requested to attend the meeting .
>
> Meeting link
> https://teams.microsoft.com/l/meetup-join/19%3ameeting_NDEwNTJiOTktOTZjNy00YThiLWJkZjYtOTQxMDEzZGE4NDAw%40thread.v2/0?context=%7b%22Tid%22%3a%22d95f6094-d28c-42bc-9096-e0746ed850b7%22%2c%22Oid%22%3a%2202c3523c-dd56-4886-90ae-038dd58de995%22%7d
>
> Thanks and regards.
> Dr.Basavaraj S Khened
> Prof.& Head
> Department of Electrical & Electronics Engineering
> Ballari Institute of Technology and Management Ballari.
> Cell no. 9845845644

Re: Incorporating your valuable suggestions in the curriculum and requesting for approval.

MAHALINGA SWAMY <smswamy198@gmail.com>
Mon 29-11-2021 10:33

To: Prof. Khened B.S <khened@bitm.edu.in>

Dear Sir,

I am OK with the syllabus content and approved

Thanks & Regards
Maahalinga Swamy S

On Sat, Nov 27, 2021 at 11:46 AM Prof. Khened B.S <khened@bitm.edu.in> wrote:

> With reference to above subject, I thank all the Board of Studies members for attending the online meeting and giving valuable inputs. we have incorporated your valuable suggestions in our curriculum.
>
> I am herewith attaching the revised syllabus of Fundamentals of Electrical Engineering (theory) and Basic Electrical Engineering Lab of B.E. I/II semester for your approval.
>
> I request you to approve the same and provide me the bank details for remitting the sitting fee .
>
> Thanking you,
>
> Your's faithfully,
> Dr. B.S.Khened
> Chairman,
> BOS (E&E Engg. Board)
> Ballari Institute of Technology and Management, Ballari.

Re: Incorporating your valuable suggestions in the curriculum and requesting for approval.

Yvr Vijay <yvrvijay@gmail.com>
Sat 27-11-2021 11:56

To: Prof. Khened B.S <khened@bitm.edu.in>

Cc: MAHALINGA SWAMY <smswamy198@gmail.com>;manjunatha.sharma@gmail.com <manjunatha.sharma@gmail.com>;Ramesh Chakrasali <pratisatu@yahoo.co.in>;suresh.j@ieee.org <suresh.j@ieee.org>;kms@nitk.ac.in <kms@nitk.ac.in>

Approved, please proceed.
Have already sent bank details.
Warm Regards

On Sat, 27 Nov, 2021, 11:46 am Prof. Khened B.S, <khened@bitm.edu.in> wrote:

With reference to above subject, I thank all the Board of Studies members for attending the online meeting and giving valuable inputs. we have incorporated your valuable suggestions in our curriculum.

I am herewith attaching the revised syllabus of Fundamentals of Electrical Engineering (theory) and Basic Electrical Engineering Lab of B.E. I/II semester for your approval.

I request you to approve the same and provide me the bank details for remitting the sitting fee .

Thanking you,

Your's faithfully,
Dr. B.S.Khened
Chairman,
BOS (E&E Engg. Board)
Ballari Institute of Technology and Management, Ballari.

Ramesh Chakrasali <pratisatu@yahoo.co.in>

Mon 26-04-2021 16:19

To: Prof. Khened B.S <khened@bitm.edu.in>

To,
Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institue of Technology and Management, Ballari

Dear Sir,
I accept your invitation to be onE&E Engg., BoS of Your College as a Member. Thank you for considering me to contribute for Engineering Education. Please find the details below desired by you.

Dr.Ramesh L.Chakrasali
Professor in E&E Engg.,
Dean (Academic Program) and
Dean (Reserach & Development)
SDM College of Engg.&Tech., Dharwad
Teaching Experience: 30 years
pratisatu@yahoo.co.in
M- 9845477797

Regards
Ramesh L.Chakrasali
On Monday, 26 April, 2021, 2:06:40 pm IST, Prof. Khened B.S <khened@bitm.edu.in> wrote:

Dear Dr. Ramesh Chakrasali,

Ballari Institue of Technology and Management, Ballari was established in 1997. With 24 years of educational excellence, institute is accreditated by NAAC with A+ graded with effect from 1st Feb 2021 for a period of 5 years.In lieu of this we have applied for autonomous status that will enable us to take our institution to the next level. We are proposing your name for Board of Studies in Electrical and Electronics Engineering. We have a scheduled UGC Inspection visit to grant fresh autonomous status in the month of May 2021. Hence I request you to give your consent to be the member of Board of Studies by replying to this email with your Name, Designation, Organisation and Contact information.

Regards

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.
Cell no. 9845845644

MAHALINGA SWAMY <smswamy198@gmail.com>
Sat 17-07-2021 13:12
To: Prof. Khened B.S <khened@bitm.edu.in>

Dear Sir,

Thanks for your mail .....

I am accepting to be the member of - Board of Studies, please find the details as per your requirment....

Name: Mahalinga Swamy S
Designation : Asst. General Manager, L & D.
Address :
SEMBCORP ENERGY INDIA LIMITED,

Site Office:
Pyanampuram / Nelaturu Village
Muthukur Mandal, SPSR Nellore - 524 344, India
Tel: (91) 0861 305 2341, Fax: (91) 0861 305 2304

Mob. No. : 7680096496

Mail Id : mahalinga.swamy@sembcorp.com

Thanks & Regards
Mahalinga Swamy S

On Sat, Jul 17, 2021 at 12:40 PM MAHALINGA SWAMY <smswamy198@gmail.com> wrote:

Dear Sir,

Thanks for your mail
Details

Name: Mahalinga Swamy S
Designation : Asst. General Manager, L & D.
Address :
SEMBCORP ENERGY INDIA LIMITED,

Site Office:
Pyanampuram / Nelaturu Village
Muthukur Mandal, SPSR Nellore - 524 344, India
Tel: (91) 0861 305 2341, Fax: (91) 0861 305 2304

Mob. No. : 7680096496

Mail Id : mahalinga.swamy@sembcorp.com

Thanks & Regards
Mahalinga Swamy S

On Mon, Apr 26, 2021 at 2:01 PM Prof. Khened B.S <khened@bitm.edu.in> wrote:

Dear Sir,

Ballari Institue of Technology and Management, Ballari was established in 1997. With 24 years of educational excellence, institute is accreditated by NAAC with A+ graded with effect from 1st Feb 2021 for a period of 5 years.In lieu of this we have applied for autonomous status that will enable us to take our institution to the next level. We are proposing your name for Board of Studies in Electrical and Electronics Engineering. We have a scheduled UGC Inspection visit to grant fresh autonomous status in the month of May 2021. Hence I request you to give your consent to be the member of Board of Studies by replying to this email with your Name, Designation, Organisation and Contact information.

Regards

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.
Cell no. 9845845644

R.S.Hiremath <flexitron@yahoo.com>
Wed 28-04-2021 09:47
To: Prof. Khened B.S <khened@bitm.edu.in>

1 attachments (13 KB)
R.S.HIREMATH.docx;

Dear Prof. Khened,

Thank you for your email!, It shall be a pleasure and a privilege to be on the Board of studies of your esteemed Institution.

My details are enclosed herewith,

Kindly refer my website for complete details about me.

With regards,

R.S.Hiremath
FLEXITRON,

FLEXITRON

On Monday, April 26, 2021, 01:58:35 PM GMT+5:30, Prof. Khened B.S <khened@bitm.edu.in> wrote:

Dear R.S.Hiremath sir,

Ballari Institue of Technology and Management, Ballari was established in 1997. With 24 years of educational excellence, institute is accreditated by NAAC with A+ graded with effect from 1st Feb 2021 for a period of 5 years. In lieu of this we have applied for autonomous status that will enable us to take our institution to the next level. We are proposing your name for Board of Studies in Electrical and Electronics Engineering. We have a scheduled UGC inspection visit to grant fresh autonomous status in the month of May 2021. Hence I request you to give your consent to be the member of Board of Studies by replying to this email with your Name, Designation, Organisation and Contact information.
With kind regards

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.
Cell no. 9845845644

Re: Consent for BOS

From: Shivraj Soukar (shivrajsoukar@gmail.com)

To: bskhened@yahoo.co.in

Date: Saturday, 17 July, 2021, 11:45 am IST

Dear Sir,
I'm much pleasure to be member of BOS (Electrical Department) and I heartily accept this invitation.

Regards
Shivarajappa
Assistant Engineer (Electrical)
Karnataka Power Corporation Ltd.
Cell: 9741804542

On Sat, 17 Jul, 2021, 11:43 AM Shivraj Soukar, <shivrajsoukar@gmail.com> wrote:

Dear Sir,
I'm much pleasure to be member of BOS (Electrical Department) and I heartily accept this invitation.

Regards
Shivarajappa
Assistant Engineer (Electrical)
Karnataka Power Corporation Ltd.

On Sat, 17 Jul, 2021, 11:34 AM Basavaraj Khened, <bskhened@yahoo.co.in> wrote:

Dear Sir,

Ballari Institue of Technology and Management, Ballari was established in 1997. With 24 years of educational excellence, institute is accreditated by NAAC with A+ graded with effect from 1st Feb 2021 for a period of 5 years.In lieu of this we have applied for autonomous status that will enable us to take our institution to the next level. We are proposing your name for Board of studies in Electrical and Electronics Engineering. We have a scheduled UGC Inspection visit to grant fresh autonomous status in the month of July 2021. Hence I request you to give your consent to be the member of Board of Examiners by replying to this email with your Name, Designation, Organisation and Contact information.

Regards

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.
Cell no. 9845845644

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.
Cell no. 9845845644

Board of Examiners (Proposed):

COMPUTER SCIENCE AND ENGINEERING AND ARTIFICIAL INTELLIGENCE & MACHINE LEARNING:	
Dr. R. N. KULKARNI	Chairman
Dr. B. M. VIDYAVATHI	Member
Dr. R. V. BIRADAR	Member
Dr. ARADHANA D	Member
Dr. S. M. JOSHI, SDMCET-Dharwad	Member
Dr. DAYANAND J, GNDEC-BIDAR	Member
VTU Nominee	Member

ELECTRONICS AND COMMUNICATION ENGINEERING:	
Dr. U ERANNA	Chairman
Dr. K M SADYOJATHA	Member
Dr. NASEERUDDIN	Member
Dr. ABDUL LATHEEF	Member
Dr. M L RAVICHANDRA B.TECH,M.TECH,PHD PROF& HEAD,SRIT,ANANTAPUR	Member
Dr. NAGARAJ BHATT B.E,M. TECH,PHD RVCE,BENGALURU	Member
VTU Nominee	Member

ELECTRICAL AND ELECTRONICS ENGINEERING	
Dr. B. S. KHENED	Chairman
Dr. SHARAN REDDY	Member
Dr. ABDUL KHADER	Member
Prof. ARATHI P B	Member
Dr. NEEL SHETTY, HOD, GND Engg. College, BIDAR	Member
Dr. G D KAMALAPUR, Professor, SDM College of Engg. Dharwad	Member
VTU Nominee	Member

MECHANICAL ENGINEERING	
Dr. YADAVALLI BASAVARAJ	Chairman
Dr. RAGHAVENDRA JOSHI	Member
Dr. V. VENKATA RAMANA	Member
Dr. RAJU JADDAR	Member
Dr. KORI NAGARAJ	Member
Dr. I SRIDHAR	Member
VTU Nominee	Member

CIVIL ENGINEERING	
Dr. MAHABALESWARA	Chairman
Dr. T. H. PATEL	Member
Mr. B. BASAVARAJ	Member
Mr. A. H. RAVI CHANDRA	Member
Dr. S. V. DINESH	Member
DR. D L VENKATESH BABU	Member
VTU Nominee	Member

Print Cancel

Re: Request for Consent for Board of Examiners

Gopalkrishna Kamalapur <gdkpur9@gmail.com>
Mon 26-04-2021 16:44
To: Prof. Khened B.S <khened@bitm.edu.in>

Sir,
Good Morning.
I am pleased to receive your mail and thanks.
I am happy to give my consent to be the Member of Board of Examiners of
Ballari Institue of Technology and Management, Ballari.

1. Name: GOPALKRISHNA D KAMALAPUR
2. Designation: PROFESSOR
3. Organisation: Shri Dharmasthala Manjunatheshwara College of Engineering and Technology, Dharwad
4. Contact Information: Mobile No:9480248486, 0836-2328335 email: gdkpur9@gmail.com

regards
kamalapur g d

Dr.G. D.Kamalapur
Professor, Dept of Electrical and Electronics Engineering
S D M College of Engineering and Technology,Dhavalagiri
DHARWAD-580002
College : 0836-2255619/ Extension:8335, (Room:0836-2328335) /
Fax-0836-2464638

A line of reply is appreciated.

On Mon, Apr 26, 2021 at 2:14 PM Prof. Khened B.S <khened@bitm.edu.in> wrote:

Dear Sir,

Ballari Institue of Technology and Management, Ballari was established in 1997. With 24 years of educational excellence, institute is accreditated by NAAC with A+ graded with effect from 1st Feb 2021 for a period of 5 years.In lieu of this we have applied for autonomous status that will enable us to take our institution to the next level. We are proposing your name for Board of Examiners in Electrical and Electronics Engineering. We have a scheduled UGC Inspection visit to grant fresh autonomous status in the month of May 2021. Hence I request you to give your consent to be the member of Board of Examiners by replying to this email with your Name, Designation, Organisation and Contact information.

Regards

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari
Cell no. 9845845644

Print Cancel

Re: Consent for Board of Examiners

Neelashetty Kashappa <neelshettyk@gmail.com>
Sat 17-07-2021 10:34
To: Prof. Khened B.S <khened@bitm.edu.in>

Dear sir,
Good morning. I am pleased to receive your email regarding acceptance of BOE member of your department/institute. I feel privileged and give my full consent to be the BOE member.
Thanking you sir

On Mon, 26 Apr 2021, 14:10 Prof. Khened B.S, <khened@bitm.edu.in> wrote:

Dear Sir,

Ballari Institue of Technology and Management, Ballari was established in 1997. With 24 years of educational excellence, institute is accreditated by NAAC with A+ graded with effect from 1st Feb 2021 for a period of 5 years.In lieu of this we have applied for autonomous status that will enable us to take our institution to the next level. We are proposing your name for Board of Examiners in Electrical and Electronics Engineering. We have a scheduled UGC Inspection visit to grant fresh autonomous status in the month of May 2021. Hence I request you to give your consent to be the member of Board of Examiners by replying to this email with your Name, Designation, Organisation and Contact information.

Regards

Dr.Basavaraj S Khened
Prof.& Head
Department of Electrical & Electronics Engineering
Ballari Institute of Technology and Management Ballari.
Cell no. 9845845644

BALLARI INSTITUTE OF TECHNIOLOGY AND MANAGEMENT, BALLARI
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course: **Fundamentals of Electrical Engineering** Credits: 3
Course Code: **21FEE13/23** Exam Hours: 3
Hours per Week: 03:02:00 CIE Marks: 40
Total Hours: 50 SEE Marks: 60

Course Learning Objectives: The students will be able to

CLO 1 : Understand and apply Ohm's law and kirchhoff's laws used for the analysis of DC circuits.
CLO 2: Understand fundamentals of AC circuits and discuss the system of approach to single and three phase circuits in AC systems.
CLO 3: Describe principle of operation, construction and performance of DC and AC machines and select suitable machine for a given application.
CLO 4: Understand the fundamentals of power systems, electrical wiring and recognize the importance of protection and safety of electrical systems

MODULE – I

D.C. CIRCUIT FUNDAMENTALS: Ohm's law, series-parallel circuits, power and energy calculations, Kirchhoff's laws.

A.C. FUNDAMENTALS: Faraday's laws of electromagnetic induction, generation of sinusoidal voltage, parameters of sinusoidal quantities, concept of average and RMS values, form factor, peak factor, phasor representation of alternating quantities.

[10 hour, RBT levels: L1, L2, L3 & L4]

MODULE – II

ANALYSIS OF A.C. CIRCUITS

Single phase circuits: Analysis of single phase AC circuits with R, L, C, RL, RC and RLC series and parallel configuration, concepts of real power, reactive power, apparent power & power factor,

Three-phase circuits: Advantages of three phase system, generation of three phase voltages, voltage and current relations in balanced star and delta circuits, measurement of three phase power using two wattmeters.

[10 hour, RBT levels: L1, L2, L3]

MODULE – III

Three Phase Synchronous Generators: Construction details, principle of operation, EMF equation (excluding derivations of pitch factor and distribution factor).

Single Phase Transformers: Concept of self and mutual induction, constructional details of transformer, principle of operation, EMF equation, losses & efficiency, condition for maximum efficiency.

[10 hour, RBT levels: L1, L2, L3]

MODULE – IV

D.C. Machines: Constructional details, working principle of DC Generator, EMF equation, working principle of DC Motor, back EMF, torque equation, types of D.C motors, characteristics of series and shunt motors, applications of DC motors.

Three Phase Induction Motors: Concept of rotating magnetic field, construction and working of three-phase induction motors, slip, frequency of rotor currents/voltages, Y/Δ starter, applications of induction motors.

[10 hour, RBT levels: L1, L2, L3]

MODULE – V

Electrical Power System: Introduction to generation, transmission and distribution of electrical power, single line diagram of a power system, generation of power from solar and wind energy (block diagram approach)

Domestic Wiring: Service mains, meter board and distribution board, open and concealed conduit wiring, two-way and three-way control of lamps, fuse and MCB, electric shock and precautions, necessity of earthing and types of earthing, ratings and energy calculations of common household electrical appliances.

[10 hour, RBT levels: L1, L2 & L3]

Course outcomes:

Upon completion of this course, students will be able to.

CO1: Solve the problems related to DC & AC circuits.

CO2: Analyse single phase and three phase AC circuits.

CO3: Distinguish the constructional details &working principle of AC machines.

CO4: Compare the constructional details & working principle of motors.

CO5: Explain Power system scheme, electrical wiring and safety measures

Course Outcome Assessment Matrix:

Course Outcomes	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	-	-	-	-	-	-	-	-	-	-
CO 2	2	3	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	-	-	-	-	-	-	-	-	-	-
CO 5	2	-	-	-	-	-	-	-	-	-	-	-

Textbooks:

1. Basic Electrical Engineering, D C Kulshreshtha, Tata McGraw Hill, Revised First edition

2. Principles of Power System, V K Mehata, Rohit Mehta, S. Chand Publications.

Reference Books:

1. Fundamentals of Electrical Engineering and Electronics, B. L. Theraja. S, Chand & Company Ltd, Reprint Edition 2013.
2. Electrical Technology, E. Hughes, International Students 9th Edition, Pearson, 2005.
3. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2017.

Question paper pattern:

Note: The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 60.

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.

BALLARI INSTITUTE OF TECHNIOLOGY AND MANAGEMENT, BALLARI
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course: **Basic Electrical Laboratory** | Credits: 2
Course Code: **21BEL18/28** | Exam Hours: 3
Hours per Week: 00:00:03 | CIE Marks: 40
Total Hours: 42 | SEE Marks: 60

Course Learning Objectives:

CLO 1: To provide exposure to common electrical components such as resistors, inductors and capacitors, types of wires and measuring instruments.

CLO 2: To explain how to select the required measuring instruments for a particular experiment and verify the theoretical values with the practical values obtained after the experiment.

Experiments

1. Study the effect of an open and short circuit in simple circuits.
2. Verification of KCL and KVL for DC circuits.
3. Measurement of current, power and power factor of various lamps.
4. Measurement of electrical energy using energy meter of a single phase AC system.
5. Measurement of resistance and inductance of a choke coil using three voltmeter method.
6. Determination of phase and line quantities in three phase star and delta connected loads.
7. Measurement of three phase power using two wattmeter method.
8. Load test on a single phase transformer.
9. Two-way and three-way control of lamp and formation of truth table.
10. Measurement of earth resistance.

[RBT Levels – L1, L2]

Demonstration Experiments (for CIE only)

1. Study of all types of machines, wall sockets, connecting wires, and Electrical components.

Course outcomes:

Upon completion of this course, students will be able to

CO 1: Realize the concepts of open circuit, short circuit, KCL & KVL in a DC circuit.
CO 2: Determine the resistance, inductance & impedance, power factor of different types of loads and energy consumed in a 1-Ø AC circuit.
CO 3: Determine the phase, line quantities & power in 3-Ø star & delta connected systems.
CO 4: Evaluate the performance of transformers.
CO 5: Realize the concepts of electrical wiring, circuit protecting devices & earthing.

Course Outcome Assessment Matrix:

Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	--	--	--	--	--	--	--	--	--	--
CO 2	3	3	--	--	--	--	--	--	--	--	--	--
CO 3	3	3	--	--	--	--	--	--	--	--	--	--
CO 4	3	3	--	--	--	--	--	--	--	--	--	--
CO 5	3	--	--	--	--	--	--	--	--	--	--	--

Practical examination pattern:

Note: The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 60.

1. All laboratory experiments are to be included for practical examination.
2. Students can pick one experiment from the questions lot prepared by the examiners
3. Change of experiment is allowed only once and 15% marks allotted to the procedure part shall be made zero.
4. Scheme of evaluation:
   Write up – 20%,
   Conduction of experiment – 40%,
   Calculation and graph – 20%,
   Viva voce – 20%.

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(An ISO 9001:2008 Certified Institution)
NAAC A+ ACCREDIATED & Autonomous Institution
DEPARTMENT OF CIVIL ENGINEERING

DATE: 25/11/2021

FIRST BOS MEETING HELD ON 24-11-21 (11:00am – 12:30pm, online mode)

Members participated in the meeting.

INTERNAL MEMBERS

1. Dr.H. Mahabaleshwara
2. Dr.T.H. Patel
3. Mr. Basavaraj B
4. Mr. Md Khalid
5. Mr. Shivkumar

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 scheme of first and second semester physics and chemistry cycle.
3. Approval of syllabus of first/second semester of elements of civil engineering (21CIV14/24)

MINUTES OF THE MEETING

1. Total credits (160) proposed for four year civil engineering programme is discussed and finalized the same by all members.
2. Scheme of first and second semester physics and chemistry cycle is discussed and approved by all the members.

3. Following are the suggestions given by BOS members with respect to syllabus of elements of civil engineering.
   A. In module 2 include Architecture & town planning, Concepts of smart city and green building construction and properties of bituminous material to be added.
   B. In module 2 title to be revised as construction materials, concepts of architecture and smart cities.
   C. RBL need not to be mentioned in syllabus.
   D. Question papers of CIE and assignment must have revised Bloom taxonomy covering level L1 to L4.
   E. In preparation of course plan BT levels can be mentioned suitably.
   F. CIE question paper may be for 40 Marks and for reaming 10 marks Quiz and assignment may be considered.
   G. SEE question paper may be Part-A and Part -B, Part A compulsory with MCQ's and Part B for main questions with choices (20+80 Pattern).
   H. CIE question paper pattern to be in line with SEE pattern.

CONCLUSIONS

The meeting concluded with the above proposed suggestions and revised syllabus to be framed and submitted for final approval by the member and presented vote of thanks to all participants.

HOD SIGNATURE
25/11/21

Semester: 1

Course Name: Elements of Civil Engineering

Course Code:21CIV14/24		**CIE Marks**	50
Teaching Hours/Week (2:2:0)		**SEE Marks**	50
Credits:03		**Exam Hours**	03

Pre-requisites:

* Applied mathematics (limits, differential, integral calculus).

* Applied physics and general pictorial view of the construction activities been carried out in the vicinity like roads, bridges, buildings etc.

COURSE OBJECTIVES: This course (21CIV14/24) will enable students to

1. Prepare the students about the basics of Civil Engineering, Scope and basic knowledge about roads, bridges, dams and quality construction materials.
2. Compare town planning and architecture.
3. Distinguish force systems, moments and resultant of force systems and equilibrium of forces.
4. Demonstrate types of loads, supports, beams and solve support reactions.
5. Compute Centroid and Moment of inertia of regular sections.

Module -1

Module -1: Introduction to Civil Engineering

Introduction to Civil Engineering, Scope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering, Architecture and Town planning.

Infrastructure: Types of infrastructure, Role of Civil Engineer in the Infrastructural Development, Effect of the infrastructural facilities on socioeconomic development of a country.

Roads: Classification of Roads and their functions, Comparison of Flexible and Rigid Pavements (Advantages and Limitations)

Bridges: Types of Bridges and Culverts, RCC, Steel and Composite Bridges
Dams: Different types of Dams based on Material, Structural behavior and functionality with simple sketches.

8Hours (RBT Levels: L1,L2)

Teaching-Learning Process:

Site visits , PowerPoint presentation and videos

Module - 2

Module -2:Construction Materials ,Elements of Surv eing ,green buildings and smart cities

Basic Construction Materials and Properties

Introduction to classification and qualities of bricks, Common building stones, their properties and uses, Cement Concrete blocks, Stabilized Mud Blocks, Sizes and requirement of good

blocks. Timber as construction material, Fine aggregate: Natural and manufactured, Coarse aggregate. Properties of bituminous materials.
Basics of Surveying: Definition of surveying, Objectives and importance of surveying. Classification of surveys. Principles of surveying. Units of measurements.
Green Building: Concept of Green building, Principles of green buildings, Eco-friendly materials.
Smart cities: Introduction to city planning, Concept, Principle stakeholders, key trends in smart cities developments.

8 Hours (RBT Levels: L1,L2

Teaching-Learning Process:

Site visits, activity-based learning, PowerPoint presentation and videos.

Module -3

Module -3: Introduction to Engineering Mechanics

Introduction to Engineering Mechanics: Basic idealizations - Particle, Continuum and Rigid body; Force and its characteristics, types of forces, Classification of force systems; Principle of physical independence of forces, Principle of superposition of forces, Principle of transmissibility of forces; Newton's laws of motion, Introduction to SI units. Couple, Moment of a couple, Characteristics of couple, Moment of a force, Equivalent force - Couple system; Numerical problems on moment of forces and couples, on equivalent force - couple system.

Analysis of Force Systems - Concurrent & Non Concurrent System
Concurrent Force System : Composition of forces - Definition of Resultant; Composition of coplanar - concurrent force system, Parallelogram Law of forces, Principle of resolved parts; Numerical problems on composition of coplanar concurrent force systems.

Non Concurrent Force System : Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent Force system.

8 Hours (RBT Levels:L2,L3)

Teaching-Learning Process:

Chalk and talk, videos, PowerPoint Presentation, animations.

Module -4

Module -4: Equilibrium of Forces

Equilibrium of Forces: Equilibrium of Concurrent and Non-concurrent Forces: Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar – concurrent and non-concurrent force systems.

Support Reactions: Types of Loads and Supports, statically determinate beams, Numerical problems on support reactions for statically determinate beams with Point load (Normal and

inclined), uniformly distributed loads and uniformly varying loads.

8 Hours (RBT Levels:L2,L3)

Teaching-Learning Proces

Chalk and talk, videos, PowerPoint Presentation, animations.

Module -5

Module -5: Centroid and Moment of Inertia

Centroids: Introduction to the concept, Centroid of line and area, centroid of basic geometrical figures, computing centroid for composite lines and Engineering composite sections – T, L, I and Z & full quadrant Circular sections and their built up sections, Numerical problems

Moment of Inertia: Introduction to the concept, Radius of gyration, Parallel axis theorem, Perpendicular axis theorem, Moment of Inertia of basic planar figures, computing moment of Inertia for Engineering composite sections – T, L, I and Z & full quadrant Circular sections and their built up sections, Numerical problems.

8 Hours (RBT Levels:L2,L3)

Teaching-Learning Process:

Chalk and talk, videos, PowerPoint Presentation, animations.

COURSE OUTCOMES: Upon completion of this course, students will be able to.

1: Apply the fundamental knowledge of Civil Engineering, its scope of study, in the construction of Roads, Bridges and Dams.

2: Apply the basic principles of Surveying and also recognize the good materials to be used for the construction work.

3: Analyze the action of Forces, Moments and other loads on systems of rigid bodies.

4: Compute the reactive forces and the effects that develop due to the applied external loads.

5: Compute the Centroid and Moment of Inertia of regular sections.

Assessment Details

CIE :

	Components	Number	Weightage	MaxMarks
(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	"Elements of Civil Engineering and Engineering Mechanics",	M.N.Shesha Prakash and Ganesh.B.Mogaveer,	PHI Learning	3rd Revised edition (2014) 2.
2	Engineering Mechanics.	Reddy Vijaykumar K and K Suresh Kumar,	Singer's	3rd edition
3	Engineering Materials	Rangawala P.C.	Charter Publishing House, Anand, India	43rd Edition
REFERENCE BOOKS				
1	Engineering Mechanics: Principles of Statics and Dynamics	R. C. Hibbbler,	Pearson Press	4th edition
2	Mechanics for Engineers, Statics and Dynamics.	F.P. Beer and E. R. Johnston	McGraw Hill	Volume I
3	A Text Book of Engineering Mechanics	Bansal R. K.,	Laxmi Publications.	Revised sixth edition
4.	Elements of Civil engineering and Engineering Mechanics	B.K.Kholapure	Eastern Book Promoters Belgaum	Revised 12th edition(2020)

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)

Ref. No. BITM/Cir/2022-23/07

Date: 16/05/2021

CIRCULAR

Chairpersons of all the Boards of Studies and all the Deans are requested to attend **"Joint Board of Studies Meeting" today**, Monday, 16/05/2022 at 3.00 pm at Board Room.

Agenda:

1. Restructuring of Credits.
2. Discussion on Revised Regulations issued by VTU for 2021-22 admitted BE students.
3. Any other subject with the permission of chair.

Dean – Academics

Copy to:
Director / Dy. Director / AO / Dean-SA&P / Dean-Aca / Dean-R&D / CoE
Chairpersons of all the Boards of Studies.
Dept. of • CSE • ECE • ME • EEE • Civil • AIML • MBA • Maths • Physics • Chem. • H&S

NEW BOARD OF STUDIES: MECHANICAL DEPARTMENT

DEPT. OF MECHANICAL ENGINEERING.

S. No.	Category	Nomination of the Committee	Name of the person
1	Head of the Dept.	Chairperson	**Dr. V. VENKATA RAMANA** Professor & HOD – Mechanical Engg
2	Faculty Members at different levels veering different specializations	Members	
3	Subject Experts from outside the College nominated by Academic Council	Members 1	**Mr. SUNIL KATARIA** Executive Vice President, JSW Steels Ltd., Toranagallu (Karnataka) Email: sunil.kataria@jsw.in Phone: 9448286076
		2	**Dr. RAMESHWAR SAH,** Dy. General Manager, R & D Department JSW Steels Ltd., Toranagallu Email ID rameshwar.sah@jsw.in Phone 9480694934
4	Expert from outside college, nominated by Vice-Chancellor	Member	**Dr. JAYANT KITTUR,** Principal, KLS Gogte Institute of Technology – Belagavi Phone: 9449735400 Email ID: jkk@git.edu.in
5	Representative from industry / corporate sector / allied area relating to placement nominated by Academic Council	Member	**Ganapathy Bhatta A.S.** **Triveni Turbine Limited** 12-A Peenya Industrial Area,Bangalore 560058,Karnataka,India Mob: +91 9632411799 | Tel: 080 -22164000, Extn: 4062 | Fax: 080-22164100 Website: www.triveniturbines.com
6	Postgraduate meritorious alumnus nominated by Principal Member	Member	**Mr. SUBODH KUMAR,** Asst. Manager, JSW Steels Ltd. – Toranagallu Email: subodh066@gmail.com
7	Co-opted members	Member 1	**Mr. Vijeesh Kumar A** vijeshkumar.a@harita.co.in Harita TechServ Ltd., Bangalore
		2	**Jayaprakash AJ** Delivery Manager, Aerospace Vertical Tata Consultancy Services Cell:- +91 9900502818 Mailto: jayaprakash.aj@tcs.com Website: http://www.tcs.com

Original (07)

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

Date: 24/11/2021

PROCEEDINGS OF 1st BOARD OF STUDY MEETING HELD ON 24th Nov. 2021

Venue: CAMA LAB, Ground Floor, C.V.RAMAN Block

Time: 2.00 PM

Members Present

S. No.	Name of the Member	Designation	Organization
1	Dr. V. Venkata Ramana	Chairman	Professor & Head ME - B.I.T.M. Ballari
2	Dr. Yadavalli Basavaraj	Member	Principal, ME, B.I.T.M. Ballari
3	Dr. Raghavendra Joshi	Member	Dean - COE, ME, B.I.T.M. Ballari
4	Dr.U.M.Daivagna	Member	Professor ME - B.I.T.M. Ballari
5	Dr. B.Ganesh	Member	Associate Professor ME, B.I.T.M. Ballari
6	Dr. Raju Jadar	Member	Associate Professor ME, B.I.T.M. Ballari
7	Dr. Lakshmi Kumari	Member	Associate Professor ME, B.I.T.M. Ballari
8	Dr. H.M.Anil Kumar	Member	Associate Professor ME, B.I.T.M. Ballari
9	Dr. Banakar Nagaraj	Member	Associate Professor ME, B.I.T.M. Ballari
10	Prof. Vishnu Prasad	Member	Assistant Professor ME, B.I.T.M. Ballari
11	Prof. Jaya Prakash	Member	Assistant Professor ME, B.I.T.M. Ballari
12	Prof. V.Srinivasulu	Member	Assistant Professor ME, B.I.T.M. Ballari
13	Prof. K. Raghavendra	Member	Assistant Professor ME, B.I.T.M. Ballari
14	Prof.Pavan Kumar B.K	Member	Assistant Professor ME, B.I.T.M. Ballari
15	Prof. Manjunath T.H	Member	Assistant Professor ME, B.I.T.M. Ballari
16	Prof.Manjunatha E	Member	Assistant Professor ME, B.I.T.M. Ballari
17	Prof. Shiva Kumar S.Y	Member	Assistant Professor ME, B.I.T.M. Ballari
18	Prof. Mohammed Fayaz. K	Member	Assistant Professor ME, B.I.T.M. Ballari
19	Prof. Raghavendra Shetty	Member	Assistant Professor ME, B.I.T.M. Ballari
20	**Mr. Sunil Kataria**	Member	Executive Vice President, JSW Steels Ltd., Toranagallu (Karnataka)
21	**Dr. Jayant Kittur,**	Member	VTU Nominee
22	**Mr. Ganapathy Bhatta**	Member	TRIVENI Turbines Ltd., PEENYA Industrial Estate, Bengaluru – 560058
23	**Mr. Subodh Kumar**	Member	Asst. Manager, JSW Steels Ltd. – Toranagallu
24	**Mr. Vijeesh Kumar**	Member	Harita TechServ Ltd., Bangalore
25	**Dr. Rameshwar Sah**	Member	Dy. General Manager, R & D Department, JSW Steels Ltd., Toranagallu

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

At the outset, the Chairman welcomed all the Honorable members for the 1st meeting of Board of Studies (UG) for discussing and finalizing the Scheme and Syllabus for B.E. 1st year common to all Branches for the subjects:

1. **Engineering Graphics** - **21EDL15 / 21EDL25**
2. **Elements of Mechanical Engineering** - **21EME15 / 21EME25**

Agenda 1	To Consider and approve the scheme and syllabus of **"Engineering Graphics - 21EDL15/21EDL25"** for 1st Year UG Course for the Academic Year 2021-22.
Module 1	
Suggestions	Suggested to minimi
Action Taken	Suggested to Minimize the weightage in terms of contact hours & marks
Module 2	
Suggestions	OK
Action Taken	
Module 3	
Suggestions	Suggested to Increase the weightage
Action Taken	
Module 4	
Suggestions	OK
Action Taken	
Module 5	
Suggestions	OK
Action Taken	

Overall Remarks: Members suggested to demonstrate the drawing using the Models (preferably by using the models prepared by students)

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

Agenda 2	To Consider and approve the scheme and syllabus of "**Elements of Mechanical Engineering -21EME15 / 21EME25**" for 1st Year UG Courses for the Academic Year 2021-22.
Module 1	
Suggestions	OK
Action Taken	
Module 2	
Suggestions	Suggested to demonstrate using cut sections of IC Engines
Action Taken	
Module 3	
Suggestions	Suggested to change the title as "Introduction to Engg. Mechanics"
Action Taken	
Module 4	
Suggestions	OK
Action Taken	
Module 5	
Suggestions	Suggested to change the title as "Introduction to Automation & Robotics". Add content of types of automation
Action Taken	

Agenda 3	**Total Credit Adjustment.**
	• The Total credit adjustment was discussed in the Joint Board of Studies Meeting held on 15/11/2021. The same was shared to all the Members.

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT, BALLARI
DEPARTMENT OF MECHANICAL ENGINEERING

Signature of the Members

S. No.	Name of the Member	Designation	Signature
1	Dr. V. Venkata Ramana	Chairman	V. Venkata Ramana
2	Dr. Yadavalli Basavaraj	Member	
3	Dr. Raghavendra Joshi	Member	
4	Dr.U.M.Daivagna	Member	
5	Dr. B.Ganesh	Member	
6	Dr. Raju Jadar	Member	
7	Dr. Lakshmi Kumari	Member	
8	Dr. H.M.Anil Kumar	Member	
9	Dr. Banakar Nagaraj	Member	
10	Prof. Vishnu Prasad	Member	
11	Prof. Jaya Prakash	Member	
12	Prof. V.Srinivasulu	Member	
13	Prof. K. Raghavendra	Member	
14	Prof.Pavan Kumar B.K	Member	
15	Prof. Manjunath T.H	Member	AB
16	Prof.Manjunatha E	Member	
17	Prof. Shiva Kumar S.Y	Member	AB
18	Prof. Mohammed Fayaz. K	Member	
19	Prof. Raghavendra Shetty	Member	AB
20	**Mr. Sunil Kataria**	Member	
21	**Dr. Jayant Kittur,**	Member	
22	**Mr. Ganapathy Bhat**	Member	online
23	**Mr. Subodh Kumar**	Member	AB
24	**Mr. Vijeesh Kumar**	Member	online
25	**Dr. Rameshwar Sah**	Member	AB

Meeting Summary	
Total Number of Participants	26
Meeting Title	
Meeting Start Time	11/24/2021, 1:50:16 PM
Meeting End Time	11/24/2021, 4:24:51 PM
Meeting Id	a3662ea2-07aa-4bd3-b075-4444087f86c9

Full Name	Join Time	Leave Time	Duration	Email	Role	Participant ID (UPN)
Raghavendra Karnool	11/24/202	11/24/202	10m 8s	raghavendı	Presenter	raghavendra.k@bitm.edu.in
Mr. Shekar K	11/24/202	11/24/202	1h 36m	shekar@bi	Presenter	shekar@bitm.edu.in
Kalyan Babu S T	11/24/202	11/24/202	1h 36m	kalyanbabu	Presenter	kalyanbabu@bitm.edu.in
GAVISIDDESHA SP (Guest)	11/24/202	11/24/202	1m 55s		Presenter	
Mr. Shivarama Krishna A	11/24/202	11/24/202	25m 17s	shivaramak	Presenter	shivaramakrishna@bitm.edu.in
Pavan Kumar B K	11/24/202	11/24/202	1h 31m		Presenter	
Vijesh Kumar -Harita Techserv Ltd (Guest)"	11/24/202	11/24/202	1h 29m		Presenter	
Dr. Venkata Ramana. V	11/24/202	11/24/202	1h 28m	venkataran	Organizer	venkataramana@bitm.edu.in
ganapathybhatta	11/24/202	11/24/202	59m 13s		Presenter	
Irayya Shikkerimath	11/24/202	11/24/202	1h 27m		Presenter	
Manjunatha E	11/24/202	11/24/202	47m 40s	manjunath	Presenter	manjunatha.e@bitm.edu.in
Gavisiddesha	11/24/202	11/24/202	45m 50s	gavisiddesl	Presenter	gavisiddesha@bitm.edu.in
RAGHAVENDRA KARNOOL (Guest)	11/24/202	11/24/202	48m 31s		Presenter	
Dr. Yadavalli Basavaraj	11/24/202	11/24/202	17m 26s	yadavallibа	Presenter	yadavallibasavaraj@bitm.edu.in
Mr. Jayaprakash.B	11/24/202	11/24/202	12m 3s	jayaprakasl	Presenter	jayaprakash@bitm.edu.in
Akkasali Taranath	11/24/202	11/24/202	1h 22m	a.taranath(	Presenter	a.taranath@bitm.edu.in
Mr. Vishnu Prasad B	11/24/202	11/24/202	1h 15m	vishnupras	Presenter	vishnuprasad@bitm.edu.in
JP (Guest)	11/24/202	11/24/202	14m 18s		Presenter	
Dr. Umesh M Daivagna	11/24/202	11/24/202	26m 45s	dr.daivagn	Presenter	dr.daivagna@bitm.edu.in
Mayur D Pawar	11/24/202	11/24/202	1h 15m	mayur.dp@	Presenter	mayur.dp@bitm.edu.in
VENKATESH K C	11/24/202	11/24/202	1h 13m		Presenter	
Sunil Kataria	11/24/202	11/24/202	54m 36s		Presenter	
Vinodkumar G	11/24/202	11/24/202	5m 55s	vinodkuma	Presenter	vinodkumar.g@bitm.edu.in
Dr. Lakshmi Kumari	11/24/202	11/24/202	1h 40m	lakshmikur	Presenter	lakshmikumari@bitm.edu.in
Ganapathy Bhatta	11/24/202	11/24/202	26m 29s		Presenter	

DATE: 26th Nov 2021

FIRST BOS MEETING HELD ON 26th Nov 2021 (11:00am – 1:00pm, online mode)

Members participated in the meeting.

INTERNAL MEMBERS

1. **Dr. CHRISTOPHER RAJ** , Chairman for BOS
2. **Dr. Janet Jyothi Dsouza**
3. **Dr. Anupama.B**
4. **Dr. Shaheeda Banu**

EXTERNAL MEMBERS

1. **Smt. SEEMA SALI**
   Curator, Advanced Technology Solutions, IIMC
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-577 004
4. **Mrs. DIVYA ACHARYA,**
   Head HR - TCS Financial Solutions, Tata Consultancy Services.
5. **Mrs. GAYATRI,**
   Global Resource Management, Cap Gemini, Bangalore
6. **Mr. NARAYANA P,**
   Vice President HR, KFIL, Koppal
7. **Mr. VELU .V**
   Rtd General Manager-HR TATA Motors LTD

AGENDA OF THE MEETING

Approval of credit allocation for the MBA program for the academic year 2021 2022

1. Approval of scheme for MBA program for the academic year 2021-2022
2. Approval of syllables of 1st Semester for MBA for semester with the respect to academic year 2021-2022

Minutes of the meeting

1. Total credits 100 proposed for MBA program, 1st semester scheme was discussed and approved by all the members of the meeting

2. Following are the suggestions given by the BOS members with respect to syllabus in each course of 1st semester MBA program

3. Members have proposed to increase concepts on difference between Leadership and management in the course Management and organization behavior.

4. Members suggested to maintain consistency between course objective, modules and course outcome.
5. BOS members asked to include practical elements like case studies, students skill enrichment programs in each course.

6. BOS members suggested to take real time data from various companies to apply, analyze and evaluate the different concepts of management.

CONCLUSION

Suggestions mentioned above were accepted by all the board members and necessary corrections and suggestions incorporation. The meeting ended with a vote of thanks proposed by one of the internal members

HOD, Management Studies,
Ballari Institute of Technology & Management
BALLARI.

Basavarajeswari Group of Institutions
BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT,BELLARY.
NAAC A+ ACCREDIATED & Autonomous Institution
Department of Management Studies

Date:

2/12/2021

BOS MEETING HELD ON 2nd DEC 2021 (3:00pm – 4:00pm, online mode)

Members participated in the meeting.

INTERNAL MEMBERS

5. **Dr. CHRISTOPHER RAJ** , Chairman for BOS
6. **Dr. Janet Jyothi Dsouza**
7. **Dr. Anupama.B**
8. **Dr. Shaheeda Banu**

EXTERNAL MEMBERS

8. **Smt. SEEMA SALI**
   Curator, Advanced Technology Solutions, IIMC
9. **Dr. P V RAVEENDRA,**
   Professor, Dept. of Management Studies, MS Ramaiah Institute of Technology, Bengaluru.
10. **Dr. T MANJUNATHA,**
    Professor (Also Chairman, VTU BOS in MBA),
    Visvesvaraya Technological University BDT College of Engineering , Davanagere-577 004
11. **Mrs. DIVYA ACHARYA,**
    Head HR - TCS Financial Solutions, Tata Consultancy Services.
12. **Mrs. GAYATRI,**
    Global Resource Management, Cap Gemini, Bangalore
13. **Mr. NARAYANA P,**
    Vice President HR, KFIL, Koppal
14. **Mr. VELU .V**
    Rtd General Manager-HR TATA Motors LTD

HOD Management Studies,
Ballari Institute of Technology & Management
BALLARI.

Basavarajeswari Group of Institutions
BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT,BELLARY.
NAAC A+ ACCREDIATED & Autonomous Institution
Department of Management Studies

AGENDA OF THE MEETING

Approval of credit allocation for the MBA program for the academic year 2021 2022

3. Approval of scheme for MBA program for the academic year 2021-2022
4. Approval of syllables of 2nd Semester for MBA for semester with the respect to academic year 2021-2022

MINUTES OF THE MEETING

1. Discussion carried on inclusion of Human Resource concepts like Real time application of Performance Management tools, Employee Life cycle Management, Global trends of Employee Engagement & Cultural aspects.

2. BOS members suggested to practical application of Working capital concepts as a skill enrichment exercise.

3. Members suggested conducting more Lab exercises for computer application concepts.
4. Members further suggested for balance of teaching hours in Strategic Management as course includes lengthy concepts to be handled.

5. BOS members also suggested for the practical orientation towards Research Methodology by inclusion of open source soft wares applications and again recommended to stress more on methodologies adopted in Review of Literature in the Research process.

6. Members also discussed on the inclusion of concepts in the Business Ethics course like Universal Human values. Members also suggested including the concept of Value champions who plays main role in maintaining the values of the organizations.

CONCLUSION

Suggestions mentioned above were accepted by all the board members and necessary corrections and suggestions incorporation. The meeting ended with a vote of thanks proposed by one of the internal members

HOD, Management Studies,
Ballari Institute of Technology & Mana
BALLARI.

Basavarajeswari Group of Institutions

BITM
ESTD : 1997
ENGINEERING • TECHNOLOGY • MANAGEMENT

NAAC A+ ACCREDITED WITH GRADE

ISO 9001 CERTIFICATION
Intertek

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under Visvesvaraya Technological University, Belagavi

ACADEMIC YEAR
2021-22

I & II Semester M.B.A
Scheme & Syllabus

"Jnana Gangotri" Campus, No.873/2, Ballari-Hosapete Road,
Near Allipura, Ballari - 583 104. Karnataka

www.bitm.edu.in
08392-237190

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT - BALLARI

1st Semester Scheme — Scheme of Teaching and Examination

Outcome Based Education(OBE) and Choice Based Credit System(CBCS) (Effective from the academic year 2021-22)

SN	Course Area	Course Code	Course Name	Teaching Hours Per Week				Marks for		Total Marks	Credits
				Lecture	Practical Component	Total	Duration of Exam hours	CIE	SEE		
1	PC	21MBA11	Management and Organization Behaviour	3	2	5	3	50	50	100	4
2	PC	21MBA12	Managerial Economics	3	2	5	3	50	50	100	4
3	PC	21MBA13	Accounting for Managers	3	2	5	3	50	50	100	4
4	PC	21MBA14	Business Statistics	3	2	5	3	50	50	100	4
5	PC	21MBA15	Marketing Management	3	2	5	3	50	50	100	4
6	PC	21MBA16	Managerial communication	3	2	5	3	50	50	100	4
7	HS	21MBA17	Business English	2	0	0	3	50	50	100	2
			Total	**20**	**12**	**30**	**--**	**350**	**350**	**700**	**26**

2nd Semester Scheme — Scheme of Teaching and Examination

Outcome Based Education(OBE) and Choice Based Credit System (CBCS) (Effective from the academic year 2021-22)

SN	Course Area	Course Code	Course Name	Teaching Hours Per Week				Marks for		Total Marks	Credits
				Lecture	Practical Component	Total	Duration of Exam hours	CIE	SEE		
1	PC	21MBA21	Human ResourceManagement	3	2	5	3	50	50	100	4
2	PC	21MBA22	Financial Management	3	2	5	3	50	50	100	4
3	PC	21MBA23	Research Methodology	3	2	5	3	50	50	100	4
4	PC	21MBA24	Computer Applications in	3	2	5	3	50	50	100	4
5	PC	21MBA25	ManagementStrategic Management	3	2	5	3	50	50	100	4
6	PC	21MBA26	Entrepreneurship and Legal Aspects	3	2	5	3	50	50	100	4
7	AEC	21MBA27	Business Ethics and Human Values	2	0	0	3	50	50	100	2
			Total	**20**	**12**	**30**	**--**	**350**	**350**	**700**	**26**

SEMESTER : I

Course Name: MANAGEMENT AND ORGANIZATION BEHAVIOR

Course Code	21MBA11	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites: Basic knowledge on management practices, insights on business operations, basics of psychology.

Course objectives:

1. To emphasis the fundamental concepts and principles of management in business situations.
2. To educate the function and applications of management.
3. To teach the concepts of employee behavior and its importance in organization.
4. To instruct process of group dynamics and managing teams.
5. To familiarize on the dynamics of cultural impact and managing the employee stress.

Module – 1

Introduction to Management

Definition, Scope of Management, Objectives, functions of management, administration vs. management, Evolution of management thought, types of managers, difference between manager and leader, Henry Mintzberg managerial roles, Managerial Skills, Managerial Competencies, Fayol's Fourteen Principles, Recent trends in Management.

9 hours (RBT Levels : L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Power Point Presentations, Videos, Group Discussion, Case Study, Seminars

Skill Enrichment Exercise : Explore on industry specific management skills required for effective leadership

Module – 2

Functions of Management

Planning: Meaning of planning, Nature of planning, Objectives, Types of Plans & the planning process, MBO, Decision making, Process of decision making, Types, Techniques in decision making.

Organizing: organization structure, formal Vs informal organizations, principles of organizations-chain of command, span of control, decentralization Vs Centralization, virtual organizations.

Directing: Definitions, Importance, Elements of Directing, and Principles of Directing.

Controlling: Need for controlling, Controlling Process, Types of control, Techniques of Managerial Control, Guidelines for Effective Control.

12 Hours (RBT Levels: L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method. Power Point Presentations, Videos, Group Discussion, Case Study, Seminars

Skill Enrichment Exercise : Perceive the four functions of management & learn how you can develop and use these skills to help advance your education and career goals.

Module – 3

Understanding Organization Behavior

Organizational Behavior: Introduction, definition, fundamental principles of OB, challenges and opportunities, Foundations of Individual Behavior.

Personality - Meaning, Factors Influencing Personality, Traits of personality, Big Five Personality Traits, Myers–Briggs Type Indicator (MBTI), Personality Tools and Tests.

Perception - Meaning, Perceptual Process, Factors Influencing Perception, Perception and Decision-making

Attitude - Meaning, Components, Relation between attitude and behavior, Changing Attitudes in the Workplace.

Motivation: Definitions, importance of motivation, Process of Motivation (Cycle of Motivation), Types, Theories of motivation, Application of motivational theories.

12 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Power Point Presentations, Videos, Group Discussion, Case Study, Seminars

Skill Enrichment Exercise : Explore on industry specific management skills required for effective leadership

Module – 4

Managing Human at Work

Group Dynamics - Meaning of Group, Group Characteristics, Classification of Groups, Models of Group Development, Meaning of Group Dynamics, Impact of Group on Individual's Behaviour, Impact of External Factors on Group Behaviour.

Teamwork - Teams meaning, Team Characteristics, Teams Versus Groups, Teamwork, Processes of Teamwork, Types of Teams, Reasons for Team Failure, Creating Effective Teams.

9 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk method. Power point presentations, videos, group discussion, case study, seminars

Skill Enrichment Exercise : Explore on industry specific management skills required for effective leadership

Module – 5

Organizational Culture and Stress Management

Culture: Definitions of Organizational Culture, Characteristics, Types, Levels, Strong versus Weak Culture, Changing Organizational Culture.

Stress Management - Definitions, Understanding Stress, Relation between Stress and Performance, Level, Signs and Symptoms of Stress, Types of Stress, Causes of Stress, Managing Stress.

10 Hours (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy: Chalk & Talk Method. Power Point Presentations, Videos, Group Discussion, Case Study, Seminars

Skill Enrichment Exercise: Recognize the positive and negative aspects of power and politics. Immerse yourself in different cultures & develop openness to different experiences. Focus on Power: The Case of Steve Jobs

Course Outcomes:

CO1 : Apply the concepts & principles of management in building manager qualities.
CO2 : Analyze the various functions of management and appropriate its business application.
CO3 : Evaluate the OB practices of employees using various personality tools and tests
CO4 : Design the functioning of Group dynamics and in building effective teams.
CO5 : Develop various dimensions in creating organization culture and overcome stress management.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Essentials of Management	Koontz	McGraw Hill	8e, 2014
2	Management and Organizational Behavior	K.Purushothama & H. H Ramesha	Himalaya Publishing House	Latest edition
3	Organizational behaviour	Stephen P Robbins, Timothy	Pearson	14e, 2012
Reference Books				
1	Principles of Management	Ramesh B. Rudani	Tata McGraw-Hill	2013
2	Masters of Management Thought	Mahanand Charati & M M Munshi	Swapna Book House	2015
3	Organizational behavior: Amodern approach	Arun Kumar and Meenakshi	Vikas Publishing House	2011.

e- Resources:

1. https://www.tandfonline.com/toc/worg20/current
2. https://managementhelp.org/
3. https://openstax.org/details/books/organizational-behavior
4. https://opentextbc.ca/organizationalbehavioropenstax/

SEMESTER : I

Course Name: MANAGERIAL ECONOMICS

Course Code	21MBA12	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites:

- Knowledge of Basic Economic concepts
- Knowledge of Indian Economy
- Knowledge of primary, secondary and tertiary sector

Course objectives:

1. To familiarize the fundamentals and theories of managerial economics.
2. To provide insights of demand and elasticity concepts in relation to firm and industry.
3. To teach fundamentals of Production and Cost concepts in Business scenario.
4. To emphasize the concepts of Market structure, Pricing, Profit strategies
5. To Educate the basics of Micro and Macro Economic concepts

Module – 1

Managerial Economics: Meaning, Nature, Scope, & Significance, Uses of Managerial Economics, Role and Responsibilities of Managerial Economist.
Theory of the Firm: Firm and Industry, Objectives of the firm, alternate objectives of firm. Managerial theories: Baumol's Model, Marris's Hypothesis, Williamson's Model.

10 Hours (RBT Levels: L1,L2,L3)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Videos Clipping.
Skill Enrichment Exercise : Learning Insights of Economic Gurus, Case Study.

Module – 2

Law of Demand, Exceptions to the Law of Demand, Elasticity of Demand –Classification of Price, Income & Cross elasticity, Advertising and promotional elasticity of demand. Uses of elasticity of demand for Managerial decision making, Measurement of elasticity of demand. Law of supply, Elasticity of supply, Demand forecasting: Meaning & Significance, Methods of demand forecasting. (Simple problems).

10 Hours (RBT Levels: L1,L2,L3,L4)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Videos Clipping.
Skill Enrichment Exercise : Mini Case Study on Demand & Supply using MS Excel

Module – 3

Concepts of Production, production function with one variable input - Law of Variable Proportions. Production function with 2 variable inputs and Laws of returns to scale, Indifference Curves, ISO-Quants & ISO-Cost line, Least cost combination factor, Economies of scale, Diseconomies of scale. Technological progress and production function. Types of cost, Cost curves, Cost – Output Relationship in the short run and in the long run, LAC curve.

Break Even Analysis – Meaning, Assumptions, Determination of BEA, Limitations, Uses of BEA in Managerial decisions (with simple Problems).

10 Hours (RBT Levels:L2,L3,L4,L5)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Videos Clipping.

Skill Enrichment Exercise : Problems on BEP Using MS-Excel

Module – 4

Perfect Competition, Features, Determination of price under perfect competition, Monopoly: Features, Pricing under monopoly, Price Discrimination. Monopolistic Competition: Features, Pricing Under monopolistic competition, Product differentiation. Oligopoly: Features, Kinked demand Curve, Cartels, Price leadership.

Descriptive Pricing Approaches: Full cost pricing, Product line pricing.

Pricing Strategies: Price Skimming, Penetration Pricing, Loss leader pricing, Peak Load pricing.

10 Hours (RBT Levels: L2,L3,L4,L5)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Videos Clipping.

Skill Enrichment Exercise : Mini Projects on Market Structure and Pricing

Module – 5

Nature, Scope, Structure of Indian Business Environment – Internal and External Environment. Political and Legal Environment, Economic Environment, Socio – Cultural Environment, Global Environment

Basic Macro Economic Concepts: Open and Closed Economies, Primary, secondary and Tertiary sectors and their contribution to the economy. Measuring GDP and GDP Growth rate, Components of GDP.

Industrial Policies and Structure: A critical look at Industrial Policies of India, New Industrial Policy 1991; - Private Sector- Growth, Problems and Prospects, SMEs –Significance in Indian economy-problems and prospects.

Fiscal policy and Monetary Policy. Foreign Trade: Trends in India's Foreign Trade, Impact of WTO on India's Foreign Trade.

10 Hours (RBT Levels:L3,L4,L5,L6)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Videos Clipping.

Skill Enrichment Exercise : Budget Analysis

Course Outcomes:

CO1 : To apply the basic concepts of managerial economics in business Scenario.
CO2 : To analyze the nature of demand and supply conditions to firm and industry.
CO3 : To evaluate the Production and Cost strategies with business environment.
CO4 : To design the strategies for Market competitions and Profit analysis.
CO5 : To communicate the micro and macroeconomic concepts with reference to firm and industry.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 80 percent theory and 20 percent problems in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Managerial Economics	Geethika, Ghosh & Choudhury	McGraw Hill	2/e, 2011
2	Managerial Economics	D.M Mithani	HPH	2016
Reference Books				
1	Managerial Economics	R. Panneerselvam, P. Sivasankaran, P. Senthilkumar	Cengage	2015
2	Managerial Economics	H.L Ahuja Samuelson & Marks	S.Chand	2014
3	Managerial Economics	Samuelson & Marks	Wiley	5/e, 2015

e- Resources:

1. https://www.youtube.com/watch?v=RaXQ8wQ6TUs
2. https://www.youtube.com/watch?v=g_Q_agzFXi0
3. https://www.youtube.com/watch?v=ycyMktNFZ88
4. https://www.youtube.com/watch?v=vLPpF0hunwc

SEMESTER : I

Course Name: ACCOUNTING FOR MANAGERS

Course Code	21MBA13	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites:

- Basic Knowledge of Commerce.
- Fundamentals of Business Studies.
- Awareness of IFRS and Accounting Standards.
- Awareness of Companies Act and other Acts.

Course objectives:

1. To understand the fundamental accounting concepts, need for accounting & Ind AS.
2. To explain the concepts of business transactions for identifying, recording & posting.
3. To prepare basic financial statements using the modern formats of Companies Act.
4. To describe the application of tools for measuring the company's financial statements using MS-Excel.
5. To utilize the concepts of standard costing and variance analysis for managerial decision making.

Module – 1

Introduction to Accounting:

Financial Accounting : Meaning and Need for accounting, Types of Accounting, Concepts and Conventions of Accounting, Concept of expenses & income ; capital and revenue, Ind-AS.

8 Hours (RBT Levels: L1,L2,L3)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Video Clippings. Case Study

Skill Enrichment Exercises : Visit the ICAI websites and study and analyze various AS and IFRS.

Module – 2

Accounting – recording, classifying & analyzing:

Journal, Ledgers, differences between journal and ledger, Trial balance, differences between trial balance and balance sheet. Bank reconciliation Statements-concept and analysis.

12 Hours (RBT Levels: L1,L2,L3,L4)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Video Clippings, Case Study

Skill Enrichment Exercise : Collect the information from Bank Passbook and Cash book details and learn the process of BRS.

Module – 3

Financial Statements:
Concept of financial statements, Income Statements, Balance Sheets, adjustments of financial statements. Concept of Window dressing. Preparation of final accounts of companies in vertical form as per Companies Act of 2013.

10 Hours (RBT Levels: L2,L3,L4,L5)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Video Clipping, Case Study.

Skill Enrichment Exercise : Visit various company website and download previous year Finical Statement understand the preparation process.

Module – 4

Analysis of Financial Statements:
Meaning and Purpose of Financial Statement Analysis, Financial Ratio Analysis and Cash flow Statement (indirect method)

10 Hours (RBT Levels:L2,L3,L4,L5,L6)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Video Clipping, Case Study.

Skill Enrichment Exercise : Individual student should analyze the Balance sheets of blue chip companies using Excel sheet.

Module – 5

Accounting for managerial decision making:
Scope, Purpose of Management Accounting;

Marginal costing - concept and areas of application of marginal costing (theory only)

Standard costing - Theory & application in Managerial Decision-Making.

12 Hours (RBT Levels: L2,L3,L4,L5,L6)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Video Clipping, Case Study.

Skill Enrichment Exercise : Collect the required data from business units to use variance analysis and make appropriate decisions.

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

CO1 : Apply theoretical knowledge of accounting for relevant business transactions.
CO2 : Analyze the transactions using accounting process in business.
CO3 : Preparation & evaluation of financial statements of varied companies.
CO4 : Design the Cash flow statements & analyze the ratios using MS-Excel
CO5 : Communicate the financial situation of business units using Variance analysis

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 scored will be proportionately reduced to 50. The question paper will have 8 full questions carrying equal marks.

- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions, selecting four full question from question number one to seven and question number eight is compulsory.
- 40 percent theory and 60 percent problems in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Accounting for Management-Text & Cases	S.K.Bhattacharya & John Dearden	Vikas Publishing House Pvt. Ltd.	3e, 2018
2	Financial Accounting	S.N.Maheshwari, Suneel K. Maheshwari, Sharad K. Maheshwari	Vikas Publishing House Pvt. Ltd.	6e, 2018
3	Computerized Accounting	NeerajGoyal, Rohit Sachdeva	Kalyani Publishers	1e, 2018
Reference Books				
1	Accounting for Managers	J.MadeGowda	Himalaya Publishing House	Ie, 2007
2	Financial Accounting for Management	H.L Ahuja Samuelson & Marks	S.Chand	2014
3	Management Accounting: Text, Problems and Cases	MY Khan, PK Jain	Tata McGraw-Hill Education	7e, 2007
4	Accounting and Finance for Non finance Managers	Jai Kumar Batra	Sage Publications	Ie, 2018

e- Resources:

1. https://www.icai.org/post.html?post_id=17757
2. https://www.icai.org/post/icai-e-journal-main
3. https://www.icai.org/post/accounting-standards
4. https://www.ifrs.org/groups/international-accounting-standards-board/
5. https://icmai.in/icmai/index.php
6. https://www.aicpa.org/topic/accounting-financial-reporting
7. https://www.youtube.com/watch?v=cPhGI-in-bw
8. https://www.youtube.com/watch?v=76gMXQBnbps
9. https://www.youtube.com/watch?v=aE4JnjAx2Qc
10. https://www.youtube.com/watch?v=I0RiMWUCQ24
11. https://www.youtube.com/watch?v=0WgqlOAmdnc

SEMESTER : I

Course Name: BUSINESS STATISTICS

Course Code	21MBA14	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites:

Familiar with Basic mathematical knowledge, Basic Logical reasoning and analytical thinking, communication and presentation skills.

Course objectives:

1. To teach the importance of descriptive statistics for various business data.
2. To educate the process and importance of correlation and regression in business.
3. To give insights on time series methods and its applications.
4. To familiarize the concepts of Hypothesis testing for inferential research findings.
5. Demonstrate the statistical tools for business situations using MS Excel.

Module – 1

IIntroduction of Statistics: Meaning, Function, Scope of statistics in business and industry, Measures of Central Tendency: Mean, Median Mode, Geometric mean, Harmonic mean.
Measures of Dispersion: Concept of dispersion, Range Coefficient of dispersion Quartile deviation mean deviation, variance, and standard deviation. Application of measures of central tendency and dispersion for business decision making.

10 Hours (RBT Levels: L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Case Study, Power Point Presentation, Solving Practical Problems.

Skill Enrichment Exercises : Collecting real time data to measures of central tendency (mean, median & mode)

Module – 2

Correlation & Regression: Correlation, Types of correlation, Pearson's coefficient of correlation, Spearman's rank correlation coefficient, Properties of correlation coefficient, Regression: Meaning and types of regression equations, Derivation of regression equations, Properties of regression equations, regression of Y on line X & regression of X on Y.

10 Hours (RBT Levels: L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Solving Practical Problems

Skill Enrichment Exercise : Collect industry data and analyze using correlation and regression.

Module – 3

Time Series Analysis: Objectives, Variations In Time Series - Methods of Estimating Trend: Freehand Method - Moving Average Method - Semi-Average Method - Least Square Method. Methods of Estimating Seasonal Index: Method Of Simple Averages - Ratio To Trend Method - Ratio To Moving Average Method.

10 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk method, Group discussion, Case study, Power point presentation, Solving Practical Problems

Skill Enrichment Exercise : Forecast sales and stock price trends using time series analysis.

Module – 4

Testing of Hypothesis: Hypothesis testing: Null and Alternative Hypotheses; Type I and Type II errors; Testing of Hypothesis: one sample and two sample tests for means and proportions of large samples (Z-test), one sample and two sample tests for means of small samples (T-test), F-test for two sample standard deviations. ANOVA: one-way and Two-way (Theory only)

10 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk method, Group discussion, Case Study, Power point presentation, Solving Practical Problems

Skill Enrichment Exercise : Formulate a question or hypothesis that can be investigated through the collection and analysis of relevant information.

Module – 5

Computer Lab for Statistics: MS Excel: Introduction, layout of the excel application, Functions, Formulae, Data analysis using MS-Excel- Mean, Median, Mode, Geometric Mean, Harmonic mean, Standard Deviation, Correlation.

10 Hours (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk & Talk method, , Power point presentation, Solve Practical Problems in computer Lab

Skill Enrichment Exercise : Students should undertake a mini project and generate the report using MS Excel.

Course Outcomes:

CO1 : Apply the basic concepts of descriptive statistic techniques to visualize data systematically.
CO2 : Analyze the business situations with appropriate use of decision making techniques.
CO3 : Evaluate the business scenarios to predict solution by using time series techniques.
CO4 : Design the research process for appropriate data analysis for inferential decisions.
CO5 : Develop the various business application and models by the use of MS Excel tools.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 40 percent theory and 60 percent problems in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Fundamentals of Statistics	S C Gupta	Himalaya Publications	2012
2	Research Methodology	Ranjit Kumar	Sage Publications	2018
3	Parametric and Non Parametric Statistics	Vimala Veeraraghavan and Suhas	Sage Publication	2017
Reference Books				
1	Statistical Methods	Dr. S P Gupta	Sultan Chand Publications	2014
2	Research Methodology	C R Kothari	Viswa Prakasam Publication	2015
3	Business Research Methods	S.N. Murthy and U. Bhojanna.	Excel Books	2016

e- Resources:

1 http://103.5.132.213:8080/jspui/bitstream/123456789/1103/1/Business%20Statistics%20%28%20PDFDrive.com%20%29%20%282%29.pdf

2 http://103.5.132.213:8080/jspui/bitstream/123456789/1103/1/Business%20Statistics%20%28%20PDFDrive.com%20%29%20%282%29.pdf

3 https://d3bxy9euw4e147.cloudfront.net/oscms-

4 prodcms/media/documents/IntroductoryBusinessStatistics-OP.pdf

5 https://mba.ind.in/forum/business-statistics-notes-mba-free-download-415321.html

6 https://onlinecourses.nptel.ac.in/noc20_mg23/preview

SEMESTER : I

Course Name: Marketing Management

Course Code	21MBA15	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites: Students should have basic knowledge of

- Market and business awareness
- Language Proficiency
- Good Communication and Presentation Skills
- Logical Reasoning

Course objectives:

1. To share basic fundamental concepts and importance of marketing & its relation to business environment.
2. To teach the insights on the concepts and factors influencing the consumer behavior and purchase decision making.
3. To familiarize the fundaments and use of segmentation, targeting and positioning as a marketer.
4. To educate the principles and elements affecting the pricing and marketing channel strategies.
5. To expound the significance of market promotional strategies to design the campaigns for products and services.

Module – 1

Introduction to Marketing: Nature and scope of marketing, Evolution, Various marketing orientations, Marketing Vs. Selling concepts, Consumer need, Want and demand concepts, Marketing Environment – Assessing the impact of micro and macro environment. Marketing challenges in the globalized economic scenario, Techniques used in Environment Analysis.
Marketing Basic Concepts: Customer value, Customer cost & its components, green marketing and green economy, Marketing Myopia, 3V concepts of Nirmalaya Kumar, Emerging areas - Neuro Marketing, Sensory Marketing- concepts only, Corporate Social Responsibility, Social Responsibility of marketing.

10 Hours (RBT Levels: L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enrichment Exercises : To Assess the micro & macro environmental analysis of various firms.

Module – 2

Analyzing Consumer Behaviour: Buying motives, Factors influencing buying behaviour, Buying habits, Buying Roles, Stages in consumer buying decision process, Types of consumer buying decisions, The black box model of consumer behaviour, B2B marketing Vs. Consumer Marketing

10 Hours (RBT Levels: L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enrichment Exercises : Analysis of consumer behaviour traits based on miniature projects.

Module – 3

Market Segmentation, Targeting, Positioning & Branding:

Segmentation: Meaning, Factors influencing segmentation, Market Aggregation, Basis for segmentation, Segmentation of Consumer and Industrial markets. Targeting: Meaning , Basis for identifying target customers, Target Market Strategies, Positioning: Meaning, Product differentiation strategies, Tasks involved in positioning Branding: Concept of Branding, Brand Types, Brand equity, Branding Strategies.

10 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enrichment Exercises : Conceptualization of STP through MS Excel.

Module – 4

Product/Service Decisions, Pricing Decisions & Marketing Channels:

Product/Service Decisions: Concept, product hierarchy, New product development, diffusion process, Product Life cycle, Product mix strategies. Packaging / Labeling: Packaging as a marketing tool, requirement of good packaging, Role of labeling in packaging. Services Marketing & its Characteristics- tasks involved in service marketing.

Pricing Decisions: Significance of pricing, Pricing strategies, New product pricing strategies –Skimming & Penetration pricing, Pricing Procedure.

Market Channel: Meaning, Purpose, Channel alternatives, Factors affecting channel choice, Channel design and Channel management decisions, Channel conflict, Distribution system, Multilevel Marketing (Network Marketing)

10 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enrichment Exercises : Practical orientation on the new product development practices followed by various firms.

Module – 5

Promotional Decisions & Strategies:

Integrated Marketing Communications: Concept of communication mix, steps in developing effective communication, Stages in designing message

Advertising: Advertising Objectives, Advertising Budget, Advertising Copy, AIDA model

Sales Promotion: Sales Promotion Mix, Tools and Techniques of sales promotion, Push-pull strategies of promotion.

Personal selling: Concept, Features, Functions, Steps/process involved in Personal Selling, Publicity

Public Relation: Meaning, Objectives, Types, Functions of Public Relations
Direct Marketing: Meaning, Features, Functions,

Database Marketing: Basic concepts of e-commerce, e-business, e-marketing, m-Commerce, m-marketing, e-networking, CRM, MkIS, Digital marketing communications, Traditional Vs. Modern Media- Online and Mobile Advertising.

Marketing Planning: Meaning, Steps involved in Marketing planning. Marketing Audit-Meaning, components of Marketing Audit.

10 Hours (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enrichment Exercises : Analyze the relevant advertisements and find its effectiveness using the procedural method of DAGMAR Approach.

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

CO1 : Access the business scenario and apply the fundamental concepts of marketing to aid business solutions.
CO2 : Analyze various models of consumer buying behaviour for better visualization of customer traits.
CO3 : Evaluating segmentation, targeting and positioning strategies to implement in business situation.
CO4 : Design the implementation of commercial and distribution aspects of products and service.
CO5 : Communicate the viable marketing campaign by appropriate marketing strategy.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Marketing Management- Indian Context, Global Perspective.	Ramaswamy & Namakumari	SAGE	6th Edition
2	Marketing Management: A South Asian Perspective.	Kotler, Keller, Koshy & Jha	Pearson Education	Latest edition
3	Marketing Management	Karunakaran	Himalayan Publication	Latest edition
Reference Books				
1	Marketing in India: Text and Cases	Neelamegham S	Vikas	Latest edition
2	Marketing	Lamb, Hair, Mc Danniel	Cengage Learning	Latest edition
3	Fundamentals of Marketing Management,	Etzel M J BJ Walker & William J Stanton	Tata Macgraw Hill	Latest edition
4	Advertisement Brands & Consumer Behaviour	Ramesh Kumar	Sage Publications	2020

e- Resources:
1. https://www.routledge.com/Marketing-Management-Text-and-Cases/Stevens-Loudon-
2. Wrenn/p/book/9780789002907
3. http://link.galegroup.com/apps/pub/8OHU/GVRL?u=ggusf_main&sid=GVRL
4. https://ebookcentral.proquest.com/lib/gguu-ebooks/detail.action?docID=4461937
5. https://www.classcentral.com/course/swayam-marketing-management-i-5308
6. https://www.classcentral.com/course/swayam-marketing-management-ii-12989
7. https://online-degree.swayam.gov.in/dyp20_d01_s2_mg10/preview

SEMESTER : I

Course Name: Managerial Communication

Course Code	21MBA16	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites: Students should have

- Basic Knowledge of MS-Office
- Basic Reading fluency
- Moderate Vocabulary Knowledge

Course objectives:

1. To familiarize the principles and process, barriers of communication skills
2. To impart the concepts of oral communication and presentation skills.
3. To educate the mechanics of writing and procedure to draft business letters precisely.
4. To explain the importance and uses of Business report and Methodology of business case study.
5. To aid in educating the procedures and process of managerial meeting and presentation.

Module – 1

Introduction: Meaning & Definition, Role, Classification – Purpose of communication –Communication Process – Characteristics of successful communication. Communicating within Organizations – Levels of communication, Communication flow, Communication barriers, Communication in a cross-cultural setting.

Language Skills : Introduction, four skills of language - Reading, Speaking, Writing, Listening, Importance of Language skills

9 Hours (RBT Levels: L1,L2,L3)

Teaching-Learning Process :

Pedagogy : Chalk And Talk Method, Power Point Presentation, You Tube Videos, Class Room Activity.

Skill Enrichment Exercises : Class room activity to understand the barriers of communication, flow of communication.

Module – 2

Oral Communication: Meaning – Principles of successful oral communication, Conversation control – Reflection and Empathy: two sides of effective oral communication.

Oral Presentation: Role of business presentations, Planning and Organizing Presentation, Planning Team and Online Presentations, Developing Visual Support for Business presentation (PPT Presentation), Practicing and Delivering Presentation - Refining your delivery.

10 Hours (RBT L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk And Talk Method, Power Point Presentation, Video Clipping, Class Room Activity.

Skill Enrichment Exercises : Students have to prepare presentations on business topics

Module – 3

Written Communication: Purpose of writing – Clarity in writing – Principles of effective writing – Approaching the writing process systematically: The 3X3 writing process for business communication Pre writing – Writing – Revising.

Types of Written Communication in Business: Business Letters, Employee Reviews, Recommendation Letters, Thank You Letters, Memos, Proposals and Reports, Press Releases and E-mail.

11 Hours (RBT L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk And Talk Method, Power Point Presentation, Video Clipping, Class Room Activity.

Skill Enrichment Exercises : Drafting letters

Module – 4

Business Reports: Purpose, Kinds and Objectives of reports – Organization & Preparing reports, short and long reports writing, writing executive summary.

Business Case Analysis: What is a case? Characteristics of Case and its Analysis, Process of Case Analysis, Requirements of Case analysis, The structure of written case analysis.

10 Hours (RBT L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Video Clipping, Case Study Analysis in classroom.

Skill Enrichment Exercises : Prepare the typical Business Reports and sketch the Case study analysis procedure.

Module – 5

Employment communication: Putting your best self forward, Preparing your resume, Writing covering letters and Inquiry Emails, Preparing for a Job Interview, Conducting Yourself during the Interview, Following up throughout the process, Practicing business etiquette.

Group Communication: Meetings – Planning meetings – objectives – participants – timing – venue of meetings.
Meeting Documentation: Notice, Agenda, Resolution & Minutes.

10 Hours (RBT L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, You tube videos, Class room activity.

Skill Enrichment Exercises : Drafting Job application and resume. Practicing interview etiquettes.

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

CO1 : To apply the communication skills for the business correspondence.

CO2 : To analyze various types of business presentation and adopt appropriate oral communication.

CO3 : To evaluate various business letters for communication and structure the appropriate writing skills.

CO4 : To draft business reports to meet the challenges of competitive environment.

CO5 : To develop interpersonal communication skills in various business situations for creating business values.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions, selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Communicating in Business	Ober Newman	Cengage	8th Edition, 2018
2	Managerial Communication	Rai & Rai	Himalaya Publishing House Pvt. Ltd.	2nd Edition, 2008
3	Business Communication	P D Chaturvedi Mukesh Chaturvedi	Pearson	3rd Edition, 2013
Reference Books				
1	Communicating in Business	Williams, Krizan Logan, Merrier	Cengage Learning	8th Edition, 2017
2	Business Communication: Process	Mary Ellen Guffey	Cengage Learning	3rd Edition, 2002
3	Business Communication	Lesikar, Flatley, Rentz, Pande	TMH	11th Edition, 2011

e-Resources:

VTU E- learning centre	http://elearning.vtu.ac.in/
National Digital Library	https://ndl.iitkgp.ac.in/
Knowledge Academy	https://www.theknowledgeacademy.com/in/courses/communication-skills-training/

SEMESTER : I

Course Name: BUSINESS ENGLISH

Course Code	21MBA17	CIE Marks	50
Teaching Hours/Week (L:T:P)	2:0:0	SEE Marks	50
Credits	02	Exam Hours	03

Pre-requisites:

1. Knowledge of Basic English Grammar,
2. Basics of Computer knowledge
3. Familiar with basics of Etiquettes

Course objectives:

1. To enable the students to become aware with presentation skills and built potential for organizing meetings.
2. To enable students for emulate the business etiquettes in business meetings and correspondence.
3. To enhance students to acquainted with body language practices.
4. To prepare students to develop the skills of leadership.
5. To comprehend students towards Interview skills.

Module – 1

PRESENTATION SKILLS: Introduction, Meaning, Definitions, Types of Presentation, Organizing Presentations, Presentation Preparation for Successful Presentation, Meeting Running a Meeting Opening a Meeting, controlling a Meeting, International Meetings, Evaluating of a Meeting. Excises on the choice of appropriate grammatical words

10 Hours (RBT Levels: L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings

Skill Enrichment Exercises : Presentation by students on selected topics and reporting.

Module – 2

BUSINESS ETIQUETTES: Introduction, Meaning, Definition, Types of Etiquettes, Rules of Business etiquettes Greetings, Farewells, Invitations Giving Requests, Advice, Recommendations Offers, Instructions, Orders, Apologies, Regret, Gratitude, Asking the Way, Making Accommodations in Hotels, Choosing Meals, the ABC of Table Manners, Telephoning, Making Appointments by Phone.

10 Hours (RBT Levels:L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation. Video Clippings

Skill Enrichment Exercises : Collect and Present the various forms of corporate business etiquettes

Module – 3

BODY LANGUGE: Defining Body Language, Scope and Relevance, Changing Contours, Classification, Defining Proxemics, Four Zones, Behavioral Connotations, Space and Designs, Haptics and its Role,

Behavioral Significance: Shaking Hands and other tactile behavior. Cultural Variations, Occulesics, Right and Left Brain Associations, Different Types of Eye Contact, Individual and Group situations, Facial Expressions, Smiles and Nods, Head Tilts and Inclines Facial Expressions, Cultural Interface.

Kinesics: Types and Contexts, Negative and Positive Gestures, Hand Movements and Steeping, Understanding Finger Movements, Fidgeting Paralanguage and Voice Modulations, Chronemics, Chromatics, Cultural and Gender Based aspects, Stereotypes.

10 Hours (RBT Levels: L1, L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings.

Skill Enrichment Exercises : Role play on various body language gesture

Module – 4

GROUP DISCUSSION: Introduction, Meaning, Definition, Scope of Group discussion, objectives and purposes of Group Discussion, various phases of group discussion, participating rules in a group discussion, Group discussion tips, facilitating a group discussion.

10 Hours (RBT Levels: L3 L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings.

Skill Enrichment Exercises : Participation on various topics in Group discussion

Module – 5

INTERVIEW SKILLS: Introduction, Meaning, Definition, Types of Interviews, Basic rules of Interview, how to face interview with confidence, Basic interview etiquettes

10 Hours (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings.

Skill Enrichment Exercises : Conduct of mock interviews and role plays

Course Outcomes: At the end of the course the students will…

CO1 : Apply then skills sets of presentation and built their potentiality for organizing meetings
CO2 : Able to analysis business situation for behavior of business etiquettes.
CO3 : Apply the habits of different body languages exposure during business communication
CO4 : Analyze the business situation for show up leadership qualities.
CO5 : Ability to demonstrate the skills sets for facing Interview.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Elementary Market Leader	David cotton David Falvey simon kant	Pearson	3ed 2012
2	Business English	Md Eifafith Md Bashir Elmagrabhi Dr fatihelelah md Ahmed Mohamed	Himalaya Publishing House Pvt. Ltd.	2nd Edition, 2008
3	Presentation Skills for students	Journvan Emden and Lucinda Becker	Macmillan study skills	3rd 2012

Reference Books

1	Master the Group discussion and personal interview	Sheetal Desarda	Notion press	1st Edition 2015
2	The definition of body language	Allah and Barbara Pease	Alrushed book shoe edition	2nd Edition, 2008
3	The Essential Job Interview Handbook	Journvan Emden and Lucinda Becker	Jaico Publishing House	3rd 2012

e-Resources:

1. https://www.coursera.org/courses?languages=en&query=business+engli
2. https://www.gymglish.com/en/sh
3. https://www.businessenglishpod.com/
4. http://www.businessenglishresources.com/

SEMESTER : II

Course Name: HUMAN RESOURCE MANAGEMENT

Course Code	21MBA21	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	04	Exam Hours	03

Pre-requisites:

- Fundamentals of Management
- Basics of Accounting
- Understanding of firm, industry and sectors of economy

Course objectives:

1. To familiarize the theories and various functions of Human Resources Management
2. To teach the importance and functions of HR Planning, Acquisition and Employee Training.
3. To educate about significance of employee performance evaluation and compensation.
4. To give insight about the HR Practices for service sector units and small and medium enterprises.
5. To emphasize on the importance of innovative HR Practices

Module – 1

Human Resource Management and Personnel Management, The Importance of Human Resource Management, Models of Human Resource Management, Evolution of Human Resource Management, HRM in India, The Factors Influencing Human Resource Management and Line Managers, The HR Competencies, Human Resource Management and Firm Performance.

10 hours (RBT L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk and talk method, Power Point Presentation, Group Discussion.

Skill Enrichment Exercises : Study of HR Department in different industry

Module – 2

Human Resource Planning: Importance of HR Planning, Manpower Planning to HR Planning, Factors Affecting HR Planning, Benefits of HR Planning, HRP Process, Tools for Demand Forecasting, Attributes of an Effective HR Planning, Barriers to HR Planning, The Challenges for HR, Process of Job Analysis and Job Evaluation.

Recruitment and Selection: Importance of Recruitment, Recruitment Policies, Factors Influencing Recruitment, Recruitment Process, Sources, Evaluation of Recruitment Process, Recruitment Strategy ; Selection, Future Trends in Recruitment; Selection Process; Selection Tests; Factors Influencing Selections, Challenges in Selection, Application Tracking System using MS-Excel

Learning, Training, and Development: Training, Learning and Development, Learning Theories, The Future of Training, Learning, and Development: Crystal Gazing into the Future, World of Learning. Process of training and Techniques of Training.

12 hours (RBT L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Group Discussion, Case Discussion.

Skill Enrichment Exercises : Study of different recruitment online portals

Module – 3

Performance Management and Appraisal: Objectives of Performance Management, Performance Management and Performance Appraisal, Common Problems with Performance Appraisals, Performance Management Process, Types of Performance Rating Systems, Future of Performance Management. Compensation and Benefits Introduction, Definitions, Total Compensation, 360 Degree appraisal, HR Mapping Total Rewards System, Forms of Pay, Theories of Compensation, External Factors, Internal Factors, Establishing Pay Rates, Employee Benefits.

10 hours (RBT L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Case Discussion.

Skill Enrichment Exercises : Study of employee benefits offered by various business units.

Module – 4

Human Resource Management in Small and Medium Enterprises: Definition of SMEs, Human Resource Management and Performance in SMEs, The Difference in Adoption of Human Resource Management: SMEs and Large Firms, Indian Experience, Impact of Weak Adoption of Human Resource Management in SMEs, Factors Influencing the Adoption of Human Resource Management Practices in SMEs, Future of Human Resource. Management in SMEs.

Human Resource Management in the Service Sector
Introduction, The Emergence of the Services Sector, Implications for Human Resource, Management Function, Differences Between Services Sector and the Manufacturing Sector, Difference in Human Resource Management Practices in Services and Manufacturing Sectors, Human Resource Management and Service Quality Correlation, Some Specific Industries in Services Sector, Trade Unions in Services Sector, Models of Union Strategies.

10 hours (RBT L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Group Discussion.
Skill Enrichment Exercises : Exploratory study with an executive of an SME

Module – 5

Human Resource Management Innovations: Introduction, Employee Life cycle Management, Employee engagement, Human Resource Management and Innovations, Factors Affecting the Innovation Process in Organizations, Characteristics of Human Resource Management Innovations, Conditions Necessary for Successful HRMI Implementation, Current Trends in Human Resource Management Innovations, Innovative Human Resource Management Practices in India, How Human Resource Management Practices Contribute to Organizational Innovation, How to Make Human Resource Management Innovations Sustainable.

8 hours (RBT L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Group Discussion, Case Discussion
Skill Enrichment Exercises : Overview of the current trends in HR Domain special attention to IT Facilitation

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

CO1 : Apply the concepts of HRM in an Organization.
CO2 : Analyze the various methods of collecting data for Human Resource Planning, Acquisition, and Development of Human Resource.
CO3 : Evaluate the effectiveness of performance management for better HR decisions
CO4 : Design the best possible HR Practices for service sector units and small and medium enterprises.
CO5 : Construct the appropriate and innovative HR Practices for better workplace.

Practical Component:

A visit to an Organisation and interact with HR Manager and list out the roles played by HR manager.

Meet Recruitment Manager and ask- 10 questions one asks during Interview.

Meet Training and Development Manager and list out various training given to employees; basis of training program; Need analysis.

Visit any Service Organisation. Observe HR functions and List them.

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.

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 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Human Resource Management: Theory and Practices	R. C. Sharma, Nipun Sharma	Sage Publication India Pvt. Ltd.	2019
2	Human Resource Management: Concepts	Amitabha Sengupta	Sage Publication India Pvt. Ltd.	2019
3	Performance Management and Appraisal Systems HR Tools for Global Competitiveness	T. V. Rao	Sage Publication India Pvt. Ltd.	2004

Reference Books

1	The HR Scorecard: Linking People, Strategy, and Performance	Brian Becker, Dave Ulrich and Mark A. Huselid	Harvard Business School Press	2001
2	The HR Answer Book: An Indispensable Guide for Managers and Human Resources Professionals	Shawn Smith and Rebecca Mazin	AMACOM	2011
3	Managing Human Resources in Small and Medium-Sized Enterprises Entrepreneurship and the Employment Relationship	Robert Wapshott, Oliver Mallett	Routledge	2015
4	The HR Answer Book: An Indispensable Guide for Managers and Human Resources Professionals	Shawn Smith and Rebecca Mazin	AMACOM	2011

e-Resources:

1. https://altametrics.com/en/human-resources-management/fundamentals-of-human-resource-management.html
2. https://www.economicsdiscussion.net/human-resource-management/human-resource-planning-definition-importance-objectives-process-prerequisites/31575
3. https://www.whatishumanresource.com/training-and-development
4. https://www.emerald.com/insight/content/doi/10.1108/00483480210445962/full/html
5. https://www.emerald.com/insight/content/doi/10.1108/IJIS-03-2020-0027/full/html

SEMESTER : II

Course Name: FINANCIAL MANAGEMENT

Course Code	**21MBA22**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P)	**03:0:02**	**SEE Marks**	**50**
Credits	**04**	**Exam Hours**	**03**

Pre-requisites:

- Knowledge of basic concepts of financial management
- Knowledge of cost of capital, capital structure, capital budgeting etc
- Knowledge of Financial Institutions
- Knowledge of Capital markets

Course objectives:

1. To familiarize the students with basic concepts of financial management and financial system.
2. To educate the application of Cost of capital and its implications.
3. To teach investment proposals and its decisions
4. To give insights on the importance and significance of working capital in an organization.
5. To teach the capital structure theories and dividend decision theories and its implication

Module – 1

Introduction
Meaning, nature and scope of finance; financial goal - profit vs. wealth maximization; Investment, Financing and Dividend decisions - Finance functions – organization structure – functions of finance manager in 21st century – Modern role - treasurer and controller. Emerging role of finance managers. Capital Markets.

8 Hours (RBT L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, PowerPoint Presentation, Video Clippings.
Skill Enrichment Exercises : Study the organization structure of Nationalized Banks

Module – 2

Sources of Financing
Meaning and significance of cost of capital: Calculation of cost of debt, preference capital, equity capital and retained earnings; Combined cost of capital (weighted); Cost of equity and CAPM;

10 Hours (RBT L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, PowerPoint Presentation, Video Clippings.
Skill Enrichment Exercises : (Case Study on Cost of Capital)

Module – 3

Investment Decisions

Capital budgeting process, Investment evaluation techniques – Net present value, Internal rate of return, Modified internal rate of return, Profitability index, Payback period, discounted payback period, accounting rate of return Problem. Risk analysis in capital budgeting - Case Study on replacement of capital project. (Numerical problems). Computer lab for calculation of NPV, IRR, PI, Payback period, ARR in MS excel.

12 Hours (RBT L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Video Clippings, MS-Excel.

Skill Enrichment Exercises : Practical orientation on the Project Evaluation (Case Study)

Module – 4

Working Capital Management

Factors influencing working capital requirements - Current asset policy and current asset finance policy- Determination of operating cycle and cash cycle on Excel- Estimation of working capital requirements of a firm. (Does not include Cash, Inventory & Receivables Management). Working Capital Cycle for manufacturing Units.

Financial leverage and its impact on EPS – Operating leverage – combined leverage – degree of leverages – working capital leverages – practical use of leverages.

10 Hours (RBT L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Video Clippings, MS-Excel.

Skill Enrichment Exercises : Case study on Working Capital Determination and the impact of negative working capital Amazon-negative working capital and profitability

Module – 5

Capital Structure and Dividend Decisions

Capital structure and dividend decisions – Planning the capital structure-Governance of Equity and Debt, Fall in interest rates and perils of Debt funding. Leverages, EBIT and EPS analysis. ROI & ROE analysis. Capital structure policy. Dividend policy – Factors affecting the dividend policy - Dividend Policies- Stable Dividend, Stable Payout (No dividend theories to be covered). Case Study on EBIT-EPS analysis & Leverages.

10 Hours (RBT L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, PowerPoint Presentation, Video Clippings, Case Study Discussion, MS-Excel.

Skill Enrichment Exercises : Case study on Dividend Policy, MS-excel.

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

CO1 : Apply the basic financial concepts of Financial management for business use
CO2 : Analyze the concept of cost of capital for inferential decisions
CO3 : Evaluate the investment decisions in changing business environment
CO4 : Estimate working capital requirements for business situations.
CO5 : Design capital structure and dividend decisions for varied industries

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 60 percent practical and 40 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Financial Management	Khan M. Y.& Jain P. K,	TMH	7/e,
2	Financial Management	Prasanna Chandra	TMH	9/e
3	Financial Management	Prahlad Rathod, Babitha Thimmaiah and Harish Babu	HPH	1/e, 2015

Reference Books

1	Financial Management	I M Pandey	Vikas Publishing	11/e 2012
2	Principles of Corporate Finance	Brealey, Myers, Allen & Mohanty	McGraw Hill Education	11/e 2014
3	Corporate Finance	Vishwanath S. R.	Sage Publications	3/e 2019

e-Resources:

1. http://egyankosh.ac.in//handle/123456789/10310
2. https://nptel.ac.in/courses/110/107/110107144/

SEMESTER : II

Course Name: RESEARCH METHODOLOGY

Course Code	**21MBA23**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P)	**3:0:2**	**SEE Marks**	**50**
Credits	**04**	**Exam Hours**	**03**

Pre-requisites:

Students must have the basics of Managerial process, Role of Data & Information in Research, Basics of Statistics or equivalent in order to pursue this course.

Course objectives:

1. To teach the fundamentals and importance of research methodology in business.
2. To foster insight on various research designs and techniques as base for business research.
3. To emphasize the basics of sampling methods and the use different sampling techniques.
4. To teach the methods of data collection with measurement & Scaling Techniques
5. To enable students to identify the problem and procedures for data analysis and report writing skills and presentation.

Module – 1

Introduction: Meaning, types, manager-researcher relationship, process of research-management problem, defining the research problem, formulating the research Hypothesis, developing the research proposals, research design formulation, sampling design, planning and collecting the data for research, data analysis and interpretation. Research Application in business decisions, Features of good research study, Internet and research. Ethics in Research

Skill Enrichment Exercise: Conducting Research with teen demographics

Purpose: Purpose of this activity is to help students of Management (MBA – Research methodology) to think about the practical and ethical issues involved in conducting research with teen demographics.

7 hours (RBT L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Classroom Lectures, Seminars and Tutorials, Discussions, Power Point Presentations.

Module – 2

Business Research Design
Meaning and significance - Types: Exploratory and Conclusive Research Design.

Exploratory Research
Meaning, purpose, methods- Literature review process, experience survey, focus groups and comprehensive case methods. Conclusive Research Design - Descriptive Research - Meaning, Types – Cross sectional studies and longitudinal studies.
Experimental Research Design – Meaning and classification of experimental designs- formal and informal, Pre experimental design, Quasi-experimental design, True experimental design, statistical experimental design.

Skill Enrichment Exercise: Methods for collecting, sampling, recording, storing and analyzing data.

Purpose: This activity encourages students to think about the most appropriate methods for collecting, sampling, recording, storing and analyzing data. It asks students, in their groups, to consider examples of different research projects and answer questions about each project. This will raise awareness of the variety of methods that are available.

9 hours (RBT L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Classroom Lectures, Seminars and Tutorials, Discussions, Power Point Presentations, Video Clippings, Case Study.

Module – 3

Concepts: Types of Sampling - Probability Sampling – simple random sampling, systematic sampling, stratified random sampling, cluster sampling - Non Probability Sampling – convenience sampling, judgmental sampling, snowball sampling, quota sampling. Sample size : Determination of Sample Size, Characteristics of a Good Sample, Errors in sampling.

Skill Enrichment Exercise: Recognize the types of probability sampling and non-probability sampling methods

Purpose: This activity, with the use of five real-world examples, helps students to recognize the different types of probability sampling and non-probability sampling methods that are available, identify possible strengths and weaknesses and think about how these different methods are used in research.

7 hours (RBT L2, L3, L4, L5))

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Classroom Lectures, Seminars and Tutorials, Discussions, Power Point Presentations, Research Based Case Study.

Module – 4

Data Collection

Primary and Secondary data : Primary data collection methods - Observations, survey, Interview and Questionnaire, Qualitative Techniques of data collection, Questionnaire design – Meaning - process of designing questionnaire. Secondary data -Sources – advantages and disadvantages.

Measurement And Scaling Techniques

Basic measurement scales-Nominal scale, Ordinal scale, Interval scale, Ratio scale. Attitude measurement scale - Likert's Scale, Semantic Differential Scale, Thurstone scale, Multi-Dimensional Scaling.

Skill Enrichment Exercise: Identifying differences between primary and secondary sources

Purpose: This activity helps students to understand the differences between primary and secondary sources when they are searching for, and using, information for their course and/or their research.

Designing questionnaire

Purpose: This is a practical activity that helps students to design a questionnaire for their research project. It enables them to avoid common mistakes and problems with questionnaire design through providing practical tips, advice, discussion and feedback as their questionnaire is designed, developed and modified.

9 hours (RBT L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Classroom Lectures, Seminars and Tutorials, Discussions, Power Point Presentations, Video Clippings, Case Study.

Module – 5

Editing, Coding, Classification, Tabulation, Validation Analysis and Interpretation- Report writing and presentation of results: Importance of report writing, types of research report, report structure, guidelines for effective documentation.

Presentation of Statistics. Oral presentation: Aristotle's 3 Principles of Persuasive Communication. Audience analysis. Organize, Support, visualize Deliver Practice & Arrange. Research analysis by the application of SPSS software.

Skill Enrichment Exercise:

Drawing Conclusions from Qualitative Data

Purpose: This activity asks students to think about and produce a description of the process or procedure that they intend to use to draw conclusions from their qualitative data, and present their description to fellow students for peer feedback and discussion

Each student will be given a copy of the student handout. This asks them to produce a description of the process or procedure that they intend to use to draw conclusions from their qualitative data, which they must present to fellow students.

9hours (RBT L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Classroom Lectures, Seminars and Tutorials, Discussions, Power Point Presentations, Case Study.

Course Outcomes:	At the end of the course the student will be able to:
CO1	: Ability to apply the methods and research techniques to business and management issues.
CO 2	: Analyze the appropriate research design, techniques and strategies in the research process.
CO 3	: To Evaluate the different methods of sampling of empirical information for better inferences.
CO 4	: To Design various research data collection methods by measurement & scaling techniques for quantitative data analysis.
CO 5	: To communicate the effective reporting of the business to aid in managerial decisions.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full questions from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Business Research Methods	Zikmund, Babin, Carr, Adhikari and Griffin	Cengage Learning	8th Edition, 2016
2	Research Methodology, Concepts and Cases,	Deepak Chawla and NeenaSondhi	Vikas publishing house pvt.ltd.	2nd Edition, 2016.
3	Research Methodology	C R Kothari	New Age International,	4th Edition, 2019.
4	Marketing Research: Text and Cases,	Rajendra Nargundkar	Mcgraw Hill Education,	4th Edition, 2019.

Reference Books

1	Research Methods	William M C, Trochim	Biztantra	2nd Edition, 2004
2	Methodology Of Research In Social Sciences	M Ranganatham, O R Krishnaswamy	Himalaya Publishers	3rd Edition, 2016
3	Research Methodology	Panneerselvam R	PHI Learning,	2nd Edition, 2014.
4	Statistical Methods for Practice and Research A guide to data Analysis using SPSS	Ajai S. Gaur and Sanjaya S.Gaur	Response Books	2nd Edition, 2009

e-Resources:

1. https://onlinecourses.nptel.ac.in/noc22_ge08/preview
2. https://nptel.ac.in/courses/121/106/121106007/
3. https://www.youtube.com/watch?v=XEMyDu_VoeQ
4. https://www.emeraldinsight.com/
5. https://www.proquest.com/165290
6. https://www.bitm.knimbus.com

SEMESTER : II

Course Name: COMPUTER APPLICATION IN MANAGEMENT

Course Code	**21MBA24**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P)	**3:0:2**	**SEE Marks**	**50**
Credits	**4**	**Exam Hours**	**03**

Pre-requisites:

Familiar with the MS word, Basic knowledge with MS Excel, Basic logical and analytical knowledge, basic mathematic knowledge.

Course objectives:

1. To contemplate the Computer Concepts and applicable in field of Management.
2. To Analyze the excel functions as a tool for decision making in business situations.
3. To Evaluate data by use of MS Access for managerial decision making
4. To share Insights the concept of e-commerce using web technologies
5. To explain the concept of IOT and Business Analytics

Module – 1

Introduction to Computer: Introduction, Information and Data, Importance of Hardware and software, CPU, Primary and Secondary storage, I/O devices, Bus structure, Computer Peripherals- VDU, Keyboard, Mouse, Printer. Software and Types of Software, Operation system and types, Programming Languages-, High Level Language.

9 Hours (RBT Levels:L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Power Point Presentation, Group Discussion, Video Clippings, Demonstration of Hardware Component of Computer.

Skill Enhancement Activities: Lab session Demonstrations and Video clippings, Presentation of Hard Ware Components

Module – 2

Introduction to Excel: Spreadsheet Concepts, Creating, Saving and Editing a Workbook, Inserting, Deleting Work Sheets, entering data in a cell / formula Copying and Moving from selected cells, basic statement; SUM, AUTOSUM, SUMPRODUCT, AVG, IF, COUNTIF.

Formatting a Worksheet: Formatting Cells – changing data alignment, changing date, number, character or currency format, changing font, adding borders and colors, Printing worksheets, Charts and Graphs – Creating, Previewing, Modifying Charts.

Functions: Mathematical, Logical, statistical, text, financial, Date and Time functions, Using Function Wizard.

10 Hours (RBT Levels L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings, Exercises Conducted In Computer Lab

Skill Enhancement Activities: Lab session of excel function and formula, Solving practical business Problems.

Module – 3

Introduction to DBMS: Database Management System & Applications Overview of Database Management – File oriented approach versus database oriented approach to data management, Disadvantage of file oriented approach

MS-Access: Introduction, creation of database and table, inserting values in a table, Sorting, deletion, Merging of rows, Linking on table and another, Report generation, Embedding MS excel in Access.

11 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation, Exercises Conducted In Computer Lab, Video Clippings

Skill Enhancement Activities: Lab session of MS Access Solving practical business Problems.

Module – 4

Introduction to Internet and Web Technologies: Definition, application, threats, working of Internet, Web Technology: Introduction, Types of servers, cryptocurrency concepts e-Commerce: Structure of e-commerce, Types of e-Commerce, analytics of e-commerce, ethics of E-commerce

10 Hours (RBT Levels:L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings

Skill Enhancement Activities: Basics Theoretical exercise on e-commerce and its application

Module – 5

Introduction to IOT and Business Analytics : Overview of IOT; meaning of IOT; History of IOT; Advantages of IOT; Challenges of IOT; IOT working process; Architecture of IOT; Devices and network; Applications of IOT at Smart home.

Overview for Data Science; Definition of data and information; Data types and representation; Data Value Chain; Data Acquisition; Data Analysis; Data Curating; Data Storage; Data Usage; Basic concepts of Big Data.

10 Hours (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings

Skill Enhancement Activities: Basics Theoretical exercise on IOT its application

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

CO1 : To apply the basis of computer application for visualization of data to aid decisions

CO2 : To analysis and interpret the data for interpretation business situation

CO3 : To evaluate the different business scenarios with the DBMS Concept

CO4 : To Demonstrate the data structuring and constructing the business Models

CO5 : To Comprehend the latest developments in the area of technology to support business

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things	Follett, J.	O'Reilly Media	2014
2	Emerging Technologies for Emerging Markets	Vong, J., & Song, I.	Springer Singapore	2014
3	Teach Yourself Excel	Matthew Harris	SAM	1999 ISB-13: 978-0672315435
4	MS Access Programming by Example	Julitta Korol	Wordware Publishing Inc.	2001
5	A Textbook on E-Commerce: Text & Cases	W. K. Sarwade & Anuranjan Misra	A.K. Publications	ISBN-10: 9380164270
Reference Books				
1	Winning in the Digital Age: Seven Building Blocks of a Successful Digital Transformation	by Nitin Seth	Penguin Enterprise	24 February 2021
2	. Computer Applications in Management	Puneet Saneja Charu Chawla	Hindustan Publishing Corporation ISBN: 9788124116937, 9788124116937	2019

e-Resources:

1. https://www.ddegjust.ac.in/studymaterial/mba/cp-106.pdf
2. https://lumenlearning.com/courses/computer-applications-for-managers/
3. https://www.encyclopedia.com/computing/news-wires-white-papers-and-books/library-applications

SEMESTER : II

Course Name: STRATEGIC MANAGEMENT

Course Code	21MBA25	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	4	Exam Hours	03

Pre-requisites: Students should have basic knowledge of

- Management and Organizational Behaviour Principles
- Basic economic terminologies and concepts.
- Basic Finance fundamentals.
- Logical Reasoning

Course objectives:

1. To provide insights on applications of core concepts and models of strategic management.
2. To emphasize various business models in dynamic market environments.
3. To infer insights about various strategic management models used in different business phases.
4. To educate the importance of overview of business and formulating and implementation of strategies.
5. To teach the importance of strategic controlling measures for better decision making.

Module – 1

Introduction: Meaning and Nature of Strategic Management, its Importance and Relevance and Characteristics of Strategic Management. The Strategic Management Process. Relationship Between a Company's Strategy and its Business Model.

Skill Enrichment Exercise: Study of strategic overview of companies across industries.

Strategy Formulation : Developing Strategic Vision and Mission for a company – Setting Objectives – Strategic Objectives and Financial Objectives – Goals, Long Term Objectives, Short-Term Objectives, Strategic group mapping, Strategic Intent, Strategic Fit, Gap Analysis, Balanced Scorecard

10 Hours (RBT Levels: L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enhancement Activities: Applications of balanced scorecard in an organization.

Module – 2

Analyzing Companies External Environment:

External Analysis: Strategically Relevant Components of a Company's External Environment–Industry Analysis – Factors Driving Industry Change and its Impact - Porter's Dominant Economic Feature - Competitive Environment Analysis - Porter's Five Forces Model– Key Success Factors Concept and Implementation.

10 Hours (RBT Levels: L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group discussion, Seminar, Power point presentation, Case Study & Experiential exercises.

Skill Enhancement Activities: Assignments for Assessing the critical success factors by appropriate models.

Module – 3

Analyzing Companies Internal Environment:

Internal Analysis: Analyzing a company's resources and competitive position – Analysis of a Company's present strategies - SWOT Analysis – Resource Based View of the firm (RBV) - Value Chain Analysis – Benchmarking, Generic Competitive Strategic – Low cost provider Strategy - Differentiation Strategy - Best cost provider Strategy – Focused Strategy – Growth strategies & retrenchment strategies - Strategic Alliance and Collaborative Partnerships – Mergers and Acquisition, Strategic Outsourcing, International Business level strategies.

10 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enhancement Activities: SWOT analysis on various organizations with strategic intent.

Module – 4

Business planning in different environment:

Business planning in different environment - Entrepreneurial level Business planning – Multistage wealth creation model for entrepreneurs – Planning for large and diversified companies – brief overview of Innovation, integration, Diversification, Turnaround Strategic – GE nine cell planning gird – BCG matrix.

10 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enhancement Activities: Contemplating various strategic models across industries.

Module – 5

Strategic Implementation & Control:

Organizational design, structures, culture, Importance of integrating strategy implementation and strategy formulation. Organizational structures used to implement different business level strategies and corporate level strategy. Strategic control, Types, Role of Corporate Governance.

10 Hours (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group discussion, Seminar, Power Point Presentation, Case Study & Experiential Exercises.

Skill Enhancement Activities: Case studies on Corporate governance practices of varied organizations.

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

CO1 : Apply concepts and models of strategic management.
CO2 : Analysis the business environment to formulating appropriate strategy for business development.
CO3 : Evaluate the competitive situation using strategic models in dealing with business environment.
CO4 : Develop the driving strategies for the holistic business challenges in varied industries.
CO5 : Design strategic performance using controlling measures for business situations.

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, SelfE-Learning withCertifications and other cooperative and problem based learning.

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 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Crafting and Executing Strategy:The Quest for CompetitiveAdvantage–ConceptsandCases	Arthur A. Thompson Jr. Margaret A. Peteraf John E. Gamble A.J. StricklandIII Arun K. Jain	Mc Graw Hill Education	19/e 2017
2	Strategic Management: A South - Asian Perspective	MichaelA.Hitt R. Duane Ireland Robert E.Hoskisson S. Manikutty	Cengage Learning	9/e 2016
Reference Books				
1	Strategy: Theory & Practice	Stewart Clegg Chris Carter Marting KornbergerJochen Schweitzer	Sage Publications	3/e,2020
2	Strategy Management: Theory & Practice	John Parnell	Biztantra	2004
3	StrategicManagement: Planning for Domestic and GlobalCompetition	John A. Pearce Richard B. Robinson	Mc Graw Hill Education	14/e 2015

e-Resources:

1. https://youtu.be/ZG3_8fG7RzQ[BBC Documentary]- Worlds Most Powerful- - Bill Gates Vs Steve Jobs
2. https://youtu.be/0FoTFal0KAA - BBC Documentary_ Steve Jobs - Billion Dollar Hippy
3. https://youtu.be/5WiDIhIkPoM - Mark Zukerberg_ Inside Facebook (BBC)
4. https://youtu.be/y5I_cnpP99U - Michael Porter on Competitiveness
5. https://youtu.be/xcZG5sIqSHE
6. https://www.classcentral.com/course/swayam-strategic-management-14306
7. https://onlinecourses.swayam2.ac.in/imb20_mg33/preview
8. https://swayam.gov.in/nc_details/IIMB
9. https://nptel.ac.in/courses/110/108/110108047/

SEMESTER : II

Course Name: ENTREPRENEURSHIP & LEGAL ASPECTS

Course Code	21MBA26	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Credits	4	Exam Hours	03

Pre-requisites:

- Basic Fundamentals of Marketing, HR, Finance & Accounting skills inclination to innovation
- Good communication & presentation skills
- Inquisitiveness for entrepreneurship
- Knowledge about business environment

Course objectives:

1. To educate the nature, characteristics and importance of entrepreneur.
2. To impart planning insights and preparation of feasibility business reports.
3. To provide an overview of entrepreneurship opportunities, sources of funding and institutions supporting entrepreneurs.
4. To familiarize the concept of family business performance, and strategies for its development.
5. To emphasize the various rules and legislation related to various acts for entrepreneurial development.

Module – 1

Entrepreneur & Entrepreneurship: Meaning of entrepreneur - Evolution of the concept - Functions of an Entrepreneur - Classification of Entrepreneur – Role of an Entrepreneur- Intrapreneur- an emerging class – Concept - Entrepreneur Vs Intrapreneur Vs Manager - Evolution and Development of Entrepreneurship - Entrepreneurial mindset and process. Creativity and Innovation: The role of creativity- The innovation Process -Sources & Methods of Generating New Ideas & Creative Problem Solving.

(10 hours) (RBT Levels: L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk and Talk method, Group Discussion, Case Study, Power Point Presentation, Video Clippings.

Skill Enhancement Activities: Students should submit a profile summary of a successful local entrepreneur indicating milestone achievements.

Module – 2

Business Planning Process: Importance of Business Model- Components of an Effective Business Model, Osterwalder Business Model Canvas. Meaning of business plan - Business plan process - Advantages of business planning – Why do Business plans fail - Marketing plan - Production/operations plan - Organization plan – Financial plan - Final Project Report with Feasibility Study - preparing a model project report for starting a new venture.

(10 hours) (RBT Levels: L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation

Skill Enhancement Activities: Students should develop a business model for a new product/service including feasibility report.

Module – 3

Entrepreneurial finance: Estimating the financial needs of a new venture, internal & external sources of finance.

Informal Risk Capital and Venture Capital: Informal risk capital market - venture capital – nature, overview and process – professionals involved in venture capital – venture capital industry in India.

Institutions supporting Entrepreneurs: Small industry financing developing countries – A brief overview of financial institutions in India - Central level and state level institutions – SIDBI-NABARD - IDBI - SIDCO - Indian Institute of Entrepreneurship - DIC – Single Window - Latest Industrial Policy of Government of India.

(10 hours) (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings.

Skill Enhancement Activities: Students should visit a bank/financial institution to enquire about various funding schemes for small scale enterprise. Student engagement in Karnataka Udyog web sites https://www.india.gov.in/karnataka-udyog-mitra-portal

Module – 4

Family Business: Importance of family business – Types- Various Forms of business organization - History - Responsibilities and rights of shareholders of a family business – 3-circle model of family business -Succession in family business - Pitfalls of the family business - strategies for improving the capability of family business - improving family business performance. Success stories of entrepreneurial knowledge exercises.

Startup Business: Startup Process, and its feasibility

(10 hours) (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings.

Skill Enhancement Activities: Students should analyze the performance of listed family firms and should submit a short report by studying the ideology and working of partnership firm, cooperative society, private and public company. Case study related to performance of family business.

Module – 5

Rules and Legislations : Applicability of Legislation; Industries Development (Regulations) Act, 1951; Factories Act, 1948; Industrial Employment (Standing Orders) Act, 1946, Suspension, Stoppage of work, Termination of employment; Karnataka Shops and Establishment Act, 1961; Environment (Protection) Act, 1986; The sale of Goods Act; 1930; Industrial Dispute Act 1947.

(10 hours) (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk and Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings.

Skill Enhancement Activities: Students should submit report by assessing the applicability of various acts by selecting different companies. Case study related to Factories Act 1948.

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

CO1 : Apply the concept of entrepreneurship to various business plans.

CO2 : Analyze the feasibility of different stages in business planning process.

CO3 : Evaluate the various sources of funding to support entrepreneurship.

CO4 : Develop the key elements of entrepreneurship in relation to family business organizations.

CO5 : Comprehend the various rules, legislations and their applicability in entrepreneurial development.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions, selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	The Dynamics of Entrepreneurial Development and Management	Vasant Desai	Himalaya Publishing House	6th Edition 2019
2	Entrepreneurship Development-Small Business Enterprises	Poornima Charantimath	Pearson Education	3rd Edition 2015
3	Entrepreneurship	Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd	McGrawHill	6th Edition 2008
Reference Books				
1	Entrepreneurial Development	Dr. S. S. Khanka	S. Chand Publishing House	Revised Edition - 2007
2	Entrepreneurship	Rajeev Roy	Oxford University Press	3rd Edition.

e-Resources:

1. https://www.youtube.com/watch?v=Bf_nEWxSSkQ
2. https://www.youtube.com/watch?v=sOjeQV5pHh
3. https://www.youtube.com/watch?v=Fqch5OrUPvA
4. https://www.youtube.com/watch?v=sC236knTsYw
5. https://www.youtube.com/watch?v=YlQFRzW6USQ

SEMESTER : II

Course Name: BUSINESS ETHICS AND HUMAN VALUES

Course Code	21MBA27	CIE Marks	50
Teaching Hours/Week (L:T:P)	2:0:0	SEE Marks	50
Credits	02	Exam Hours	03

Pre-requisites: Familiar with the basic management concepts and human Relation and Finance concepts, familiar with basics concepts of corporate social responsibility (CSR).

Course objectives:

1. To familiarize the business Ethics and to provide best practices of business situation.
2. To learn the values and ethical issues in corporate governance and to adhere to the ethical codes.
3. To teach the work ethos and values required for good managers and ethical careers.
4. To educate the significance of stress management and mechanism to handle employee stress.
5. To give insights on the contemporary Indian ethos in work environment.

Module – 1

Introduction: Values-Concept, types and formation of values, ethics, values and behaviour, Values of Indian Managers, Ethics, development of ethics, ethical decision making and decision making process, relevance of ethics and values in business.

8 Hours (RBT Levels: L1, L2, L3)

Teaching-Learning Process :

Pedagogy : Chalk & Talk method, Group discussion, Case study, Power point presentation, Video Clippings, Quiz

Skill Enhancement Activities: Learn the principal of ethic by corporate example

Module – 2

Corporate Social Responsibility & Consumer Protection:

Corporate Social Responsibility & Consumer Protection: Corporate responsibility of business: employees, consumers and community, Corporate Governance, Code of Corporate Governance, Consumerism, unethical issues, in sales, marketing and technology.

10 Hours (RBT Levels: L1, L2, L3, L4)

Teaching-Learning Process :

Pedagogy : Chalk & Talk method, Group discussion, Case study, Power point presentation, Video Clippings, Quiz

Skill Enhancement Activities: Collect the Data of various companies involved in CSR activities.

Module – 3

Work Ethos and Values: Work Ethos: Meaning, Levels, Dimensions, Steps, Factors Responsible for Poor Work Ethos. Values: Meaning, Features, Values for Indian Managers, Relevance of Value Based Management in Global Change, Impact of Values on Stakeholders: Employees, Customers, Government, Competitors and Society. Relevance of values in management: need for values in global change- Indian perspective; values for managers; holistic approach for managers in decision making; secular versus spiritual values in management, Trans-Cultural Human Values in Management and Management Education, Importance of Value System in Work Culture, teaching ethics, Concept of Value Champions.

12 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Video Clippings, Quiz.

Skill Enhancement Activities: Case Study on Work Ethos and Values.

Module – 4

Stress Management: Meaning, Types of Stress at Work, Causes of Stress, Consequences of Stress, Problems relating to stress in corporate management –Indian perspective, Stress Management Techniques: Meditation-Meaning, Techniques, Advantages, Mental Health and its Importance in Management, Brain Storming, Brain Stilling, Yoga: Meaning, Significance.

10 Hours (RBT Levels: L2, L3, L4, L5)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Debate, Quiz

Skill Enhancement Activities: Role plays on handling stress Management.

Module – 5

Leadership: Meaning, Contemporary Approaches to Leadership, Joint Hindu Family Business–Leadership Qualities of Karta; Motivation: Meaning, Indian Approach to Motivation, Techniques. Self-Management: Personal growth and Lessons from Ancient Indian Education System, Personality Development: Meaning, Determinants, Indian Ethos and Personality Development, science and human values. Trans-cultural human values in management education.

10 Hours (RBT Levels: L3, L4, L5, L6)

Teaching-Learning Process :

Pedagogy : Chalk & Talk Method, Group Discussion, Case Study, Power Point Presentation, Debate, Quiz

Skill Enhancement Activities: Role Plays of various leadership styles.

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

CO1 : Illustrate and apply the theoretical foundations of business ethics.

CO2 : Analyze the knowledge of corporate governance and business concepts from an ethical perspective.

CO3 : Evaluate the importance of Work Ethos and Values of business with community and ethical conduct.

CO4 : Develop proactive steps to stressful business situations and resolve ethical.

CO5 : Communicate and reflect by critically examine the values and importance of the ethical dimension in business and workplace decision making.

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 scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks.
- Each full question will have sub question covering all the topics under a Module.
- The students will have to answer five full questions; selecting four full question from question number one to seven and question number eight is compulsory.
- 100 percent theory in the SEE.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Foundation of Managerial Work-Contributions from Indian Thought	Chakraborty, S.K	Himalaya Publication House, Delhi	1998
2	Ethics In Management and Indian Ethos	Biswanath Ghosh	Vikas Publishing House	2009
3	Indian Ethos and Values for Managers	Khandelwal	Himalaya Publication House, Delhi	2009

Reference Books

1	Indian Ethics and Values in Management	R Nandagopal, Ajith Sankar R. N.	Tata Mc Graw Hill	2009
2	Management by Values	S. K. Chakraborty	Oxford University Press, New Delhi	2009
3	Ethics and the Conduct of Business	by R Boatright John D Smith Jeffrey Prasan Patra Bibhu	Pearson Education	Oct 2017

e-Resources:

1. https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Values%20by%20R.S%20NAAGARAZAN.pdf
2. https://www.researchgate.net/publication/226607374_Business_Ethics_Resources_on_the_Internet
3. https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Values%20by%20R.S%20NAAGARAZAN.pdf

Vision of the Institute:

- To Contribute Valuable Graduates for Industry and Society through Excellence in Technical & Management Education and Research.

Mission of the Institute:

- To offer State-of-the-Art Undergraduate, Postgraduate and Doctoral Programmes.
- To Empower the Students with Technical, Managerial Skills and Professional Ethics
- To Collaborate with Academia and Industries for Skill Developement

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

3rd to 8th Semester BE –

Artificial Intelligence and Machine Learning (AI)

Scheme of Teaching and Examinations
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2018 – 19)

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Artificial Intelligence and Machine Learning (AI)

Scheme of Teaching and Examinations

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018 – 19)

III SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BSC	18MAT31	Transform Calculus, Fourier Series And Numerical Techniques	Mathematics	2	2	--	03	40	60	100	3
2	PCC	18CS32	Data Structures and Applications	CS / IS / AI	3	2	--	03	40	60	100	4
3	PCC	18CS33	Analog and Digital Electronics	CS / IS / AI	3	0	--	03	40	60	100	3
4	PCC	18CS34	Computer Organization	CS / IS / AI	3	0	--	03	40	60	100	3
5	PCC	18CS35	Software Engineering	CS / IS / AI	3	0	--	03	40	60	100	3
6	PCC	18CS36	Discrete Mathematical Structures	CS / IS / AI	3	0	--	03	40	60	100	3
7	PCC	18CSL37	Analog and Digital Electronics Laboratory	CS / IS / AI	--	2	2	03	40	60	100	2
8	PCC	18CSL38	Data Structures Laboratory	CS / IS / AI	--	2	2	03	40	60	100	2
9	HSMC	18KVK39	Vyavaharika Kannada (Kannada for communication)/	HSMC	--	2	--	--	100	--	100	1
		18KAK39	Aadalitha Kannada (Kannada for Administration)									
		OR	**OR**									
		18CPH39	Constitution of India, Professional Ethics and Cyber Law		1	--	--	02	40	60		
					Examination is by objective type questions							
				TOTAL	**17**	**10**	**04**	**24**	**420**	**480**	**900**	**24**
					OR	**OR**		**OR**	**OR**	**OR**		
					18	**08**		**27**	**360**	**540**		

Note: BSC: Basic Science, PCC: Professional Core, HSMC: Humanity and Social Science, NCMC: Non-credit mandatory course

18KVK39 Vyavaharika Kannada (Kannada for communication) is for non-Kannada speaking, reading and writing students and **18KAK39**Aadalitha Kannada (Kannada for Administration) is for students who speak, read and write Kannada.

Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs

10	NCMC	18MATDIP31	Additional Mathematics - I	Mathematics	02	01	--	03	40	60	100	0

(a)The mandatory non – credit courses Additional Mathematics I and II prescribed for III and IV semesters respectively, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/ fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the student have to fulfil the requirements during subsequent semester/s to appear for SEE.

(b) These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree

Courses prescribed to lateral entry B. Sc degree holders admitted to III semester of Engineering programs

Lateral entrant students from B.Sc. Stream, shall clear the non-credit courses Engineering Graphics and Elements of Civil Engineering and Mechanics of the First Year Engineering Programme. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

AICTE Activity Points to be earned by students admitted to BE/B.Tech/B. Plan day college programme (For more details refer to Chapter 6,AICTE Activity Point Programme, Model Internship Guidelines): Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other Universities to 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, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, minimum hours' requirement should be fulfilled. Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the eighth semester grade card.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Artificial Intelligence and Machine Learning (AI)

Scheme of Teaching and Examinations

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018 – 19)

IV SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BSC	18MAT41	Complex Analysis, Probability And Statistical Methods	Mathematics	2	2	--	03	40	60	100	3
2	PCC	18CS42	Design and Analysis of Algorithms	CS / IS / AI	3	2	--	03	40	60	100	4
3	PCC	18CS43	Operating Systems	CS / IS / AI	3	0	--	03	40	60	100	3
4	PCC	18CS44	Microcontroller and Embedded Systems	CS / IS / AI	3	0	--	03	40	60	100	3
5	PCC	18CS45	Object Oriented Concepts	CS / IS / AI	3	0	--	03	40	60	100	3
6	PCC	18CS46	Data Communication	CS / IS / AI	3	0	--	03	40	60	100	3
7	PCC	18CSL47	Design and Analysis of Algorithm Laboratory	CS / IS / AI	--	2	2	03	40	60	100	2
8	PCC	18CSL48	Microcontroller and Embedded Systems Laboratory	CS / IS / AI	--	2	2	03	40	60	100	2
9	HSMC	18KVK49	Vyavaharika Kannada (Kannada for communication)/	HSMC	--	2	--	--	100	--	100	1
		18KAK49	Aadalitha Kannada (Kannada for Administration)									
		OR	**OR**									
		18CPH49	Constitution of India, Professional Ethics and Cyber Law		1	--	--	02	40	60		
					Examination is by objective type questions							
				TOTAL	**17 OR 18**	**10 OR 08**	**04**	**24 OR 27**	**420 OR 360**	**480 OR 540**	**900**	**24**

Note: BSC: Basic Science, PCC: Professional Core, HSMC: Humanity and Social Science, NCMC: Non-credit mandatory course

18KVK49 Vyavaharika Kannada (Kannada for communication) is for non-Kannada speaking, reading and writing students and **18KAK49**Aadalitha Kannada (Kannada for Administration) is for students who speak, read and write Kannada.

Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs

10	NCMC	18MATDIP41	Additional Mathematics - II	Mathematics	02	01	--	03	40	60	100	0

(a)The mandatory non – credit courses Additional Mathematics I and II prescribed for III and IV semesters respectively, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/ fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the student has to fulfil the requirements during subsequent semester/s to appear for SEE.

(b) These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree

Courses prescribed to lateral entry B. Sc degree holders admitted to III semester of Engineering programs

Lateral entrant students from B.Sc. Stream, shall clear the non-credit courses Engineering Graphics and Elements of Civil Engineering and Mechanics of the First Year Engineering Programme. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

AICTE activity Points: In case students fail to earn the prescribed activity Points, eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Artificial Intelligence and Machine Learning (AI)

Scheme of Teaching and Examinations

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018 – 19)

V SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	HSMC	18CS51	Management and Entrepreneurshipfor IT Industry	HSMC	2	2	--	03	40	60	100	3
2	PCC	18AI52	Python Programming	CS / IS / AI	3	2	--	03	40	60	100	4
3	PCC	18CS53	Database Management System	CS / IS / AI	3	2	--	03	40	60	100	4
4	PCC	18CS54	Automata Theory and Computability	CS / IS / AI	3	--	--	03	40	60	100	3
5	PCC	18AI55	Principles of Artificial Intelligence	CS / IS / AI	3	--	--	03	40	60	100	3
6	PCC	18AI56	Mathematics for Machine Learning	CS / IS / AI	3	--	--	03	40	60	100	3
7	PCC	18AIL57	Artificial Intelligence Laboratory	CS / IS / AI	--	2	2	03	40	60	100	2
8	PCC	18CSL58	DBMS Laboratory with mini project	CS / IS / AI	--	2	2	03	40	60	100	2
9	HSMC	18CIV59	Environmental Studies	Civil/ Environmental [Paper setting: Civil Engineering Board]	1	--	--	02	40	60	100	1
				TOTAL	**18**	**10**	**4**	**26**	**360**	**540**	**900**	**25**

Note: PCC: Professional Core, HSMC: Humanity and Social Science.

AICTE activity Points: In case students fail to earn the prescribed activity Points, eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Artificial Intelligence and Machine Learning (AI)

Scheme of Teaching and Examinations

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018 – 19)

VI SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	18AI61	Machine Learning	CS / IS / AI	3	2	--	03	40	60	100	4
2	PCC	18AI62	Digital Image Processing	CS / IS / AI	3	2	--	03	40	60	100	4
3	PCC	18AI63	Java for Mobile Applications	CS / IS / AI	3	2	--	03	40	60	100	4
4	PEC	18AI64X	Professional Elective -1	CS / IS / AI	3	--	--	03	40	60	100	3
5	OEC	18AI65X	Open Elective –A	CS / IS / AI	3	--	--	03	40	60	100	3
6	PCC	18AIL66	Machine Learning Laboratory	CS / IS / AI	--	2	2	03	40	60	100	2
7	PCC	18AIL67	Digital Image Processing Laboratory with mini project	CS / IS / Ai	--	2	2	03	40	60	100	2
8	MP	18AIL68	Mobile Application Development Laboratory	CS / IS / AI	--	2	2	03	40	60	100	2
9	INT	--	Internship	(To be carried out during the intervening vacations of VI and VII semesters)				--	--	--	--	--
				TOTAL	**15**	**12**	**6**	**24**	**320**	**480**	**800**	**24**

Note: PCC: Professional core, PEC: Professional Elective, OE: Open Elective, MP: Mini-project, INT: Internship.

Professional Elective -1

Course code under18XX64X	Course Title
18AI641	Natural Language Processing
18AI642	Software Project and Management
18AI643	Web Programming
18AI644	Foundation forData Science

Open Elective –A (18CS65x are not to be opted by CSE / ISE /AIML Programs)

18CS651	Mobile Application Development
18CS652	Introduction to Data Structures and Algorithms
18CS653	Programming in JAVA
18CS654	Introduction to Operating System

Students can select any one of the open electives offered by any Department (Please refer to the list of open electives under 18CS65X).
Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Adviser/Mentor.

Mini-project work: Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students.

CIE procedure for Mini project:

(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide. The CIE marks awarded for the Mini-project work, shall be based on the evaluation of project report, project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group wise at the college level with the participation of all the guides of the college. The CIE marks awarded for the Mini-project, shall be based on the evaluation of project report, project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.

SEE for Mini project:

(i) Single discipline: Contribution to the Mini-project and the performance of each group member shall be assessed individually in the semester end examination (SEE) conducted at the department.

(ii) Interdisciplinary: Contribution to the Mini-project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted separately at the departments to which the student/s belong to.

Internship: All the students admitted to III year of BE/B.Tech shall have to undergo mandatory internship of 4 weeks during the vacation of VI and VII semesters and /or VII and VIII semesters. A University examination shall be conducted during VIII semester and the prescribed credit shall be included in VIII semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not takeup/complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements

AICTE activity Points: In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Artificial Intelligence and Machine Learning (AI)

Scheme of Teaching and Examinations

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018 – 19)

VII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	18AI71	Advanced Artificial Intelligence	CS / IS / AI	4	--	--	03	40	60	100	4
2	PCC	18AI72	Advanced Machine Learning	CS / IS / AI	4	--	--	03	40	60	100	4
3	PEC	18AI73X	Professional Elective – 2	CS / IS / AI	3	--	--	03	40	60	100	3
4	PEC	18AI74X	Professional Elective – 3	CS / IS / AI	3	--	--	03	40	60	100	3
5	OEC	18AI75X	Open Elective –B	CS / IS / AI	3	--	--	03	40	60	100	3
6	PCC	18AIL76	AI and ML Application Development Laboratory	CS / IS / AI	--	--	2	03	40	60	100	1
7	Project	18AIP77	Project Work Phase – 1	CS / IS / AI	--	--	2	--	100	--	100	2
8	INT	--	Internship	(If not completed during the vacation of VI and VII semesters, it has to be carried out during the intervening vacations of VII and VIII semesters								
				TOTAL	**17**	--	**4**	**18**	**340**	**360**	**700**	**20**

Note: PCC: Professional core, PEC: Professional Elective, OEC: Open Elective, INT: Internship.

Professional Elective – 2

Course code under 18CS73X	Course Title		
18AI731	Internet of Things	18AI733	Blockchain Technology
18AI732	Multiagent Systems	18AI734	Cloud Computing and Virtualization

Professional Electives – 3

Course code under 18CS74X	Course Title		
18AI741	Fuzzy Logic& its Applications	18AI743	Semantic Web and Social Network
18AI742	Computer Vision	18AI744	Business Intelligence

Open Elective –B (18CS75x are not to be opted by CSE / ISE / AIML Programs)

18CS751	Introduction to Big Data Analytics
18CS752	Python Application Programming
18CS753	Introduction to Artificial Intelligence
18CS754	Introduction to Dot Net framework for Application Development

Students can select any one of the open electives offered by any Department (Please refer to the list of open electives under 18CS75X).
Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.
- Registration to electives shall be documented under the guidance of Programme Coordinator/ Adviser/Mentor.

Project work: Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary project can be assigned to an individual student or to a group having not more than 4 students. In extraordinary cases, like the funded projects requiring students from different disciplines, the project student strength can be 5 or 6.

CIE procedure for Project Work Phase - 1:

(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide. The CIE marks awarded for the project work phase -1, shall be based on the evaluation of the project work phase -1 Report (covering Literature Survey, Problem identification, Objectives and Methodology), project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the Project report shall be the same for all the batch mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work phase -1, shall be based on the evaluation of project work phase -1 Report, project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.

Internship: All the students admitted to III year of BE/B.Tech shall have to undergo mandatory internship of 4 weeks during the vacation of VI and VII semesters and /or VII and VIII semesters. A University examination shall be conducted during VIII semester and the prescribed credit shall be included in VIII semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not takeup/complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements

AICTE activity Points: In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Artificial Intelligence and Machine Learning (AI)

Scheme of Teaching and Examinations

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018 – 19)

VIII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	18AI81	Neural Networks and Deep Learning	AM	3	--	--	03	40	60	100	3
2	PEC	18AI82X	Professional Elective – 4	AM	3	--	--	03	40	60	100	3
3	Project	18AIP83	Project Work Phase – 2	AM	--	--	2	03	40	60	100	8
4	Seminar	18AIS84	Technical Seminar	AM	--	--	2	03	100	--	100	1
5	INT	18AII85	Internship	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semesters.)				03	40	60	100	3
				TOTAL	**06**	--	**4**	**15**	**260**	**240**	**500**	**18**

Note: PCC: Professional Core, PEC: Professional Elective, OEC: Open Elective, INT: Internship.

Professional Electives – 4

Course code under 18CS82X	Course Title
18AI821	System Modelling and Simulation
18AI822	Soft and Evolutionary Computing
18AI823	Robotic Process Automation Design and Development
18AI824	Modern Information Retrieval

Project Work CIE procedure for Project Work Phase - 2:

(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide. The CIE marks awarded for the project work phase -2, shall be based on the evaluation of project work phase -2 Report, project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work phase -2, shall be based on the evaluation of project work phase -2 Report, project presentation skill and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.

SEE for Project Work Phase - 2:

(i) Single discipline: Contribution to the project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted at the department.

(ii) Interdisciplinary: Contribution to the project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted separately at the departments to which the student/s belong to.

Internship: Those, who have not pursued /completed the internship shall be declared as fail and have to complete during subsequent University examination after satisfying the internship requirements

AICTE activity Points: In case students fail to earn the prescribed activity Points, eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card. Activity points of the students who have earned the prescribed AICTE activity Points shall be sent the University along with the CIE marks of 8th semester. In case of students who have not satisfied the AICTE activity Points at the end of eighth semester, the column under activity Points shall be marked NSAP (Not Satisfied Activity Points).

[1]TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES (Effective from the academic year 2018 -2019) SEMESTER – III			
Subject Code	18MAT31	**CIE Marks**	40
Number of Contact Hours/Week	2:2:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- To have an insight into Fourier series, Fourier transforms, Laplace transforms, Difference equations and Z-transforms.
- To develop the proficiency in variational calculus and solving ODE's arising in engineering applications, using numerical methods.

Module 1	**Contact Hours**
Laplace Transform: Definition and Laplace transforms of elementary functions (statements only). Laplace transforms of Periodic functions (statement only) and unit-step function – problems. **Inverse Laplace Transform**: Definition and problems, Convolution theorem to find the inverse Laplace transforms (without Proof) and problems. Solution of linear differential equations using Laplace transforms. **RBT: L2, L3**	08
Module 2	
Fourier Series: Periodic functions, Dirichlet's condition. Fourier series of periodic functions period 2π and arbitrary period. Half range Fourier series. Practical harmonic analysis. **RBT: L1, L2**	08
Module 3	
Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Problems. **Difference Equations and Z-Transforms:** Difference equations, basic definition, z-transform-definition, Standard z-transforms, Damping and shifting rules, initial value and final value theorems (without proof) and problems, Inverse z-transformand applications to solve difference equations. **RBT: L1, L2**	08
Module 4	
Numerical Solutions of Ordinary Differential Equations(ODE's): Numerical solution of ODE's of first order and first degree- Taylor's series method, Modified Euler's method. Runge - Kutta method of fourth order, Milne's and Adam-Bashforthpredictor and corrector method (No derivations of formulae)-Problems. **RBT: L1, L2**	08
Module 5	
Numerical Solution of Second Order ODE's: Runge -Kutta method and Milne's predictor and corrector method. (No derivations of formulae). **Calculus of Variations:** Variation of function and functional, variational problems, Euler's	08

equation, Geodesics, hanging chain, problems. **RBT: L1, L2, L3**	

Course Outcomes: The student will be able to :

- Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
- Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
- Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
- Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
- Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2016
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017
3. Srimanta Pal et al , Engineering Mathematics, Oxford University Press, 3rd Edition, 2016

Reference Books:

1. C.Ray Wylie, Louis C.Barrett , Advanced Engineering Mathematics, McGraw-Hill Book Co, 6th Edition, 1995
2. S.S.Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India, 4th Edition 2010
3. B.V.Ramana, Higher Engineering Mathematics, McGraw-Hill, 11th Edition,2010
4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, 6th Edition, 2014

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU EDUSAT PROGRAMME – 20

ADDITIONAL MATHEMATICS – I
(Mandatory Learning Course: Common to All Branches)
(A Bridge course for Lateral Entry students under Diploma quota to BE/B.Tech programmes)
(Effective from the academic year 2018 -2019)
SEMESTER – III

Subject Code	18MATDIP31	**CIE Marks**	40
Number of Contact Hours/Week	2:1:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 00

Course Learning Objectives: This course will enable students to:

- To provide basic concepts of complex trigonometry, vector algebra, differential and integral calculus.
- To provide an insight into vector differentiation and first order ODE's.

Module 1	**Contact Hours**
Complex Trigonometry: Complex Numbers: Definitions and properties. Modulus and amplitude of a complex number, Argand's diagram, De-Moivre's theorem (without proof). **Vector Algebra:** Scalar and vectors. Addition and subtraction and multiplication of vectors-Dot and Cross products, problems. **RBT: L2, L2**	08
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. Jacobians of order two-Problems. **RBT: L1, L2**	08
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, Curl-simple problems. Solenoidal and irrotational vector fields-Problems. **RBT: L1, L2**	08
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 examples. **RBT: L1, L2**	08
Module 5	
Ordinary differential equations (ODE's. Introduction-solutions of first order and first degree differential equations: exact, linear differential equations. Equations reducible to exact and Bernoulli's equation. **RBT: L1, L2**	08

Course Outcomes: The student will be able to :

- Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area.
- Use derivatives and partial derivatives to calculate rate of change of multivariate functions.
- Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.
- Learn techniques of integration including the evaluation of double and triple integrals.

- Identify and solve first order ordinary differential equations.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015

Reference Books:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, 6th Edition, 2014
3. RohitKhurana , Engineering Mathematics Vol.I, Cengage Learning, 1st Edition, 2015.

DATA STRUCTURES AND APPLICATIONS (Effective from the academic year 2018 -2019) SEMESTER – III			
Subject Code	18CS32	**CIE Marks**	40
Number of Contact Hours/Week	3:2:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	3 Hrs
CREDITS –4			

Course Learning Objectives: This course will enable students to:

- Explain fundamentals of data structures and their applications essential for programming/problem solving.
- Illustrate linear representation of data structures: Stack, Queues, Lists, Trees and Graphs.
- Demonstrate sorting and searching algorithms.
- Find suitable data structure during application development/Problem Solving.

Module 1	**Contact Hours**
Introduction: Data Structures, Classifications (Primitive &Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Dynamically allocated arrays. **Array Operations**: Traversing, inserting, deleting, searching, and sorting. Multidimensional Arrays, Polynomials and Sparse Matrices. **Strings:** Basic Terminology, Storing, Operations and Pattern Matching algorithms. Programming Examples. **Textbook 1: Chapter 1: 1.2, Chapter 2: 2.2 - 2.7Text Textbook 2: Chapter 1: 1.1 - 1.4, Chapter 3: 3.1 - 3.3, 3.5, 3.7, Chapter 4: 4.1 - 4.9, 4.14Reference 3: Chapter 1: 1.4** **RBT: L1, L2, L3**	10
Module 2	
Stacks: Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression. **Recursion** - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, Ackerman's function. **Queues:** Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Dequeues, Priority Queues, A Mazing Problem. Multiple Stacks and Queues. Programming Examples. **Textbook 1: Chapter 3: 3.1 -3.7Textbook 2: Chapter 6: 6.1 -6.3, 6.5, 6.7-6.10, 6.12, 6.13** **RBT: L1, L2, L3**	10
Module 3	
Linked Lists: Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists – Polynomials, Sparse matrix representation. Programming Examples **Textbook 1: Chapter 4: 4.1 – 4.6, 4.8, Textbook 2: Chapter 5: 5.1 – 5.10,** **RBT: L1, L2, L3**	10
Module 4	
Trees: Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations. Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression, Programming Examples **Textbook 1: Chapter 5: 5.1 –5.5, 5.7; Textbook 2: Chapter 7: 7.1 – 7.9** **RBT: L1, L2, L3**	10
Module 5	
Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First	10

Search. **Sorting and Searching**: Insertion Sort, Radix sort, Address Calculation Sort. **Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing. **Files and Their Organization:**Data Hierarchy, File Attributes, Text Files and Binary Files, Basic File Operations, File Organizations and Indexing **Textbook 1: Chapter 6 : 6.1 –6.2, Chapter 7:7.2, Chapter 8 : 8.1-8.3** **Textbook 2: Chapter 8 : 8.1 – 8.7, Chapter 9 : 9.1-9.3, 9.7, 9.9** **Reference 2: Chapter 16 : 16.1 - 16.7** **RBT: L1, L2, L3**	

Course Outcomes: The student will be able to :

- Use different types of data structures, operations and algorithms
- Apply searching and sorting operations on files
- Use stack, Queue, Lists, Trees and Graphs in problem solving
- Implement all data structures in a high-level language for problem solving.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

Reference Books:

1. Gilberg&Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning,2014.
2. ReemaThareja, Data Structures using C, 3rd Ed, Oxford press, 2012.
3. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013
4. A M Tenenbaum, Data Structures using C, PHI, 1989
5. Robert Kruse, Data Structures and Program Design in C, 2nd Ed, PHI, 1996.

ANALOG AND DIGITAL ELECTRONICS
(Effective from the academic year 2018 -2019)
SEMESTER – III

Subject Code	18CS33	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Explain the use of photoelectronics devices, 555 timer IC, Regulator ICs and uA741 opamap IC
- Make use of simplifying techniques in the design of combinational circuits.
- Illustrate combinational and sequential digital circuits
- Demonstrate the use of flipflops and apply for registers
- Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techqniues.

Module 1	**ContactHours**
Photodiodes, Light Emitting Diodes and Optocouplers ,BJT Biasing :Fixed bias ,Collector to base Bias , voltage divider bias, Operational Amplifier Application Circuits: Multivibrators using IC-555, Peak Detector, Schmitt trigger, Active Filters, Non-Linear Amplifier, Relaxation Oscillator, Current-to-Voltage and Voltage-to-Current Converter , Regulated Power Supply Parameters, adjustable voltage regulator ,D to A and A to D converter. **Text Book 1 :Part A:Chapter 2(Section 2.9,2.10,2.11), Chapter 4(Section 4.2 ,4.3,4.4),Chapter 7 (section (7.2,7.3.1,7.4,7.6 to 7.11), Chapter 8 (section (8.1,8.5), Chapter 9** **RBT: L1, L2**	08
Module 2	
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-McClusky Method: determination of prime implicants, The prime implicant chart, petricks method, simplification of incompletely specified functions, simplification using map-entered variables **Text book 1:Part B: Chapter 5 (Sections 5.1 to 5.4) Chapter 6(Sections 6.1 to 6.5)** **RBT: L1, L2**	08
Module 3	
Combinational circuit design and simulation using gates: Review of Combinational circuit design, design of circuits with limited Gate Fan-in ,Gate delays and Timing diagrams, Hazards in combinational Logic, simulation and testing of logic circuits Multiplexers, Decoders and Programmable Logic Devices: Multiplexers, three state buffers, decoders and encoders, Programmable Logic devices, Programmable Logic Arrays, Programmable Array Logic. **Text book 1:Part B: Chapter 8,Chapter 9 (Sections 9.1 to 9.6)** **RBT: L1, L2**	08
Module 4	
Introduction to VHDL: VHDL description of combinational circuits, VHDL Models for multiplexers, VHDL Modules. Latches and Flip-Flops: Set Reset Latch, Gated Latches, Edge-Triggered D Flip Flop 3,SR Flip Flop, J K Flip Flop, T Flip Flop, Flip Flop with additional inputs, Asynchronous Sequential Circuits	08

Text book 1:Part B: Chapter 10(Sections 10.1 to 10.3),Chapter 11 (Sections 11.1 to 11.9) **RBT: L1, L2**	
Module 5	
Registers and Counters: Registers and Register Transfers, Parallel Adder with accumulator, shift registers, design of Binary counters, counters for other sequences, counter design using SR and J K Flip Flops, sequential parity checker, state tables and graphs **Text book 1:Part B: Chapter 12(Sections 12.1 to 12.5),Chapter 13(Sections 13.1,13.3** **RBT: L1, L2**	08

Course Outcomes: The student will be able to :

- Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
- Explain the basic principles of A/D and D/A conversion circuits and develop the same.
- Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods
- Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.
- Develop simple HDL programs

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Charles H Roth and Larry L Kinney, Raghunandan G H, Analog and Digital Electronics, Cengage Learning,2019

Reference Books:

1. Anil K Maini, Varsha Agarwal, Electronic Devices and Circuits, Wiley, 2012.
2. Donald P Leach, Albert Paul Malvino&GoutamSaha, Digital Principles and Applications, 8th Edition, Tata McGraw Hill, 2015.
3. M. Morris Mani, Digital Design, 4th Edition, Pearson Prentice Hall, 2008.
4. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008

COMPUTER ORGANIZATION (Effective from the academic year 2018 -2019) SEMESTER – III			
Subject Code	18CS34	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Explain the basic sub systems of a computer, their organization, structure and operation.
- Illustrate the concept of programs as sequences of machine instructions.
- Demonstrate different ways of communicating with I/O devices and standard I/O interfaces.
- Describe memory hierarchy and concept of virtual memory.
- Describe arithmetic and logical operations with integer and floating-point operands.
- Illustrate organization of a simple processor, pipelined processor and other computing systems.

Module 1	**ContactHours**
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, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions **Text book 1: Chapter1 – 1.3, 1.4, 1.6 (1.6.1-1.6.4, 1.6.7), Chapter2 – 2.2 to 2.10** **RBT: L1, L2, L3**	08
Module 2	
Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB. **Text book 1: Chapter4 – 4.1, 4.2, 4.4, 4.5, 4.6, 4.7** **RBT: L1, L2, L3**	08
Module 3	
Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations. **Text book 1: Chapter5 – 5.1 to 5.4, 5.5(5.5.1, 5.5.2), 5.6** **RBT: L1, L2, L3**	08
Module 4	
Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division. **Text book 1: Chapter2-2.1, Chapter6 – 6.1 to 6.6** **RBT: L1, L2, L3**	08
Module 5	
Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Micro programmed Control. **Pipelining:** Basic concepts of pipelining**,** **Text book 1: Chapter7, Chapter8 – 8.1** **RBT: L1, L2, L3**	08

Course Outcomes: The student will be able to :

- Explain the basic organization of a computer system.
- Demonstrate functioning of different sub systems, such as processor, Input/output,and memory.
- Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.
- Design and analyse simple arithmetic and logical units.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002. (Listed topics only from Chapters 1, 2, 4, 5, 6, 7, 8, 9 and12)

Reference Books:

1. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015.

SOFTWARE ENGINEERING
(Effective from the academic year 2018 -2019)
SEMESTER – III

Subject Code	18CS35	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Outline software engineering principles and activities involved in building large software programs.Identify ethical and professional issues and explain why they are of concern to software engineers.
- Explain the fundamentals of object oriented concepts
- Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation. Differentiate system models, use UML diagrams and apply design patterns.
- Discuss the distinctions between validation testing and defect testing.
- Recognize the importance of software maintenance and describe the intricacies involved in software evolution.Apply estimation techniques, schedule project activities and compute pricing.
- Identify software quality parameters and quantify software using measurements and metrics. List software quality standards and outline the practices involved.

Module 1	**Contact Hours**
Introduction: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies. **Software Processes**: Models: Waterfall Model **(Sec 2.1.1)**, Incremental Model **(Sec 2.1.2)** and Spiral Model **(Sec 2.1.3)**. Process activities. **Requirements Engineering**: Requirements Engineering Processes **(Chap 4)**. Requirements Elicitation and Analysis **(Sec 4.5).** Functional and non-functional requirements **(Sec 4.1)**. The software Requirements Document **(Sec 4.2)**. Requirements Specification **(Sec 4.3)**. Requirements validation **(Sec 4.6)**. Requirements Management **(Sec 4.7)**. **RBT: L1, L2, L3**	08
Module 2	
What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models. **Introduction, Modelling Concepts and Class Modelling:** What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models. Class Modelling: Object and Class Concept; Link and associations concepts; Generalization and Inheritance; A sample class model; Navigation of class models; **Textbook 2: Ch 1,2,3.** **RBT: L1, L2 L3**	08
Module 3	
System Models: Context models **(Sec 5.1)**. Interaction models **(Sec 5.2)**. Structural models **(Sec 5.3)**. Behavioral models **(Sec 5.4)**. Model-driven engineering **(Sec 5.5)**. **Design and Implementation**: Introduction to RUP **(Sec 2.4)**, Design Principles **(Chap 17)**. Object-oriented design using the UML **(Sec 7.1)**. Design patterns **(Sec 7.2)**. Implementation issues **(Sec 7.3)**. Open source development **(Sec 7.4)**. **RBT: L1, L2, L3**	08
Module 4	
Software Testing: Development testing **(Sec 8.1)**, Test-driven development **(Sec 8.2)**,	08

Release testing **(Sec 8.3)**, User testing **(Sec 8.4)**. Test Automation **(Page no 42, 70,212, 231,444,695)**. **Software Evolution**: Evolution processes **(Sec 9.1)**. Program evolution dynamics **(Sec 9.2)**. Software maintenance **(Sec 9.3)**. Legacy system management **(Sec 9.4)**. **RBT: L1, L2, L3**	
Module 5	
Project Planning: Software pricing **(Sec 23.1)**. Plan-driven development **(Sec 23.2)**. Project scheduling **(Sec 23.3)**: Estimation techniques **(Sec 23.5)**. **Quality management**: Software quality **(Sec 24.1)**. Reviews and inspections **(Sec 24.3)**. Software measurement and metrics **(Sec 24.4)**. Software standards **(Sec 24.2)** **RBT: L1, L2, L3**	08

Course Outcomes: The student will be able to :

- Design a software system, component, or process to meet desired needs within realistic constraints.
- Assess professional and ethical responsibility
- Function on multi-disciplinary teams
- Use the techniques, skills, and modern engineering tools necessary for engineering practice
- Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5, 7, 8, 9, 23, and 24)
2. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML,2nd Edition, Pearson Education,2005.

Reference Books:

1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.
2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India

DISCRETE MATHEMATICAL STRUCTURES (Effective from the academic year 2018 -2019) SEMESTER – III			
Subject Code	18CS36	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Provide theoretical foundations of computer science to perceive other courses in the programme.
- Illustrate applications of discrete structures: logic, relations, functions, set theory and counting.
- Describe different mathematical proof techniques,
- Illustrate the importance of graph theory in computer science

Module 1	**ContactHours**
Fundamentals of Logic: Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference. Fundamentals of Logic contd.: The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems. **Text book 1: Chapter2** **RBT: L1, L2, L3**	08
Module 2	
Properties of the Integers: The Well Ordering Principle – Mathematical Induction, **Fundamental Principles of Counting:** The Rules of Sum and Product, Permutations, Combinations – The Binomial Theorem, Combinations with Repetition. **Text book 1: Chapter4 – 4.1, Chapter1** **RBT: L1, L2, L3**	08
Module 3	
Relations and Functions: Cartesian Products and Relations, Functions – Plain and One-to-One, Onto Functions. The Pigeon-hole Principle, Function Composition and Inverse Functions. **Relations:** Properties of Relations, Computer Recognition – Zero-One Matrices and Directed Graphs, Partial Orders –Hasse Diagrams, Equivalence Relations and Partitions. **Text book 1: Chapter5 , Chapter7 – 7.1 to 7.4** **RBT: L1, L2, L3**	08
Module 4	
The Principle of Inclusion and Exclusion: The Principle of Inclusion and Exclusion, Generalizations of the Principle, Derangements – Nothing is in its Right Place, Rook Polynomials. **Recurrence Relations:** First Order Linear Recurrence Relation, The Second Order Linear Homogeneous Recurrence Relation with Constant Coefficients. **Text book 1: Chapter8 – 8.1 to 8.4, Chapter10 – 10.1, 10.2** **RBT: L1, L2, L3**	08
Module 5	
Introduction to Graph Theory: Definitions and Examples, Sub graphs, Complements, and Graph Isomorphism, **Trees**: Definitions, Properties, and Examples, Routed Trees, Trees and Sorting, Weighted Trees and Prefix Codes	08

Text book 1: Chapter11 – 11.1 to 11.2 Chapter12 – 12.1 to 12.4 **RBT: L1, L2, L3**	

Course Outcomes: The student will be able to :

- Use propositional and predicate logic in knowledge representation and truth verification.
- Demonstrate the application of discrete structures in different fields of computer science.
- Solve problems using recurrence relations and generating functions.
- Application of different mathematical proofs techniques in proving theorems in the courses.
- Compare graphs, trees and their applications.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education. 2004.

Reference Books:

1. Basavaraj S Anami and Venakanna S Madalli: Discrete Mathematics – A Concept based approach, Universities Press, 2016
2. Kenneth H. Rosen: Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007.
3. Jayant Ganguly: A Treatise on Discrete Mathematical Structures, Sanguine-Pearson, 2010.
4. D.S. Malik and M.K. Sen: Discrete Mathematical Structures: Theory and Applications, Thomson, 2004.
5. Thomas Koshy: Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008.

ANALOG AND DIGITAL ELECTRONICS LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – III

Subject Code	18CSL37	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours	36	**Exam Hours**	3 Hrs

CREDITS – 2

Course Learning Objectives: This course will enable students to:

This laboratory course enable students to get practical experience in design, assembly and evaluation/testing of

- Analog components and circuits including Operational Amplifier, Timer, etc.
- Combinational logic circuits.
- Flip - Flops and their operations
- Counters and registers using flip-flops.
- Synchronous and Asynchronous sequential circuits.
- A/D and D/A converters

Descriptions (if any):

- Simulation packages preferred: Multisim, Modelsim, PSpice or any other relevant.
- For Part A (Analog Electronic Circuits) students must trace the wave form on Tracing sheet / Graph sheet and label trace.
- Continuous evaluation by the faculty must be carried by including performance of a student in both hardware implementation and simulation (if any) for the given circuit.
- A batch not exceeding 4 must be formed for conducting the experiment. For simulation individual student must execute the program.

Laboratory Programs:

	PART A (Analog Electronic Circuits)
1.	Design an astablemultivibratorciruit for three cases of duty cycle (50%, <50% and >50%) using NE 555 timer IC. Simulate the same for any one duty cycle.
2.	Using ua 741 Opamp, design a 1 kHz Relaxation Oscillator with 50% duty cycle. And simulate the same.
3.	Using ua 741 opamap, design a window comparate for any given UTP and LTP. And simulate the same.
	PART B (Digital Electronic Circuits)
4.	Design and implement Half adder, Full Adder, Half Subtractor, Full Subtractor using basic gates. And implement the same in HDL.
5.	Given a 4-variable logic expression, simplify it using appropriate technique and realize the simplified logic expression using 8:1 multiplexer IC. And implement the same in HDL.
6.	Realize a J-K Master / Slave Flip-Flop using NAND gates and verify its truth table. And implement the same in HDL.
7.	Design and implement code converter I)Binary to Gray (II) Gray to Binary Code using basic gates.
8.	Design and implement a mod-n (n<8) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working.
9.	Design and implement an asynchronous counter using decade counter IC to count up from 0 to n (n<=9) and demonstrate on 7-segment display (using IC-7447)

Laboratory Outcomes: The student should be able to:

- Use appropriate design equations / methods to design the given circuit.
- Examine and verify the design of both analog and digital circuits using simulators.
- Make us of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.
- Compile a laboratory journal which includes; aim, tool/instruments/software/components used, design equations used and designs, schematics, program listing, procedure followed, relevant theory, results as graphs and tables, interpreting and concluding the findings.

Conduct of Practical Examination:

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accoradance with university regulations)*
  a) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  b) For laboratories having PART A and PART B
     i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
     ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

DATA STRUCTURES LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – III

Subject Code	18CSL38	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours	36	**Exam Hours**	3 Hrs

CREDITS – 2

Course Learning Objectives: This course will enable students to:

This laboratory course enable students to get practical experience in design, develop, implement, analyze and evaluation/testing of

- Asymptotic performance of algorithms.
- Linear data structures and their applications such as stacks, queues and lists
- Non-Linear data structures and their applications such as trees and graphs
- Sorting and searching algorithms

Descriptions (if any):

- Implement all the programs in 'C / C++'Programming Language and Linux / Windows as OS.

Programs List:

1.	Design, Develop and Implement a menu driven Program in C for the following array operations. a. Creating an array of N Integer Elements b. Display of array Elements with Suitable Headings c. Inserting an Element (ELEM) at a given valid Position (POS) d. Deleting an Element at a given valid Position(POS) e. Exit. Support the program with functions for each of the above operations.
2.	Design, Develop and Implement a Program in C for the following operationson Strings. a. Read a main String (STR), a Pattern String (PAT) and a Replace String (REP) b. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in STR with REP if PAT exists in STR. Report suitable messages in case PAT does not exist in STR Support the program with functions for each of the above operations. Don't use Built-in functions.
3.	Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) a. Push an Element on to Stack b. Pop an Element from Stack c. Demonstrate how Stack can be used to check Palindrome d. Demonstrate Overflow and Underflow situations on Stack e. Display the status of Stack f. Exit Support the program with appropriate functions for each of the above operations
4.	Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, %(Remainder), ^(Power) and alphanumeric operands.
5.	Design, Develop and Implement a Program in C for the following Stack Applications a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^ b. Solving Tower of Hanoi problem with n disks
6.	Design, Develop and Implement a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX) a. Insert an Element on to Circular QUEUE b. Delete an Element from Circular QUEUE

	c. Demonstrate Overflow and Underflow situations on Circular QUEUE d. Display the status of Circular QUEUE e. Exit Support the program with appropriate functions for each of the above operations
7.	Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: *USN, Name, Branch, Sem, PhNo* a. Create a SLL of N Students Data by using *front insertion*. b. Display the status of SLL and count the number of nodes in it c. Perform Insertion / Deletion at End of SLL d. Perform Insertion / Deletion at Front of SLL(Demonstration of stack) e. Exit
8.	Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: *SSN, Name, Dept, Designation, Sal, PhNo* a. Create a DLL of N Employees Data by using *end insertion*. b. Display the status of DLL and count the number of nodes in it c. Perform Insertion and Deletion at End of DLL d. Perform Insertion and Deletion at Front of DLL e. Demonstrate how this DLL can be used as Double Ended Queue. f. Exit
9.	Design, Develop and Implement a Program in C for the following operationson Singly Circular Linked List (SCLL) with header nodes a. Represent and Evaluate a Polynomial $P(x,y,z) = 6x^2y^2z-4yz^5+3x^3yz+2xy^5z-2xyz^3$ b. Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z) Support the program with appropriate functions for each of the above operations
10.	Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers . a. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2 b. Traverse the BST in Inorder, Preorder and Post Order c. Search the BST for a given element (KEY) and report the appropriate message d. Exit
11.	Design, Develop and Implement a Program in C for the following operations on Graph(G) of Cities a. Create a Graph of N cities using Adjacency Matrix. b. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method
12.	Given a File of N employee records with a set K of Keys(4-digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash Table(HT) of m memory locations with L as the set of memory addresses (2-digit) of locations in HT. Let the keys in K and addresses in L are Integers. Design and develop a Program in C that uses Hash function H: K $\rightarrow$L as H(K)=K mod m (remainder method), and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.
Laboratory Outcomes: The student should be able to:	
• Analyze and Compare various linear and non-linear data structures • Code, debug and demonstrate the working nature of different types of data structures and their applications • Implement, analyze and evaluate the searching and sorting algorithms • Choose the appropriate data structure for solving real world problems	
Conduct of Practical Examination:	
• Experiment distribution	

- For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
- For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.

- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accoradance with university regulations)*
  c) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  d) For laboratories having PART A and PART B
     i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
     ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS
(Effective from the academic year 2018 -2019)
SEMESTER – IV

Subject Code	18MAT41	**CIE Marks**	40
Number of Contact Hours/Week	2:2:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- To provide an insight into applications of complex variables, conformal mapping and special functions arising in potential theory, quantum mechanics, heat conduction and field theory.
- To develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, design engineering and microwave engineering.

Module 1	**Contact Hours**
Calculus of complex functions: Review offunction of a complex variable, limits, continuity, and differentiability. Analytic functions: Cauchy-Riemann equations in cartesian and polar forms and consequences. Construction of analytic functions : Milne-Thomson method- Problems. **RBT: L1, L2**	08
Module 2	
Conformal transformations: Introduction. Discussion of transformations: $w=z^2$, $w=e^z$, $w=z+\frac{1}{z},(z\neq 0)$. Bilinear transformations- Problems. **Complex integration**: Line integral of a complex function-Cauchy's theorem and Cauchy's integral formula and problems. **RBT: L1, L2**	08
Module 3	
Probability Distributions: Review of basic probability theory. Random variables (discrete and continuous), probability mass/density functions. Binomial, Poisson, exponential and normal distributions- problems (No derivation for mean and standard deviation)-Illustrative examples. **RBT: L1, L2, L3**	08
Module 4	
Curve Fitting: Curve fitting by the method of least squares- fitting the curves of the form- $y=ax+b, y=ax^b$ & $y=ax^2+bx+c.$ **Statistical Methods:** Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation-problems. Regression analysis- lines of regression –problems. **RBT: L1, L2, L3**	08
Module 5	
Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation and covariance.	08

Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, student's t-distribution, Chi-square distribution as a test of goodness of fit. **RBT:L2, L3, L4**	

Course Outcomes: The student will be able to :

- Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
- Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
- Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
- Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
- Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2016
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017
3. Srimanta Pal et al , Engineering Mathematics, Oxford University Press, 3rd Edition, 2016

Reference Books:

1. C.Ray Wylie, Louis C.Barrett , Advanced Engineering Mathematics, McGraw-Hill Book Co, 6th Edition, 1995
2. S.S.Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India, 4th Edition 2010
3. B.V.Ramana, Higher Engineering Mathematics, McGraw-Hill, 11th Edition,2010
4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, 6th Edition, 2014

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU EDUSAT PROGRAMME – 20

ADDITIONAL MATHEMATICS – II
(Mandatory Learning Course: Common to All Branches)
(A Bridge course for Lateral Entry students under Diploma quota to BE/B.Tech programmes)
(Effective from the academic year 2018 -2019)
SEMESTER – IV

Subject Code	18MATDIP41	**CIE Marks**	40
Number of Contact Hours/Week	2:1:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 0

Course Learning Objectives: This course will enable students to:

- To provide essential concepts of linear algebra, second & higher order differential equations along with methods to solve them.
- To provide an insight into elementary probability theory and numerical methods.

Module 1	**Contact Hours**
Linear Algebra: Introduction - rank of matrix by elementary row operations - Echelon form. Consistency of system of linear equations - Gauss elimination method. Eigen values and eigen vectors of a square matrix. Problems. **RBT: L2, L2**	08
Module 2	
Numerical Methods: Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae (Statements only)-problems. Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods (only formulae)- Illustrative examples. Numerical integration: Simpson's one third rule and Weddle's rule (without proof) Problems. **RBT: L1, L2, L3**	08
Module 3	
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 R(x)=* $e^{ax}, \sin ax / \cos ax$ *for* $f(D)y = R(x)$.] **RBT: L1, L2**	08
Module 4	
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 PDEs involving derivative with respect to one independent variable only. **RBT: L1, L2**	08
Module 5	
Probability: Introduction. Sample space and events. Axioms of probability. Addition & multiplication theorems. Conditional probability, Bayes's theorem, problems. **RBT: L1, L2**	08

Course Outcomes: The student will be able to :

- Solve systems of linear equations using matrix algebra.
- Apply the knowledge of numerical methods in modelling and solving engineering problems.
- Make use of analytical methods to solve higher order differential equations.
- Classify partial differential equations and solve them by exact methods.
- Apply elementary probability theory and solve related problems.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015

Reference Books:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2016
2. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, 6th Edition, 2014
3. RohitKhurana , Engineering Mathematics Vol.I, Cengage Learning, 1st Edition, 2015.

DESIGN AND ANALYSIS OF ALGORITHMS (Effective from the academic year 2018 -2019) SEMESTER – IV			
Subject Code	18CS42	**CIE Marks**	40
Number of Contact Hours/Week	3:2:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –4			

Course Learning Objectives: This course will enable students to:

- Explain various computational problem solving techniques.
- Apply appropriate method to solve a given problem.
- Describe various methods of algorithm analysis.

Module 1	**Contact Hours**
Introduction: What is an Algorithm? **(T2:1.1),** Algorithm Specification **(T2:1.2),** Analysis Framework **(T1:2.1),Performance Analysis**: Space complexity, Time complexity **(T2:1.3)**. **Asymptotic Notations:** Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ), and Little-oh notation (o), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples **(T1:2.2, 2.3, 2.4).Important Problem Types:**Sorting, Searching, String processing, Graph Problems, Combinatorial Problems. **Fundamental Data Structures:**Stacks, Queues, Graphs, Trees, Sets and Dictionaries. **(T1:1.3,1.4).** **RBT: L1, L2, L3**	8
Module 2	
Divide and Conquer: General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum **(T2:3.1, 3.3, 3.4)**, Merge sort, Quick sort **(T1:4.1, 4.2)**, Strassen's matrix multiplication **(T2:3.8)**, Advantages and Disadvantages of divide and conquer. **Decrease and Conquer Approach:** Topological Sort. **(T1:5.3).** **RBT: L1, L2, L3**	8
Module 3	
Greedy Method: General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines **(T2:4.1, 4.3, 4.5).Minimum cost spanning trees:** Prim's Algorithm, Kruskal's Algorithm **(T1:9.1, 9.2)**. **Single source shortest paths:** Dijkstra's Algorithm **(T1:9.3)**. **Optimal Tree problem:**Huffman Trees and Codes **(T1:9.4)**. **Transform and Conquer Approach:** Heaps and Heap Sort **(T1:6.4)**. **RBT: L1, L2, L3**	8
Module 4	
Dynamic Programming: General method with Examples, Multistage Graphs **(T2:5.1, 5.2)**. **Transitive Closure:**Warshall's Algorithm, **All Pairs Shortest Paths:**Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem **((T1:8.2, 8.3, 8.4)**, Bellman-Ford Algorithm **(T2:5.4)**, Travelling Sales Person problem **(T2:5.9)**, Reliability design **(T2:5.8)**. **RBT: L1, L2, L3**	8
Module 5	
Backtracking: General method **(T2:7.1)**, N-Queens problem **(T1:12.1)**, Sum of subsets problem **(T1:12.1)**, Graph coloring**(T2:7.4)**, Hamiltonian cycles **(T2:7.5)**. **Branch and Bound:** Assignment Problem, Travelling Sales Person problem **(T1:12.2)**, **0/1 Knapsack problem (T2:8.2, T1:12.2):** LC Branch and Bound solution **(T2:8.2)**, FIFO Branch and Bound solution **(T2:8.2)**. **NP-Complete and NP-Hard problems:** Basic concepts, non-deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes **(T2:11.1)**. **RBT: L1, L2, L3**	8

Course Outcomes: The student will be able to :

- Describe computational solution to well known problems like searching, sorting etc.
- Estimate the computational complexity of different algorithms.

- Devise an algorithm using appropriate design strategies for problem solving.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Introduction to the Design and Analysis of Algorithms, AnanyLevitin:, 2rd Edition, 2009. Pearson.
2. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press

Reference Books:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
2. Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education).

OPERATING SYSTEMS (Effective from the academic year 2018 -2019) SEMESTER – IV			
Subject Code	18CS43	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Introduce concepts and terminology used in OS
- Explain threading and multithreaded systems
- Illustrate process synchronization and concept of Deadlock
- Introduce Memory and Virtual memory management, File system and storage techniques

Module 1	**Contact 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; Computing environments. **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; Operating System generation; System boot. **Process Management** Process concept; Process scheduling; Operations on processes; Inter process communication **Text book 1: Chapter 1, 2.1, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9, 2.10, 3.1, 3.2, 3.3, 3.4** **RBT: L1, L2, L3**	08
Module 2	
Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. **Process Synchronization:** Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors. **Text book 1: Chapter 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7** **RBT: L1, L2, L3**	08
Module 3	
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. **Text book 1: Chapter 7, 8.1 to 8.6** **RBT: L1, L2, L3**	08
Module 4	
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. **Text book 1: Chapter 91. To 9.6, 10.1 to 10.5**	08

RBT: L1, L2, L3	
Module 5	
Secondary Storage Structures, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability- Based systems. **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. **Text book 1: Chapter 12.1 to 12.6, 21.1 to 21.9** **RBT: L1, L2, L3**	08

Course Outcomes: The student will be able to :

- Demonstrate need for OS and different types of OS
- Apply suitable techniques for management of different resources
- Use processor, memory, storage and file system commands
- Realize the different concepts of OS in platform of usage through case studies

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006

Reference Books:

1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition
2. D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.
4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

MICROCONTROLLER AND EMBEDDED SYSTEMS (Effective from the academic year 2018 -2019) SEMESTER – IV			
Subject Code	18CS44	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system.
- Program ARM controller using the various instructions
- Identify the applicability of the embedded system
- Comprehend the real time operating system used for the embedded system

Module 1	**Contact Hours**
Microprocessors versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table , Core Extensions **Text book 1: Chapter 1 - 1.1 to 1.4, Chapter 2 - 2.1 to 2.5** **RBT: L1, L2**	08
Module 2	
Introduction to the ARM Instruction Set : Data Processing Instructions , Branch Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants **ARM programming using Assembly language:** Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation, Conditional Execution, Looping Constructs **Text book 1: Chapter 3:Sections 3.1 to 3.6 (Excluding 3.5.2), Chapter 6(Sections 6.1 to 6.6)** **RBT: L1, L2**	08
Module 3	
Embedded System Components: Embedded Vs General computing system, History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components. **Text book 2:Chapter 1(Sections 1.2 to 1.6),Chapter 2(Sections 2.1 to 2.6)** **RBT: L1, L2**	08
Module 4	
Embedded System Design Concepts: Characteristics and Quality Attributes of Embedded Systems, Operational quality attributes ,non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design and Program Modelling, embedded firmware design and development **Text book 2: Chapter-3, Chapter-4, Chapter-7 (Sections 7.1, 7.2 only), Chapter-9**	08

(Sections 9.1, 9.2, 9.3.1, 9.3.2 only) **RBT: L1, L2**	
Module 5	
RTOS and IDE for Embedded System Design: Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program), Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan. **Text book 2: Chapter-10 (Sections 10.1, 10.2, 10.3, 10.4 , 10.7, 10.8.1.1, 10.8.1.2, 10.8.2.2, 10.10 only), Chapter 12, Chapter-13 (block diagram before 13.1, 13.3, 13.4, 13.5, 13.6 only)** **RBT: L1, L2**	08

Course Outcomes: The student will be able to :

- Describe the architectural features and instructions of ARM microcontroller
- Apply the knowledge gained for Programming ARM for different applications.
- Interface external devices and I/O with ARM microcontroller.
- Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
- Develop the hardware /software co-design and firmware design approaches.
- Demonstrate the need of real time operating system for embedded system applications

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition.

Reference Books:

1. Raghunandan..G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019
2. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005.
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

OBJECT ORIENTED CONCEPTS (Effective from the academic year 2018 -2019) SEMESTER – IV			
Subject Code	18CS45	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Learn fundamental features of object oriented language and JAVA
- Set up Java JDK environment to create, debug and run simple Java programs.
- Create multi-threaded programs and event handling mechanisms.
- Introduce event driven Graphical User Interface (GUI) programming using applets and swings.

Module 1	**Contact Hours**
Introduction to Object Oriented Concepts: A Review of structures, Procedure–Oriented Programming system, Object Oriented Programming System, Comparison of Object Oriented Language with C, Console I/O, variables and reference variables, Function Prototyping, Function Overloading. **Class and Objects:** Introduction, member functions and data, objects and functions. **Text book 1: Ch 1: 1.1 to 1.9 Ch 2: 2.1 to 2.3** **RBT: L1, L2**	08
Module 2	
Class and Objects (contd): Objects and arrays, Namespaces, Nested classes, Constructors, Destructors. **Introduction to Java**: Java's magic: the Byte code; Java Development Kit (JDK); the Java Buzzwords, Object-oriented programming; Simple Java programs. Data types, variables and arrays, Operators, Control Statements. **Text book 1:Ch 2: 2.4 to 2.6Ch 4: 4.1 to 4.2** **Text book 2: Ch:1 Ch: 2 Ch:3 Ch:4 Ch:5** **RBT: L1, L2**	08
Module 3	
Classes, Inheritance,Exception Handling: Classes: Classes fundamentals; Declaring objects; Constructors, this keyword, garbage collection. **Inheritance:** inheritance basics, using super, creating multi level hierarchy, method overriding. **Exception handling:** Exception handling in Java. **Text book 2: Ch:6 Ch: 8 Ch:10** **RBT: L1, L2, L3**	08
Module 4	
Packages and Interfaces: Packages, Access Protection,ImportingPackages.Interfaces. **Multi ThreadedProgramming:**Multi Threaded Programming: What are threads? How to make the classes threadable ; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, producer consumer problems. **Text book 2: CH: 9 Ch 11:** **RBT: L1, L2, L3**	08
Module 5	
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. **Swings:** Swings: The origins of Swing; Two key Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; Jlabel and ImageIcon; JTextField;The Swing Buttons; JTabbedpane; JScrollPane; JList;	08

JComboBox; JTable. **Text book 2: Ch 22: Ch: 29 Ch: 30** **RBT: L1, L2, L3**	

Course Outcomes: The student will be able to :

- Explain the object-oriented concepts and JAVA.
- Develop computer programs to solve real world problems in Java.
- Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using swings.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Sourav Sahay, Object Oriented Programming with C++ , 2nd Ed, Oxford University Press,2006
2. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Reference Books:

1. Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806
2. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.
3. Stanley B.Lippmann, JoseeLajore, C++ Primer, 4th Edition, Pearson Education, 2005.
4. RajkumarBuyya,SThamarasiselvi, xingchenchu, Object oriented Programming with java, Tata McGraw Hill education private limited.
5. Richard A Johnson, Introduction to Java Programming and OOAD, CENGAGE Learning.
6. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.

Mandatory Note: Every institute shall organize bridge course on C++, either in the vacation or in the beginning of even semester for a minimum period of ten days (2hrs/day). Maintain a copy of the report for verification during LIC visit.

Faculty can utilize open source tools to make teaching and learning more interactive.

DATA COMMUNICATION (Effective from the academic year 2018 -2019) SEMESTER – IV			
Subject Code	18CS46	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Explain with the basics of data communication and various types of computer networks;
- Demonstrate Medium Access Control protocols for reliable and noisy channels.
- Expose wireless and wired LANs.

Module 1	**Contact Hours**
Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration, **Networks Models**: Protocol Layering, TCP/IP Protocol suite, The OSI model, **Introduction to Physical Layer-1:** Data and Signals**,** Digital Signals, Transmission Impairment, Data Rate limits, Performance. **Textbook1: Ch 1.1 to 1.5, 2.1 to 2.3, 3.1, 3.3 to 3.6** **RBT: L1, L2**	08
Module 2	
Digital Transmission: Digital to digital conversion (Only Line coding: Polar, Bipolar and Manchester coding). **Physical Layer-2:** Analog to digital conversion (only PCM), Transmission Modes, **Analog Transmission**: Digital to analog conversion. **Textbook1: Ch 4.1 to 4.3, 5.1** **RBT: L1, L2**	08
Module 3	
Bandwidth Utilization: Multiplexing and Spread Spectrum, **Switching**: Introduction, Circuit Switched Networks and Packet switching. **Error Detection and Correction**: Introduction, Block coding, Cyclic codes, Checksum, **Textbook1: Ch 6.1, 6.2, 8.1 to 8.3, 10.1 to 10.4** **RBT: L1, L2**	08
Module 4	
Data link control: DLC services, Data link layer protocols, Point to Point protocol (Framing, Transition phases only). **Media Access control**: Random Access, Controlled Access and Channelization, **Introduction to Data-Link Layer:** Introduction, Link-Layer Addressing, ARP **IPv4 Addressing and subnetting:** Classful and CIDR addressing, DHCP, NAT **Textbook1: Ch 9.1, 9.2, 11.1, 11.2 11.4, 12.1 to 12.3, 18.4** **RBT: L1, L2**	08
Module 5	
Wired LANs Ethernet: Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet, **Wireless LANs:** Introduction, IEEE 802.11 Project and Bluetooth. **Other wireless Networks**: Cellular Telephony	08

Textbook1: Ch 13.1 to 13.5, 15.1 to 15.3, 16.2 **RBT: L1, L2**	

Course Outcomes: The student will be able to :

- Explain the various components of data communication.
- Explain the fundamentals of digital communication and switching.
- Compare and contrast data link layer protocols.
- Summarize IEEE 802.xx standards

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Behrouz A. Forouzan, Data Communications and Networking 5E, 5th Edition, Tata McGraw-Hill, 2013.

Reference Books:

1. Alberto Leon-Garcia and IndraWidjaja: Communication Networks - Fundamental Concepts and Key architectures, 2nd Edition Tata McGraw-Hill, 2004.
2. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
3. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.
4. Nader F. Mir: Computer and Communication Networks, Pearson Education, 2007.

DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – IV

Subject Code	18CSL47	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours	36	**Exam Hours**	3 Hrs

Credits – 2

Course Learning Objectives: This course will enable students to:

- Design and implement various algorithms in JAVA
- Employ various design strategies for problem solving.
- Measure and compare the performance of different algorithms.

Descriptions (if any):

- Design, develop, and implement the specified algorithms for the following problems using Java language under LINUX /Windows environment. Netbeans / Eclipse or IntellijIdea Community Edition IDE tool can be used for development and demonstration.
- **Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.**

Programs List:

1.	
a.	Create a Java class called ***Student***with the following details as variables within it. (i) USN (ii) Name (iii) Branch (iv) Phone Write a Java program to create *nStudent* objects and print the USN, Name, Branch, and Phoneof these objects with suitable headings.
b.	Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.
2.	
a.	Design a superclass called ***Staff*** with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely ***Teaching*** (domain, publications), ***Technical*** (skills), and ***Contract*** (period). Write a Java program to read and display at least 3 *staff* objects of all three categories.
b.	Write a Java class called ***Customer*** to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as "/".
3.	
a.	Write a Java program to read two integers *a*and*b*. Compute *a*/*b* and print, when *b* is not zero. Raise an exception when *b* is equal to zero.
b.	Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number andprints; third thread will print the value of cube of the number.
4.	Sort a given set of ***n*** integer elements using **Quick Sort** method and compute its time complexity. Run the program for varied values of *n*> 5000 and record the time taken to sort. Plot a graph of the time taken versus ***n***on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.

5.	Sort a given set of ***n*** integer elements using **Merge Sort** method and compute its time complexity. Run the program for varied values of *n*> 5000, and record the time taken to sort. Plot a graph of the time taken versus ***n***on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
6.	Implement in Java, the **0/1 Knapsack** problem using (a) Dynamic Programming method (b) Greedy method.
7.	From a given vertex in a weighted connected graph, find shortest paths to other vertices using **Dijkstra's algorithm**. Write the program in Java.
8.	Find Minimum Cost Spanning Tree of a given connected undirected graph using **Kruskal'salgorithm.** Use Union-Find algorithms in your program
9.	Find Minimum Cost Spanning Tree of a given connected undirected graph using **Prim's algorithm**.
10.	Write Java programs to (a) Implement All-Pairs Shortest Paths problem using **Floyd's algorithm**. (b) Implement **Travelling Sales Person problem** using Dynamic programming.
11.	Design and implement in Java to find a **subset** of a given set **S** = {Sl, S2,.....,Sn} of ***n*** positive integers whose SUM is equal to a given positive integer ***d***. For example, if S ={1, 2, 5, 6, 8} and ***d***= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.
12.	Design and implement in Java to find all **Hamiltonian Cycles** in a connected undirected Graph G of *n* vertices using backtracking principle.

Laboratory Outcomes: The student should be able to:

- Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
- Implement a variety of algorithms such assorting, graph related, combinatorial, etc., in a high level language.
- Analyze and compare the performance of algorithms using language features.
- Apply and implement learned algorithm design techniques and data structuresto solve real-world problems.

Conduct of Practical Examination:

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accoradance with university regulations)*
  e) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  f) For laboratories having PART A and PART B
    i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
    ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – IV

Subject Code	18CSL48	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours	36	**Exam Hours**	3 Hrs

Credits – 2

Course Learning Objectives: This course will enable students to:

- Develop and test Program using ARM7TDMI/LPC2148
- Conduct the experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' &Keil Uvision-4 tool/compiler.

Descriptions (if any):

Programs List:

PART A Conduct the following experiments by writing program using ARM7TDMI/LPC2148 using an evaluation board/simulator and the required software tool.

1.	Write a program to multiply two 16 bit binary numbers.
2.	Write a program to find the sum of first 10 integer numbers.
3.	Write a program to find factorial of a number.
4.	Write a program to add an array of 16 bit numbers and store the 32 bit result in internal RAM
5.	Write a program to find the square of a number (1 to 10) using look-up table.
6.	Write a program to find the largest/smallest number in an array of 32 numbers .
7.	Write a program to arrange a series of 32 bit numbers in ascending/descending order.
8.	Write a program to count the number of ones and zeros in two consecutive memory locations.

PART –B Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' &Keil Uvision-4 tool/compiler.

9.	Display "Hello World" message using Internal UART.
10.	Interface and Control a DC Motor.
11.	Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.
12.	Determine Digital output for a given Analog input using Internal ADC of ARM controller.
13.	Interface a DAC and generate Triangular and Square waveforms.
14.	Interface a 4x4 keyboard and display the key code on an LCD.
15.	Demonstrate the use of an external interrupt to toggle an LED On/Off.
16.	Display the Hex digits 0 to F on a 7-segment LED interface, with an appropriate delay in between

Laboratory Outcomes: The student should be able to:

- Develop and test program using ARM7TDMI/LPC2148
- Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' &Keil Uvision-4 tool/compiler.

Conduct of Practical Examination:

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accoradance with university regulations)*
  g) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  h) For laboratories having PART A and PART B
    i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
    ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY
(Effective from the academic year 2018 -2019)
SEMESTER – V

Subject Code	18CS51	**CIE Marks**	40
Number of Contact Hours/Week	2:2:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

- Explain the principles of management, organization and entrepreneur.
- Discuss on planning, staffing, ERP and their importance
- Infer the importance of intellectual property rights and relate the institutional support

Module – 1	**CH**
Introduction - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories,. Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection **RBT: L1, L2**	08
Module – 2	
Directing and controlling- meaning and nature of directing, leadership styles, motivationTheories, Communication- Meaning and importance, Coordination- meaning andimportance, Controlling- meaning, steps in controlling, methods of establishing control. **RBT: L1, L2**	08
Module – 3	
Entrepreneur – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study. **RBT: L1, L2**	08
Module – 4	
Preparation of project and ERP - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, **Enterprise Resource Planning: Meaning and Importance- ERP** and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation **RBT: L1, L2**	08
Module 5 **Micro and Small Enterprises:** Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India indusial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy &Infosys), **Institutional support:** MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, **Introduction to IPR.** **RBT: L1, L2**	

Course outcomes: The students should be able to:

- Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship
- Utilize the resources available effectively through ERP
- Make use of IPRs and institutional support in entrepreneurship

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6th Edition, 2010.
2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.
3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.
4. Management and Entrepreneurship - KanishkaBedi- Oxford University Press-2017

Reference Books:

1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson.
2. Entrepreneurship Development -S S Khanka -S Chand & Co.
3. Management -Stephen Robbins -Pearson Education /PHI -17th Edition, 2003

PYTHON PROGRAMMING
[(Effective from the academic year 2018 -2019)
SEMESTER – V

Subject Code	18AI52	**IA Marks**	40
Number of Lecture Hours/Week	3:2:0	**Exam Marks**	60
Total Number of Lecture Hours	50	**Exam Hours**	03

CREDITS – 04

Course Learning Objectives: This course will enable students to:

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

Module – 1	**Contact 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 **Textbook 1: Chapters 1 – 3** **RBT: L1, L2**	10
Module – 2	
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, Project: Password Locker, Project: Adding Bullets to Wiki Markup **Textbook 1: Chapters 4 – 6** **RBT: L1, L2, L3**	10
Module – 3	
Pattern Matching with Regular Expressions, Finding Patterns of Text Without Regular Expressions, Finding Patterns of Text with Regular Expressions,More Pattern Matching with Regular Expressions, Greedy and Nongreedy Matching, The findall() Method, Character Classes, Making Your Own Character Classes, The Caret and Dollar Sign Characters, The Wildcard Character, Review of Regex Symbols, Case-Insensitive Matching, Substituting Strings with the sub() Method, Managing Complex Regexes, Combining re .IGNORECASE, re .DOTALL, and re .VERBOSE, Project: Phone Number and Email Address Extractor, **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: Multiclipboard. **Textbook 1: Chapters 7 – 10** **RBT: L1, L2, L3**	10

Module – 4	
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,Theinit 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 **Textbook 2: Chapters 15 – 18** **RBT: L1, L2, L3**	10
Module – 5	
Web Scraping, Project: MAPIT.PY with the webbrowser Module, Downloading Files from the Web with the requests Module, Saving Downloaded Files to the Hard Drive, HTML, Parsing HTML with the BeautifulSoup Module, Project: "I'm Feeling Lucky" Google Search,Project: Downloading All XKCD Comics, Controlling the Browser with the selenium Module, **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, Project: Removing the Header from CSV Files, JSON and APIs, The json Module, Project: Fetching Current Weather Data **Textbook 1: Chapters 11 – 14** **RBT: L1, L2, L3**	10

Course Outcomes: After studying this course, students will be able to

- Demonstrate proficiency in handling of loops and creation of functions.
- Identify the methods to create and manipulate lists, tuples and dictionaries.
- Discover the commonly used operations involving regular expressions and file system.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Determine the need for scraping websites and working with CSV, JSON and other file formats.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Al Sweigart,**"Automate the Boring Stuff with Python",**1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/)
   (Chapters 1 to 18)
2. Allen B. Downey, **"Think Python: How to Think Like a Computer Scientist",** 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf)
   (Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above links)

Reference Books:

1. Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data",** 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2. Charles Dierbach, **"Introduction to Computer Science Using Python",** 1st Edition, Wiley India Pvt Ltd, 2015. ISBN-13: 978-8126556014
3. Wesley J Chun, **"Core Python Applications Programming",** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

DATABASE MANAGEMENT SYSTEM (Effective from the academic year 2018 -2019) SEMESTER – V			
Subject Code	18CS53	**CIE Marks**	40
Number of Contact Hours/Week	3:2:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	3 Hrs
CREDITS –4			

Course Learning Objectives: This course will enable students to:

- Provide a strong foundation in database concepts, technology, and practice.
- Practice SQL programming through a variety of database problems.
- Demonstrate the use of concurrency and transactions in database
- Design and build database applications for real world problems.

Module 1	**Contact Hours**
Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. **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. **Conceptual Data Modelling using Entities and Relationships:** Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization. **Textbook 1:Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10** **RBT: L1, L2, L3**	10
Module 2	
Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. **Relational Algebra:** Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. **Mapping Conceptual Design into a Logical Design:** Relational Database Design using ER-to-Relational mapping. **SQL:** SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL. **Textbook 1: Ch4.1 to 4.5, 5.1 to 5.3, 6.1 to 6.5, 8.1; Textbook 2: 3.5** **RBT: L1, L2, L3**	10
Module 3	
SQL : Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. **Database Application Development:** Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop. **Internet Applications:** The three-Tier application architecture, The presentation layer, The Middle Tier **Textbook 1: Ch7.1 to 7.4; Textbook 2: 6.1 to 6.6, 7.5 to 7.7.** **RBT: L1, L2, L3**	10
Module 4	
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. **Normalization Algorithms:** Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms **Textbook 1: Ch14.1 to 14.7, 15.1 to 15.6**	10

RBT: L1, L2, L3	
Module 5	
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. **Introduction to Database Recovery Protocols:** Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failures **Textbook 1: 20.1 to 20.6, 21.1 to 21.7, 22.1 to 22.4, 22.7.** **RBT: L1, L2, L3**	10

Course Outcomes: The student will be able to :

- Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.
- Use Structured Query Language (SQL) for database manipulation.
- Design and build simple database systems
- Develop application to interact with databases.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Fundamentals of Database Systems, RamezElmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

Reference Books:

1. SilberschatzKorth and Sudharshan, Database System Concepts, 6th Edition, Mc-GrawHill, 2013.
2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.

AUTOMATA THEORY AND COMPUTABILITY (Effective from the academic year 2018 -2019) SEMESTER – V			
Subject Code	18CS54	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Introduce core concepts in Automata and Theory of Computation
- Identify different Formal language Classes and their Relationships
- Design Grammars and Recognizers for different formal languages
- Prove or disprove theorems in automata theory using their properties
- Determine the decidability and intractability of Computational problems

Module 1	**Contact Hours**
Why study the Theory of Computation, Languages and Strings: Strings, Languages. A Language Hierarchy, Computation, **Finite State Machines (FSM)**: Deterministic FSM, Regular languages, Designing FSM, Nondeterministic FSMs, From FSMs to Operational Systems, Simulators for FSMs, Minimizing FSMs, Canonical form of Regular languages, Finite State Transducers, Bidirectional Transducers. **Textbook 1: Ch 1,2, 3,4, 5.1 to 5.10** **RBT: L1, L2**	08
Module 2	
Regular Expressions (RE): what is a RE?, Kleene's theorem, Applications of REs, Manipulating and Simplifying REs. Regular Grammars: Definition, Regular Grammars and Regular languages. Regular Languages (RL) and Non-regular Languages: How many RLs, To show that a language is regular, Closure properties of RLs, to show some languages are not RLs. **Textbook 1: Ch 6, 7, 8: 6.1 to 6.4, 7.1, 7.2, 8.1 to 8.4** **RBT: L1, L2, L3**	08
Module 3	
Context-Free Grammars(CFG): Introduction to Rewrite Systems and Grammars, CFGs and languages, designing CFGs, simplifying CFGs, proving that a Grammar is correct, Derivation and Parse trees, Ambiguity, Normal Forms. Pushdown Automata (PDA): Definition of non-deterministic PDA, Deterministic and Non-deterministic PDAs, Non-determinism and Halting, alternative equivalent definitions of a PDA, alternatives that are not equivalent to PDA. **Textbook 1: Ch 11, 12: 11.1 to 11.8, 12.1, 12.2, 12,4, 12.5, 12.6** **RBT: L1, L2, L3**	08
Module 4	
Algorithms and Decision Procedures for CFLs: Decidable questions, Un-decidable questions. **Turing Machine**: Turing machine model, Representation, Language acceptability by TM, design of TM, Techniques for TM construction. Variants of Turing Machines (TM), The model of Linear Bounded automata. **Textbook 1: Ch 14: 14.1, 14.2, Textbook 2: Ch 9.1 to 9.8** **RBT: L1, L2, L3**	08
Module 5	
Decidability: Definition of an algorithm, decidability, decidable languages, Undecidable languages, halting problem of TM, Post correspondence problem. Complexity: Growth rate of functions, the classes of P and NP, Quantum Computation: quantum computers, Church-Turing thesis. **Applications:** G.1 Defining syntax of programming language, Appendix J: Security **Textbook 2: 10.1 to 10.7, 12.1, 12.2, 12.8, 12.8.1, 12.8.2** **Textbook 1: Appendix: G.1(only), J.1 & J.2**	08

RBT: L1, L2, L3

Course Outcomes: The student will be able to :

- Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation
- Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).
- Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
- Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness.
- Classify a problem with respect to different models of Computation.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Elaine Rich, Automata, Computability and Complexity, 1st Edition, Pearson education,2012/2013
2. K L P Mishra, N Chandrasekaran , 3rd Edition, Theory of Computer Science, PhI, 2012.

Reference Books:

1. John E Hopcroft, Rajeev Motwani, Jeffery D Ullman, Introduction to AutomataTheory, Languages, and Computation, 3rd Edition, Pearson Education, 2013
2. Michael Sipser : Introduction to the Theory of Computation, 3rd edition, Cengage learning,2013
3. John C Martin, Introduction to Languages and The Theory of Computation, 3rd Edition, Tata McGraw –Hill Publishing Company Limited, 2013
4. Peter Linz, "An Introduction to Formal Languages and Automata", 3rd Edition, NarosaPublishers, 1998
5. Basavaraj S. Anami, Karibasappa K G, Formal Languages and Automata theory, Wiley India, 2012
6. C K Nagpal, Formal Languages and Automata Theory, Oxford University press, 2012.

Faculty can utilize open source tools (like JFLAP) to make teaching and learning more interactive.

PRINCIPLES OF ARTIFICIAL INTELLIGENCE
(Effective from the academic year 2018 -2019)
SEMESTER – V

Subject Code	18AI55	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

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, knowledge representation, and learning.

Module – 1	**CH**
Introduction to AI: history, Intelligent systems, foundation and sub area of AI , applications, current trend and development of AI. **Problem solving**: state space search and control strategies. **Chapter 1 and 2** **RBT: L1, L2**	08
Module – 2	
Problem reduction and Game playing : Problem reduction, game playing, Bounded look-ahead strategy, alpha-beta pruning, Two player perfect information games **Chapter 3** **RBT: L1, L2**	08
Module – 3	
Logic concepts and logic Programming: propositional calculus, Propositional logic, natural deduction system, semantic tableau system, resolution refutation, predicate logic, Logic programming. **Chapter 4** **RBT: L1, L2**	08
Module – 4	
Advanced problem solving paradigm: Planning: types of planning sytem, block world problem, logic based planning, Linear planning using a goal stack, Means-ends analysis, Non linear planning strategies, learning plans **Chapter 6.** **RBT: L1, L2**	08
Module – 5	
Knowledge Representation , Expert system Approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, Knowledge representation using Frames. Expert system: introduction phases, architecture ES verses Traditional system **Chapter 7 and 8 (8.1 to 8.4)** **RBT: L1, L2**	08

Course outcomes: The students should be able to:

- Apply the knowledge of Artificial Intelligence to write simple algorithm for agents.
- Apply the AI knowledge to solve problem on search algorithm.
- Develop knowledge base sentences using propositional logic and first order logic.
- Apply first order logic to solve knowledge engineering process.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Saroj Kaushik, Artificial Intelligence, Cengage learning, 2014

Reference Books:

1. Elaine Rich, Kevin Knight, Artificial Intelligence, Tata McGraw Hill
2. Nils J. Nilsson, Principles of Artificial Intelligence, Elsevier, 1980
3. StaurtRussel, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Education, 3rd Edition, 2009
4. George F Lugar, Artificial Intelligence Structure and strategies for complex, Pearson Education, 5th Edition, 2011

MATHEMATICS FOR MACHINE LEARNING
(Effective from the academic year 2018 -2019)
SEMESTER – V

Subject Code	18AI56	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

- Improve the skills and knowledge in linear algebra to get more out of machine learning.
- Understand the vector calculus required to build many common machine learning techniques.
- Learn the probability and distribution in statistics to build machine learning applications.
- Learn the basic theoretical properties of optimization problems, for applications in machine learning

Module – 1	**CH**
Linear Algebra-Part1: Introduction,Matrices , System of Linear Equations, Vector Spaces, Linear Dependence and Independence, Gaussian Elimination, Basis and basis set, Rank, Norms , Inner Products, Lengths and Distances, Angles **(Ch: 2-2.6, Ch:3-3.3)** **RBT: L1, L2**	08
Module – 2	
Linear Algebra-Part2: Orthogonality, Orthonormal Basis, Orthogonal Complement, Rotations, Determinant and Trace, Eigenvalues and Eigenvectors – its interpretations, Projections, Regression, Diagonalization, Singular Value Decomposition**(Ch:3.4-3.6, 3.9, Ch:4-4.5)** **RBT: L1, L2**	08
Module – 3	
Vector Calculus: Introduction, Differentiation of Univariate Functions, Partial Differentiation and Gradients, Gradients of Vector-Valued Functions, Gradients of Matrices, Useful Identities for Computing Gradients, Backpropagation **(Ch-5)** **RBT: L1, L2**	08
Module – 4	
Probability and Distribution: Probability concepts, Conditional probability, Bayes' Theorem, Discrete and Continuous Random Variables and Distributions, Expectation and its Interpretations, Standard discrete and continuous distribution functions, Central Limit theorem **(Ch-6)** **RBT: L1, L2**	08
Module – 5	
Optimization: Introduction, Optimization Using Gradient Descent, Constrained Optimization and Lagrange Multipliers, Convex Optimization **(Ch-7)** **RBT: L1, L2**	08

Course outcomes: The students should be able to:

- Improve the skills and knowledge in linear algebra to get more out of machine learning.
- Understand the vector calculus required to build many common machine learning techniques.
- Learn the probability and distribution in statistics to build machine learning applications.
- Learn the basic theoretical properties of optimization problems, for applications in machine learning

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong. "Mathematics for Machine Learning" , Published by Cambridge University Press, Copyright 2020

Reference Books:

1. Sheldon Axler, “Linear Algebra Done Right” third edition, 2015, Springer
2. David C. Lay, “Linear Algebra and its Applications,” 3rd edition, Pearson Education (Asia) Pte. Ltd,2005.
3. Gilbert Strang, "Linear Algebra and its Applications”, 3rd edition, Thomson Learning Asia, 2003.
4. D. Chatterjee, “Analytical Geometry: Two and Three Dimensions”, Alpha Science International Limited, 2009
5. Charles M. Grinstead, J. Laurie Snell, “Introduction to Probability”.
6. DasGupta, Anirban, “Probability for Statistics and Machine Learning: Fundamentals and Advanced Topics” , Springer, 2011
7. David Morin, “Probability: For the Enthusiastic Beginner”, 2016
8. V. Jeyakumar, Alexander M. Rubinov, “ Continuous Optimization: Current Trends and Modern Applications(Applied Optimization) 2005th Edition
9. Kulkarni, Anand J., Satapathy, Suresh Chandra, “Optimization in Machine Learning and Applications”, Springer, 2020

ARTIFICIAL INTELLIGENCE LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – V

Subject Code	18AIL57	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours		**Exam Hours**	3 Hrs

Credits – 2

Course Learning Objectives: This course will enable students to:

- Implement and evaluate AI algorithms in Python programming language.

Descriptions (if any):

Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.

Programs List:

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, 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()

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

Laboratory Outcomes: The student should be able to:

- Implement and demonstrate AI algorithms.
- Evaluate different algorithms.

Conduct of Practical Examination:

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accoradance with university regulations)*
  i) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks

  j) For laboratories having PART A and PART B
     i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
     ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

DBMS LABORATORY WITH MINI PROJECT
(Effective from the academic year 2018 -2019)
SEMESTER – V

Subject Code	18CSL58	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours		**Exam Hours**	3 Hrs

Credits – 2

Course Learning Objectives: This course will enable students to:

- Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
- Strong practice in SQL programming through a variety of database problems.
- Develop database applications using front-end tools and back-end DBMS.

Descriptions (if any):

PART-A: SQL Programming ()

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Create Schema and insert at least 5 records for each table. Add appropriate database constraints.

PART-B: Mini Project ()

- Use Java, C#, PHP, Python, or any other similar front-end tool. All applications must be demonstrated on desktop/laptop as a stand-alone or web based application (Mobile apps on Android/IOS are not permitted.)

.

Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.

Programs List:

PART A

1.	Consider the following schema for a Library Database: BOOK(Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS(Book_id, Author_Name) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id, Branch_id, No-of_Copies) BOOK_LENDING(Book_id, Branch_id, Card_No, Date_Out, Due_Date) LIBRARY_BRANCH(Branch_id, Branch_Name, Address) Write SQL queries to 1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc. 2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017. 3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query. **5.** Create a view of all books and its number of copies that are currently available in the Library.
2.	Consider the following schema for Order Database: SALESMAN(Salesman_id, Name, City, Commission) CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id) Write SQL queries to 1. Count the customers with grades above Bangalore's average. 2. Find the name and numbers of all salesman who had more than one customer. 3. List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order

	of a day. 5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.
3.	Consider the schema for Movie Database: ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by 'Hitchcock'. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by 'Steven Spielberg' to 5.
4.	Consider the schema for College Database: STUDENT(USN, SName, Address, Phone, Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN, SSID) SUBJECT(Subcode, Title, Sem, Credits) IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA) Write SQL queries to 1. List all the student details studying in fourth semester 'C' section. 2. Compute the total number of male and female students in each semester and in each section. 3. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects. 4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students. 5. Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = 'Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA< 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.
5.	Consider the schema for Company Database: EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate) DLOCATION(DNo,DLoc) PROJECT(PNo, PName, PLocation, DNo) WORKS_ON(SSN, PNo, Hours) Write SQL queries to 1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project. 2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise. 3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department 4. Retrieve the name of each employee who works on all the projects controlledby department number 5 (use NOT EXISTS operator). 5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.
PART B: Mini Project	

•	**For any problem selected make sure that the application should have five or more tables indicative areas include; health care , salary management, office automation, etc.**

Laboratory Outcomes: The student should be able to:

- Create, Update and query on the database.
- Demonstrate the working of different concepts of DBMS
- Implement, analyze and evaluate the project developed for an application.

Conduct of Practical Examination:

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accoradance with university regulations)*
  k) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  l) For laboratories having PART A and PART B
    i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
    ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

MACHINE LEARNING
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18AI61	**CIE Marks**	40
Number of Contact Hours/Week	3:2:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	3 Hrs

CREDITS – 04

Course Learning Objectives: This course will enable students to:

- Define machine learning and understand the basic theory underlying machine learning.
- Differentiate supervised, unsupervised and reinforcement learning
- Understand the basic concepts of learning and decision trees.
- Understand Bayesian techniques for problems appear in machine learning
- Perform statistical analysis of machine learning techniques.

Module – 1	**CH**
Introduction: Machine learning Landscape: what is ML?, Why, Types of ML, main challenges of ML (T2:Chapter1) **Concept learning and Learning Problems** – Designing Learning systems, Perspectives and Issues – Concept Learning – Find S-Version Spaces and Candidate Elimination Algorithm –Remarks on VS-Inductive bias – **T2: Chapter 1** **T1:Chapter 1 and 2)**	10
Module – 2	
End to end Machine learning Project : Working with real data, Look at the big picture, Get the data, Discover and visualize the data, Prepare the data, select and train the model, Fine tune your model **Classification** : MNIST, training a Binary classifier, performance measure, multiclass classification, error analysis, multi label classification, multi output classification **(T2: Chapter 2 and 3)**	10
Module – 3	
Training Models: Linear regression, gradient descent, polynomial regression, learning curves, regularized linear models, logistic regression Support Vector Machine: linear, Nonlinear , SVM regression and under the hood (**T2**: **Chapter 4 and 5**) **RBT: L1, L2**	10
Module – 4	
Decision Trees Training and Visualizing DT, making prediction, estimating class, the CART training, computational complexity, GINI impurity, Entropy, regularization Hyper parameters, Regression, instability **Ensemble learning and Random Forest**: Voting classifiers, Bagging and pasting, Random patches, Random forests, Boosting, stacking **(T2: Chapter 6 and 7)** **RBT: L1, L2**	10
Module – 5	
Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier– example-Bayesian Belief Network – EM Algorithm **Text book (T1: Chapter 6)** **RBT: L1, L2**	10
Course outcomes: The students should be able to:	

- Choose the learning techniques with this basic knowledge.
- Apply effectively ML algorithms for appropriate applications.
- Apply bayesian techniques and derive effectively learning rules.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Tom M. Mitchell, Machine Learning, McGraw-Hill Education, 2013
2. AurelienGeron, Hands-on Machine Learning with Scikit-Learn &TensorFlow , O'Reilly, Shroff Publishers and Distributors pvt.Ltd 2019

Reference Books:

1. EthemAlpaydin, Introduction to Machine Learning, PHI Learning Pvt. Ltd, 2nd Ed., 2013
2. T. Hastie, R. Tibshirani, J. H. Friedman, The Elements of Statistical Learning, Springer, 1st edition, 2001
3. Machine Learning using Python ,Manaranjan Pradhan, U Dinesh kumar, Wiley, 2019
4. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson,2020

DIGITAL IMAGE PROCESSING (Effective from the academic year 2018 -2019) SEMESTER – VI			
Subject Code	18AI62	**CIE Marks**	40
Number of Contact Hours/Week	3:2:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	03
CREDITS –4			

- **Course Learning Objectives:** This course will enable students to:
- Understand the fundamentals of digital image processing
- Understand the image transform used in digital image processing
- Understand the image enhancement techniques used in digital image processing
- Understand the image restoration techniques and methods used in digital imageprocessing
- Understand the Morphological Operations and Segmentation used in digital image processing

Module-1	**Contact Hours.**
Digital Image Fundamentals: What is Digital Image Processing?,Originsof Digital Image Processing, Examples of fields that use DIP, FundamentalSteps in Digital Image Processing, Components of an Image ProcessingSystem, Elements of Visual Perception, Image Sensing and Acquisition,Image Sampling and Quantization, Some Basic Relationships betweenPixels, Linear and Nonlinear Operations. [Text1: Chapter 1 and Chapter 2: Sections 2.1 to 2.5, 2.6.2]	10
RBT: L1,L2	
Module-2	
Spatial Domain: Some Basic Intensity Transformation Functions,Histogram Processing, Fundamentals of Spatial Filtering,-SmoothingSpatial Filters, Sharpening SpatialFilters**Frequency Domain**: Preliminary Concepts, The Discrete FourierTransform (DFT) of Two Variables, Properties of the 2-D DFT, Filtering inthe Frequency Domain, Image Smoothing and Image Sharpening UsingFrequency Domain Filters, and Selective Filtering. [Text1: Chapter 3: Sections 3.2 to 3.6 and Chapter 4: Sections 4.2, 4.5 to4.10]	10
RBT: L1,L2, L3	
Module-3	
Restoration: Noise models, Restoration in the Presence of Noise Onlyusing Spatial Filtering and Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, InverseFiltering, Minimum Mean Square Error (Wiener) Filtering, and ConstrainedLeast Squares Filtering. [Text1: Chapter 5: Sections 5.2, to 5.9]	10
RBT: L1,L2, L3	
Module-4	
Color Image Processing: Color Fundamentals, Color Models, and Pseudo-colorImage Processing. **Wavelets:** Background, Multiresolution Expansions. **Morphological Image Processing:** Preliminaries, Erosion and Dilation,Opening and Closing,	10

The Hit-or-Miss Transforms, and Some BasicMorphological Algorithms. [Text1: Chapter 6: Sections 6.1 to 6.3, Chapter 7: Sections 7.1 and 7.2,Chapter 9: Sections 9.1 to 9.5]	
RBT: L1,L2, L3	
Module-5	
Segmentation: Introduction, classification of image segmentation algorithms, Detection of Discontinuities, Edge Detection, Hough Transforms and Shape Detection, Corner Detection, and Principles of Thresholding. **Representation and Description:** Representation, and Boundary descriptors. [Text2: Chapter 9: Sections 9.1, to 9.7 and Text 1: Chapter 11: Sections 11.1and 11.2]	10
RBT: L1,L2, L3	

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

- Understand, Ascertain and describe the basics of image processing concepts through mathematical interpretation.
- Apply image processing techniques in both the spatial and frequency (Fourier)domains.
- Demonstrate image restoration process and its respective filters required.
- Design image analysis techniques in the form of image segmentation and toevaluate the Methodologies for segmentation.
- Conduct independent study and analysis of Image Enhancement techniques.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Third Ed., Prentice Hall, 2008.
2. S. Sridhar, Digital Image Processing, Oxford University Press, 2nd Edition, 2016.

Reference Books:

1. Digital Image Processing- S.Jayaraman, S.Esakkirajan, T.Veerakumar, TataMcGraw Hill 2014.
2. Fundamentals of Digital Image Processing-A. K. Jain, Pearson 2004.

JAVA FOR MOBILE APPLICATIONS (Effective from the academic year 2018 -2019) SEMESTER – VI			
Subject Code	18AI63	**CIE Marks**	40
Number of Contact Hours/Week	3:2:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	3 Hrs
CREDITS –4			

Course Learning Objectives: This course will enable students to:

- To have an insight into enumerations and collection frameworks for storing and processing data.
- To understand the architecture and components of android application.
- To design interactive user interface.
- To work with SQLite database

Module 1	**Contact Hours**
Enumerations, Autoboxing and Annotations(metadata): Enumerations, Enumeration fundamentals, the values () and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations. **RBT: L2, L3**	10
Module 2	
The collections and Framework: Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working with Maps, Comparators, The Collection Algorithms, Why Generic Collections? The legacy Classes and Interfaces, Parting Thoughts on Collections **RBT: L1, L2**	10
Module 3	
String Handling: The String Constructors, String Length, Special String Operations, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString( ) Character Extraction, charAt( ), getChars( ), getBytes( ) toCharArray(), String Comparison, equals( ) and equalsIgnoreCase( ), regionMatches( ) startsWith( ) and endsWith( ), equals( ) Versus ==, compareTo( ) Searching Strings, Modifying a String, substring( ), concat( ), replace( ), trim( ), Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer, StringBuffer Constructors, length( ) and capacity( ), ensureCapacity( ), setLength( ), charAt( ) and setCharAt( ), getChars( ),append( ), insert( ), reverse( ), delete( ) and deleteCharAt( ), replace( ), substring( ), Additional StringBuffer Methods, StringBuilder **Text Book 1: Ch 15**	10
Module 4	
Getting Started with Android Programming: What is Android? Features of Android, Android Architecture, obtaining the required tools, launching your first android application **Activities, Fragments and Intents:** Understanding activities, linking activities using intents, fragments.**Text Book 3: Ch 1, 3**	10

RBT: L1, L2, L3	
Module 5	
Getting to know the Android User Interface: Views and ViewGroups, FrameLayout, LinearLayout, TableLayout, RelativeLayout, ScrollView **Designing User Interface with Views:** TextView view – Button, ImageButton, EditText, Checkbox, ToggleButton, RadioButton and RadioGroupViews. **Creating and using Databases:** Creating the DBAdapter Helper class, using the database programmatically. **Text Book 3: Ch 4.1, 5.1, 7.3** **RBT: L1, L2, L3**	10

Course Outcomes: The student will be able to:

- Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs
- Understand various application components in android.
- Design efficient user interface using different layouts.
- Develop application with persistent data storage using SQLite

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1.Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.
2.Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007
3.J. F. DiMarzio, Beginning Android Programming with Android Studio, 4th Edition, 2017

Reference Books:

1. John Horton,Android Programming for Beginners, 1st Edition, 2015
2.Dawn Griffiths & David Griffiths, Head First Android Development, O'Reilly, 1st Edition, 2015

NATURAL LANGUAGE PROCESSING (Effective from the academic year 2018 -2019) SEMESTER – VI			
Subject Code	18AI641	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS – 03			

Course Learning Objectives: This course will enable students to:

- Analyze the natural language text.
- Define the importance of natural language.
- Understand the concepts Text mining.
- Illustrate information retrieval techniques.

Module – 1	**Contact Hours**
Overview and language modeling: Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages- NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model. **Textbook 1: Ch. 1,2** **RBT: L1, L2, L3**	08
Module – 2	
Word level and syntactic analysis: Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency-Parsing-Probabilistic Parsing. **Textbook 1: Ch. 3,4** **RBT: L1, L2, L3**	08
Module – 3	
Extracting Relations from Text: From Word Sequences to Dependency Paths: Introduction, Subsequence Kernels for Relation Extraction, A Dependency-Path Kernel for Relation Extraction and Experimental Evaluation. **Mining Diagnostic Text Reports by Learning to Annotate Knowledge Roles:** Introduction, Domain Knowledge and Knowledge Roles, Frame Semantics and Semantic Role Labeling, Learning to Annotate Cases with Knowledge Roles and Evaluations. **A Case Study in Natural Language Based Web Search:** InFact System Overview, The GlobalSecurity.org Experience. **Textbook 2: Ch. 3,4,5** **RBT: L1, L2, L3**	08
Module – 4	
Evaluating Self-Explanations in iSTART: Word Matching, Latent Semantic Analysis, and Topic Models: Introduction, iSTART: Feedback Systems, iSTART: Evaluation of Feedback Systems, **Textual Signatures: Identifying Text-Types Using Latent Semantic Analysis to Measure the Cohesion of Text Structures:** Introduction, Cohesion, Coh-Metrix, Approaches to Analyzing Texts, Latent Semantic Analysis, Predictions, Results of Experiments. **Automatic Document Separation: A Combination of Probabilistic Classification and Finite-State Sequence Modeling:** Introduction, Related Work, Data Preparation, Document Separation as a Sequence Mapping Problem, Results. **Evolving Explanatory Novel Patterns for Semantically-Based Text Mining:** Related Work, A Semantically Guided Model for Effective Text Mining. **Textbook 2: Ch. 6,7,8,9** **RBT: L1, L2, L3**	08
Module – 5	
Information Retrieval And Lexical Resources: Information Retrieval: Design features of Information Retrieval Systems-Classical, Non classical, Alternative Models of Information	08

Retrieval – valuation Lexical Resources: World Net-Frame Net- Stemmers-POS Tagger-Research Corpora. **Textbook 1: Ch. 9,12** **RBT: L1, L2, L3**	

Course outcomes: The students should be able to:

- Analyze the natural language text.
- Define the importance of natural language.
- Understand the concepts Text mining.
- Illustrate information retrieval techniques.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.
2. Anne Kao and Stephen R. Poteet (Eds), "Natural LanguageProcessing and Text Mining", Springer-Verlag London Limited 2007.

Reference Books:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: Anintroduction to Natural Language Processing, Computational Linguistics and SpeechRecognition", 2nd Edition, Prentice Hall, 2008.
2. James Allen, "Natural Language Understanding", 2nd edition, Benjamin/Cummingspublishing company, 1995.
3. Gerald J. Kowalski and Mark.T. Maybury, "Information Storage and Retrieval systems", Kluwer academic Publishers, 2000.

SOFTWARE PROJECT MANAGEMENT
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18AI642	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

- Understand the basics of software project management concepts, principles and practices.
- Understand the different methods of estimation for software project.
- Understand the basic concepts, principles and practices of software project scheduling and riskmanagement.
- Analyse a software project based on various review metrics with review guidelines.
- Understand software project maintenance, reengineering and configuration management.

Module – 1	**Contact Hours**
Project Management Concepts: The Management Spectrum – The People, The Products, The Process, TheProject, People -The Stakeholders, Team Leaders, The Software Team, Agile Teams, Coordination AndCommunication Issues, The Product – Software Scope, Problem Decomposition, The Process – Melding TheProductsAnd The Process, Process Decomposition, The Project, The W5HH Principle, Critical Practices. **T1: Chapter 31** **RBT: L1, L2**	08
Module – 2	
Metrics in the Process and Project Domains -Process Metrics And Software Process Improvement, ProjectMetrics, Software Measurement – Size-Oriented Metrics, Function-Oriented Metrics, Reconciling LOC AndFP Metrics, Object-Oriented Metrics, Use Cases- Oriented Metrics, Webapp Project Metrics, Metrics ForSoftware Quality – Measuring Quality ,Defect Removal Efficiency, Integrating Metrics With The SoftwareProcess - Arguments For Software Metrics, Establishing A Baseline, Metrics Collection Computation AndEvaluation, Metrics For Small Organisation, Establishing A Software Metrics Program. **T1: Chapter 32** **RBT: L1, L2**	08
Module – 3	
Estimation for Software Project: Observations On Estimation, The Project Planning Process, SoftwareScope And Feasibility, Resources – Human Resources, Reusable Software Resources, EnvironmentalResources, Software Project Estimation, Decomposition Techniques – Software Sizing, Problem BasedEstimation, An Example Of LOC Based Estimation, An Example Of FP – Based Estimation, Process-BasedEstimation, An Example Of Process- Based Estimation, Estimation With Usecases, An Example Of EstimationUsing Use Case Points, Reconciling Estimates, Empirical Estimation Models – The Structure Of EstimationModels, The COCOMO II Model, The Software Equation. **T1: Chapter 33** **RBT: L1, L2**	08
Module – 4	

Project Scheduling: Basic concepts, Project Scheduling – Basic Principles - The Relationship BetweenPeople and Effort – Effort Distribution, defining a Task Set for The Software Project – a Task Set Example –Refinement of Major Tasks, defining a Task Network, Scheduling – Timeline Charts – Tracking the Schedule– Tracking Progress for an OO Project. **T1: Chapter 34** **RBT: L1, L2**	08
Module – 5	
Software Quality: What is Quality? Software Quality – Garvin's Quality Dimensions, McCall‟sQualityFactors, ISO 9126 Quality Factors, Targeted Quality Factors, The Transition to a Quantitative View, TheSoftware Quality Dilemma - "Good Enough" Software, The Cost Of Quality, Risks, Negligence and Liability,Quality and Security, The Impact Of Management Actions, Achieving Software Quality – SoftwareEngineering Methods, Project Management Techniques, Quality Control, Quality Assurance. **T1: Chapter 19** **RBT: L1, L2**	08

Course outcomes: The students should be able to:

- Describe the basics of software project management concepts, principles and practices.
- Apply the different metrics and techniques to measure a software project.
- Apply software cost estimation models.
- Apply scheduling techniques to software project.
- Discuss the software quality concepts and good practices.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Software Engineering: APractitioner'sApproachRoger S. Pressman, BruceMaximMcGraw Hill 8th Edition,2015

Reference Books:

1. Software Project ManagementBobHughesMikeCotterellRajibMallMcGraw Hill 6th Edition 2018
2. Managing the Software ProcessWattsHumphreyPearson Education 2000
3. Software Project Management inpracticePankajJalote Pearson Education 2002

WEB PROGRAMMING (Effective from the academic year 2018 -2019) SEMESTER – VI			
Subject Code	18AI643	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –4			

Course Learning Objectives: This course will enable students to:

- Illustrate the Semantic Structure of HTML and CSS
- Compose forms and tables using HTML and CSS
- Design Client-Side programs using JavaScript and Server-Side programs using PHP
- Infer Object Oriented Programming capabilities of PHP
- Examine JavaScript frameworks such as jQuery and Backbone

Module 1	**Contact Hours**
Introduction to HTML, What is HTML and Where did it come from?, HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, Introduction to CSS, What is CSS, CSS Syntax, Location of Styles, Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling. **Textbook 1: Ch. 2, 3** **RBT: L1, L2, L3**	8
Module 2	
HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Microformats, Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks. **Textbook 1: Ch. 4,5** **RBT: L1, L2, L3**	8
Module 3	
JavaScript: Client-Side Scripting, What is JavaScript and What can it do?, JavaScript Design Principles, Where does JavaScript Go?, Syntax, JavaScript Objects, The Document Object Model (DOM), JavaScript Events, Forms, Introduction to Server-Side Development with PHP, What is Server-Side Development, A Web Server's Responsibilities, Quick Tour of PHP, Program Control, Functions **Textbook 1: Ch. 6, 8** **RBT: L1, L2, L3**	8
Module 4	
PHP Arrays and Superglobals, Arrays, $_GET and $_POST Superglobal Arrays, $_SERVER Array, $_Files Array, Reading/Writing Files, PHP Classes and Objects, Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, What are Errors and Exceptions?, PHP Error Reporting, PHP Error and Exception Handling **Textbook 1: Ch. 9, 10** **RBT: L1, L2, L3**	8
Module 5	
Managing State, The Problem of State in Web Applications, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, HTML5 Web Storage, Caching, Advanced JavaScript and jQuery, JavaScript Pseudo-Classes, jQuery Foundations, AJAX, Asynchronous File Transmission, Animation, Backbone MVC Frameworks, XML Processing and Web Services, XML Processing, JSON, Overview of Web Services. **Textbook 1: Ch. 13, 15,17** **RBT: L1, L2, L3**	8

Course Outcomes: The student will be able to :

- Adapt HTML and CSS syntax and semantics to build web pages.
- Construct and visually format tables and forms using HTML and CSS
- Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
- Appraise the principles of object oriented development using PHP
- Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Randy Connolly, Ricardo Hoar, **"Fundamentals of Web Development",** 1st Edition, Pearson Education India. (**ISBN:**978-9332575271)

Reference Books:

1. Robin Nixon, **"Learning PHP, MySQL &JavaScript with jQuery, CSS and HTML5",** 4th Edition, O'Reilly Publications, 2015. (**ISBN:**978-9352130153)
2. Luke Welling, Laura Thomson, **"PHP and MySQL Web Development",** 5th Edition, Pearson Education, 2016. (**ISBN:**978-9332582736)
3. Nicholas C Zakas, **"Professional JavaScript for Web Developers",** 3rd Edition, Wrox/Wiley India, 2012. (**ISBN:**978-8126535088)
4. David Sawyer Mcfarland, **"JavaScript & jQuery: The Missing Manual",** 1st Edition, O'Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014

Mandatory Note:

Distribution of CIE Marks is a follows (Total 40 Marks):

- 20 Marks through IA Tests
- 20 Marks through practical assessment

Maintain a copy of the report for verification during LIC visit.

FOUNDATION FOR DATA SCIENCE
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18AI644	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

- Understand the knowledge of mathematics to explain the concept of data science
- Design Decision tree to predict the class for a given data
- Analyze the given data set, and solve a problem by performing Classification using the basics of mathematics and data science
- Develop solutions to group entities in data set and apply it for the given real-world data using the basic knowledge of similarity, neighbors and clustering

Module – 1	CH
Introduction: Data-Analytic Thinking: The Ubiquity of Data Opportunities, Example: Hurricane Frances, Example: Predicting Customer Churn. Data Science, Engineering, and Data-Driven Decision Making, Data Processing and ―Big Data‖, Data and Data Science Capability as a Strategic Asset, Data-Analytic Thinking. **Business Problems and Data Science Solutions:** From Business Problems to Data Mining Tasks, Supervised Versus Unsupervised Methods, Data Mining and Its Results, The Data Mining Process, Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, Deployment, Other Analytics Techniques and Technologies: Statistics, Database Querying, Data Warehousing, Regression Analysis, Machine Learning and Data Mining **Text Book 1: Chapter 1, Chapter 2** **RBT: L1, L2**	08
Module – 2	
Introduction to Predictive Modeling: From Correlation to Supervised Segmentation Models, Induction, and Prediction, Supervised Segmentation, Selecting Informative Attributes Example: Attribute Selection with Information Gain, Supervised Segmentation with Tree- Structured Models, Visualizing Segmentations, Trees as Sets of Rules, Probability Estimation, Example: Addressing the Churn Problem with Tree Induction. **Text Book 1: Chapter 3** **RBT: L1, L2**	08
Module – 3	
Fitting a Model to Data: Classification via Mathematical Functions: LinearDiscriminant Functions, Optimizing an Objective Function, An Example of Mining a Linear Discriminant from Data, Linear Discriminant Functions for Scoring and Ranking Instances, Support Vector Machines briefly, Regression via Mathematical Functions, Class Probability Estimation and Logistic ―Regression‖. Logistic Regression: Some Technical Details. Example: Logistic Regression versus Tree Induction, Non-Linear Functions, Support vector machines and Neural Networks OverfittingandIts Avoidance: Fundamental Concepts,ExemplaryTechniques,Regularization,Genaralization, Overfitting,Overfitting Examined **Text Book 1: Chapter 4, Chapter 5** **RBT: L1, L2, L3**	08
Module – 4	
Similarity, Neighbors, and Clusters: Similarity and Distance, Nearest-Neighbor Reasoning, Example: Whiskey Analytics, Nearest Neighbors for Predictive Modeling, How Many Neighbors and How Much Influence? Geometric Interpretation, Overfitting, and Complexity Control. Issues with Nearest-Neighbor Methods. Some important Technical Details Relating to Similarities and neighbors. Clustering, Example: Whiskey Analytics Revisited, Hierarchical Clustering, Nearest Neighbors Revisited: Clustering Around Centroids. Understanding the Results of Clustering **Text Book 1: Chapter 6** **RBT: L1, L2,L3**	08
Module – 5	
Decision Analytic Thinking I: What is a Good Model? Evaluating Classifiers Plain Accuracyand its Problems, The confusion matrix, Problems with unbalanced Classes, Problems with Unequal Costs and Benefits. **Representing and Mining Text**: Why Text Is Important? Why Text Is Difficult? Representation, Bag of Words, Term Frequency, Measuring Sparseness: Inverse Document Frequency, Combining Them: TFIDF, Example: Jazz Musicians	08

Other Data Science Tasks and Techniques: Co-occurrences and Associations: Finding Items That Go Together, Measuring Surprise: Lift and Leverage, Example: Beer and Lottery Tickets, Associations Among Facebook Likes, Profiling: Finding Typical Behavior, Link Prediction and Social Recommendation. **Text Book 1: Chapter 7, Chapter 10, Chapter 12** **RBT: L1, L2, L3**	

Course outcomes: The students should be able to:

- **Apply** the knowledge of mathematics to explain the concept of data science, the available techniques in data science and its scope in business
- **Develop** a Decision tree based on supervised segmentation and predict the class for a given data set by selecting (through solving) the attribute for segmentation using the available techniques.
- **Analyze** the given data set, and solve a problem by performing Classification using the basics of mathematics and data science
- **Develop** solutions to group entities in data set and **apply** it for the given real-world data using the basic **knowledge** of similarity, neighbors and clustering
- **Analyze** the importance of mining text (social data) and formulate the association rules based on market basket analysis

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Foster Provost and Tom Fawcett, Data Science for Business, O'Reilly, 2013

Reference Books:

1. Cathy O'Neil and Rachel Schutt, **Doing Data Science**, O'Reilly, 2014.
2. Hector Cuesta, **Practical Data Analysis**, PACKT Publishing, 2013
3. Michael R. Berthold, Christian Borgelt, Frank Hijppner Frank Klawonn, **Guide to Intelligent Data Analysis**, Springer-Verlag London Limited, 2010
4. Data Analytics using Python, Bharti Motwani, Wiley, 2020

MOBILE APPLICATION DEVELOPMENT
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18CS651	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Learn to setup Android application development environment
- Illustrate user interfaces for interacting with apps and triggering actions
- Interpret tasks used in handling multiple activities
- Identify options to save persistent application data
- Appraise the role of security and performance in Android applications

Module – 1	**CH**
Get started, Build your first app, Activities, Testing, debugging and using support libraries **Textbook 1: Lesson 1,2,3** **RBT: L1, L2**	08
Module – 2	
User Interaction, Delightful user experience, Testing your UI **Textbook 1: Lesson 4,5,6** **RBT: L1, L2**	08
Module – 3	
Background Tasks, Triggering, scheduling and optimizing background tasks **Textbook 1: Lesson 7,8** **RBT: L1, L2**	08
Module – 4	
All about data, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders **Textbook 1: Lesson 9,10,11,12** **RBT: L1, L2**	08
Module – 5	
Permissions, Performance and Security, Firebase and AdMob, Publish// **Textbook 1: Lesson 13,14,15** **RBT: L1, L2**	08

Course outcomes: The students should be able to:

- Create, test and debug Android application by setting up Android development environment
- Implement adaptive, responsive user interfaces that work across a wide range of devices.
- Infer long running tasks and background work in Android applications
- Demonstrate methods in storing, sharing and retrieving data in Android applications
- Analyze performance of android applications and understand the role of permissions and security
- Describe the steps involved in publishing Android application to share with the world

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-

training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link)

Reference Books:

1. Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley India Pvt Ltd, 2014.
2. Dawn Griffiths and David Griffiths, "Head First Android Development", 1st Edition, O'Reilly SPD Publishers, 2015.
3. J F DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
4. Anubhav Pradhan, Anil V Deshpande, " Composing Mobile Apps" using Android, Wiley 2014, ISBN: 978-81-265-4660-2

INTRODUCTION TO DATA SRUCTURES AND ALGORITHM
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18CS652	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Identify different data structures in C programming language
- Appraise the use of data structures in problem solving
- Implement data structures using C programming language.

Module 1	**Contact Hours**
Introduction to C, constants, variables, data types, input output operations, operators and expressions, control statements, arrays, strings, built-in functions, user defined functions, structures, unions and pointers **Text Book 1: Chapter 1 and 2** **RBT: L1, L2**	08
Module 2	
Algorithms, Asymptotic notations, Introduction to data structures, Types of data structures, Arrays. **Text Book 1: Chapter 3 and 4** **RBT: L1, L2**	08
Module 3	
Linked lists, Stacks **Text Book 1: Chapter 5 and 6** **RBT: L1, L2**	08
Module 4	
Queues, Trees **Text Book 1: Chapter 7 and 8** **RBT: L1, L2**	08
Module 5	
Graphs, Sorting ,(selection, insertion, bubble, quick)and searching(Linear, Binary, Hash) **Text Book 1: Chapter 9 and 10** **RBT: L1, L2**	08

Course Outcomes: The student will be able to :

- Identify different data structures in C programming language
- Appraise the use of data structures in problem solving
- Implement data structures using C programming language.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Data structures using C , E Balagurusamy, McGraw Hill education (India) Pvt. Ltd, 2013.

Reference Books:

1. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

PROGRAMMING IN JAVA
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18CS653	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Learn fundamental features of object oriented language and JAVA
- Set up Java JDK environment to create, debug and run simple Java programs.
- Learn object oriented concepts using programming examples.
- Study the concepts of importing of packages and exception handling mechanism.
- Discuss the String Handling examples with Object Oriented concepts

Module – 1	**CH**
An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, 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, A Few Words About Strings **Text book 1: Ch 2, Ch 3** **RBT: L1, L2**	08
Module – 2	
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, Jump Statements. **Text book 1: Ch 4, Ch 5** **RBT: L1, L2**	08
Module – 3	
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Inheritance: Inheritance, 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. **Text book 1: Ch 6, Ch 7.1-7.9, Ch 8.** **RBT: L1, L2**	08
Module – 4	
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. **Text book 1: Ch 9, Ch 10** **RBT: L1, L2**	08
Module – 5	
Enumerations, Type Wrappers, I/O, Applets, and Other Topics: I/O Basics, Reading Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files, Applet Fundamentals, The transient and volatile Modifiers, Using instanceof, strictfp, Native Methods, Using assert, Static Import, Invoking Overloaded Constructors Through this( ), String Handling: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf( ), Changing the Case of Characters Within a String , Additional String Methods, StringBuffer, StringBuilder.	08

Text book 1: Ch 12.1,12.2, Ch 13, Ch 15 **RBT: L1, L2**	

Course outcomes: The students should be able to:

- Explain the object-oriented concepts and JAVA.
- Develop computer programs to solve real world problems in Java.

Develop simple GUI interfaces for a computer program to interact with users

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 2, 3, 4, 5, 6,7, 8, 9,10, 12,13,15)

Reference Books:

1. Cay S Horstmann, "Core Java - Vol. 1 Fundamentals", Pearson Education, 10th Edition, 2016.
2. Raoul-Gabriel Urma, Mario Fusco, Alan Mycroft, "Java 8 in Action", Dreamtech Press/Manning Press, 1st Edition, 2014.

INTRODUCTION TO OPERATING SYSTEM
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18CS654	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Explain the fundamentals of operating system
- Comprehend multithreaded programming, process management, memory management and storage management.
- Familier with various types of operating systems

Module – 1	**CH**
Introduction: What OS do, Computer system organization, architecture, structure, Operations, Process, memory and storage management, Protection and security, Distributed systems, Special purpose systems, computing environments. System Structure: OS Services, User OSI, System calls, Types of system calls, System programs, OS design and implementation, OS structure, Virtual machines, OS generation, system boot **Textbook1: Chapter 1, 2** **RBT: L1, L2**	08
Module – 2	
Process Concept: Overview, Process scheduling, Operations on process, IPC, Examples in IPC, Communication in client-server systems. Multithreaded Programming: Overview, Models, Libraries, Issues, OS Examples **Textbook1: Chapter 3,4** **RBT: L1, L2**	08
Module – 3	
Process Scheduling: Basic concept, Scheduling criteria, Algorithm, multiple processor scheduling, thread scheduling, OS Examples, Algorithm Evaluation. Synchronization: Background, the critical section problem, Petersons solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Atomic transactions **Textbook1: Chapter 5, 6** **RBT: L1, L2**	08
Module – 4	
Deadlocks: System model, Deadlock characterization, Method of handling deadlock, Deadlock prevention, Avoidance, Detection, Recovery from deadlock Memory management strategies: Background, swapping, contiguous memory allocation, paging, structure of page table, segmentation, **Textbook1: Chapter 7, 8** **RBT: L1, L2**	08
Module – 5	
Virtual Memory management: Background, Demand paging, Copy-on-write, Page replacement,	08

allocation of frames, Trashing, Memory mapped files, Allocating Kernel memory, Operating system examples File system: File concept, Access methods, Directory structure, File system mounting, File sharing, protection **Textbook1: Chapter 9, 10** **RBT: L1, L2**	

Course outcomes: The students should be able to:

- Explain the fundamentals of operating system
- Comprehend process management, memory management and storage management.
- Familiar with various types of operating systems

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. A. Silberschatz, P B Galvin, G Gagne, Operating systems, 7th edition, John Wiley and sons,.

Reference Books:

1. William Stalling,"Operating Systems: Internals and Design Principles", Pearson Education, 1st Edition, 2018.
2. Andrew S Tanenbaum, Herbert BOS, "Modern Operating Systems", Pearson Education, 4th Edition, 2016

MACHINE LEARNING LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18AIL66	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours		**Exam Hours**	3 Hrs

Credits – 2

Course Learning Objectives: This course will enable students to:

- Implement and evaluate ML algorithms in Python/Java programming language.

Descriptions (if any):
1. The programs can be implemented in either JAVA or Python.
2. Data sets can be taken from standard repository such as UCI

Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.

Programs List:

1.	Implement and demonstratethe**FIND-Salgorithm** for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file and show the output for test cases. Develop an interactive program by Compareing the result by implementing **LIST THEN ELIMINATE** algorithm.
2	For a given set of training data examples stored in a .CSV file, implement and demonstrate the **Candidate-Elimination**algorithm. Output a description of the set of all hypotheses consistent with the training examples.
3	Demonstrate Pre processing (Data Cleaning, Integration and Transformation) activity on suitable data: For example: Identify and Delete **Rows that Contain Duplicate Data** by considering an appropriate dataset. Identify and Delete **Columns That Contain a Single Value** by considering an appropriate dataset.
4	Demonstrate the working of the decision tree based **ID3 algorithm**. Use an appropriate data set for building the decision tree and apply this knowledge toclassify a new sample.
5	Demonstrate the working of the Random forest **algorithm**. Use an appropriate data set for building and apply this knowledge toclassify a new sample.
6	Implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7	Assuming a set of documents that need to be classified, use the **naive Bayesian Classifier** model to perform this task. Calculate the accuracy, precision, and recall for your data set.
8	Construct a**Bayesian network** considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
9	Demonstrate the working of EM algorithm to cluster a set of data stored in a .CSV file.
10	Demonstrate the working of SVM classifier for a suitable data set

Laboratory Outcomes: The student should be able to:

- Implement and demonstration of ML algorithms.
- Evaluation of different algorithms.

Conduct of Practical Examination:

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accordance with university regulations)*

m) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks

n) For laboratories having PART A and PART B

i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks

ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

DIGITAL IMAGE PROCESSING LABORATORY WITH MINI PROJECT
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Subject Code	18AIL67	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours		**Exam Hours**	03

CREDITS – 2

Course Learning Objectives: This course will enable students to:

- Demonstrate the basic skills of image process
- Demonstrate the application development skills
- Design and develop the applications of images

Descriptions (if any): --

- Programming tools preferred: SCILAB, Python, Java or any other relevant platform.
- For Part A: Students must exhibit the results and its print copy to be attached to Lab record.
- For Part B: Real Time Images can be used to demonstrate the work.
  During the practical exam: the students should demonstrate and answer Viva-Voce

Programs List:PART A

1	Write a Program to read a digital image. Split and display image into 4 quadrants, up, down, right and left
2	Write a program to showrotation, scaling, and translation of an image.
3	Read an image, first apply erosion to the image and then subtract the result from the original. Demonstrate the differencein the edge image if you use dilation instead of erosion.
4	Read an image and extract and display low-level features such as edges, textures usingfiltering techniques
5	Demonstrate enhancing and segmenting low contrast 2D images.

PART B :MINI PROJECT

Student should develop a mini project and it should be demonstratedin the laboratory examination, Some of the projects are listed and it is not limited to:

- Recognition of License Plate through Image Processing
- Recognition of Face Emotion in Real-Time
- Detection of Drowsy Driver in Real-Time
- Recognition of Handwriting by Image Processing
- Detection of Kidney Stone
- Verification of Signature
- Compression of Color Image
- Classification of Image Category
- Detection of Skin Cancer
- Marking System of Attendance using Image Processing
- Detection of Liver Tumor
- IRIS Segmentation
- Detection of Skin Disease and / or Plant Disease
- Biometric Sensing System
- Mobile Phone Camera-based Light Communications
- Modeling of Perspective Distortion within Face Images &Library for Object Tracking
- Controlling of Intelligent Traffic Light & Image Processing

- Controlling of Pests in Agriculture Field with Image Processing

(**During the practical exam: the students should demonstrate and answer Viva-Voce**)

Laboratory Outcomes: The student should be able toillustrate the following operations:

- Image Segmentation algorithm development
- Image filtering in spatial and frequency domain.
- Morphological operations in analyzing image structures

Conduct of Practical Examination:

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A: Students are allowed to pick one experiment from PART A, with equal opportunity. The mini project from PART B to be run &exhibit the results also a report on the work is produced.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accordance with university regulations)*
  - o) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  - p) For laboratories having PART A and PART B
    - i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
    - ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

MOBILE APPLICATION DEVELOPMENT LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Course Code	**18AIMP68**	**IA Marks**	40
Number of Contact Hours/Week	0:2:2	**Exam Marks**	60
Total Number of Contact Hours	3 Hours/Week	**Exam Hours**	03

CREDITS – 02

Course Learning Objectives: This course will enable students to:

- Learn and acquire the art of AndroidProgramming.
- Configure Android studio to run theapplications.
- Understand and implement Android's User interfacefunctions.
- Create, modify and query on SQlitedatabase.
- Inspect different methods of sharing data usingservices.

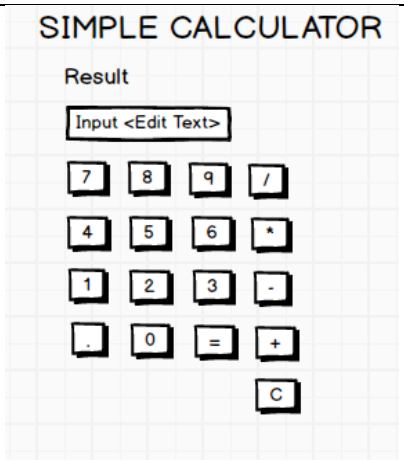
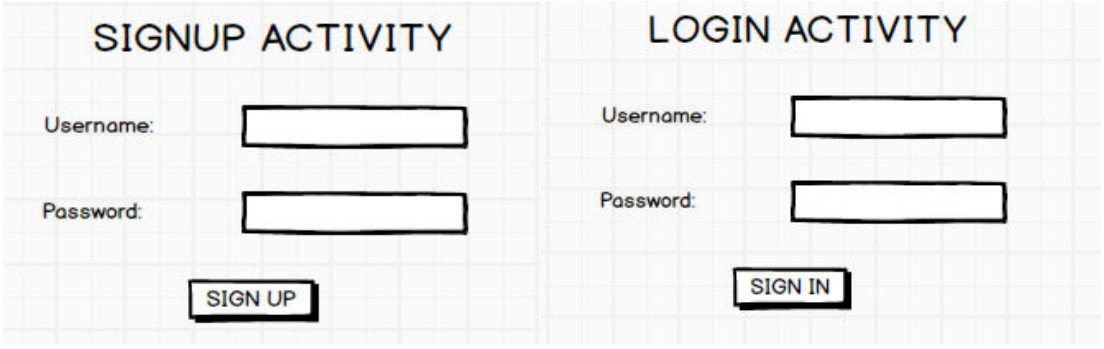
Descriptions (if any):

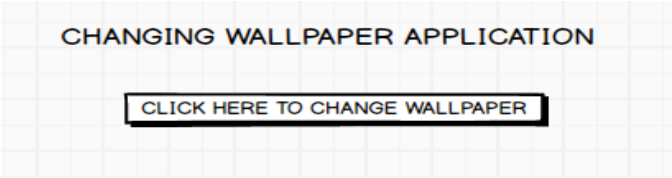
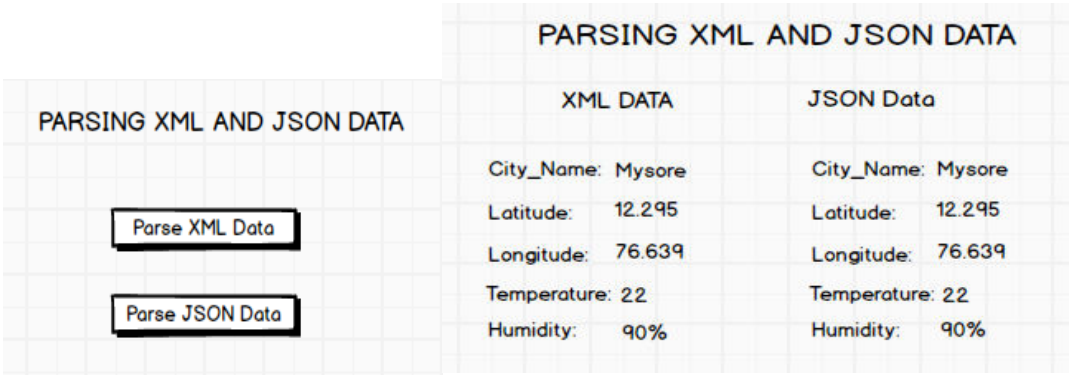
1. Installation procedure of the Android Studio/Java software must be demonstrated and carried out ingroups.
2. Students should use the latest version of Android Studio/Java/Kotlin to execute these programs. Diagrams given are for representational purpose only, students are expected to improvise on it.
3. Part B programs should be developed as an application and be demonstrated as a mini project in a group by adding extra features or the students can also develop their own application and demonstrate it as a mini project. (Projects/programs are not limited to the list given in Part B)

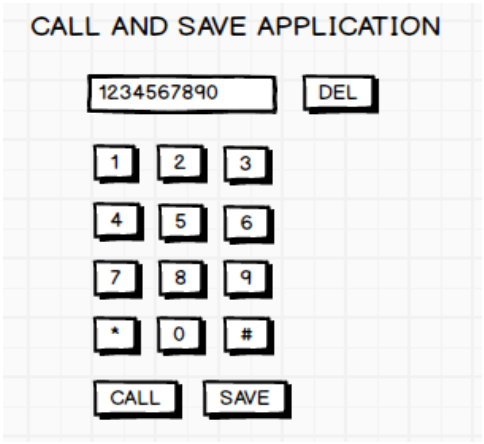
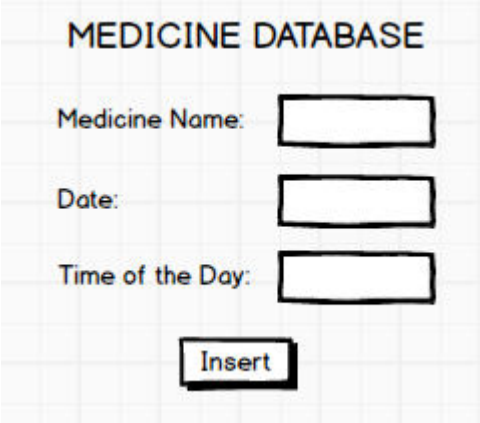
Programs List:

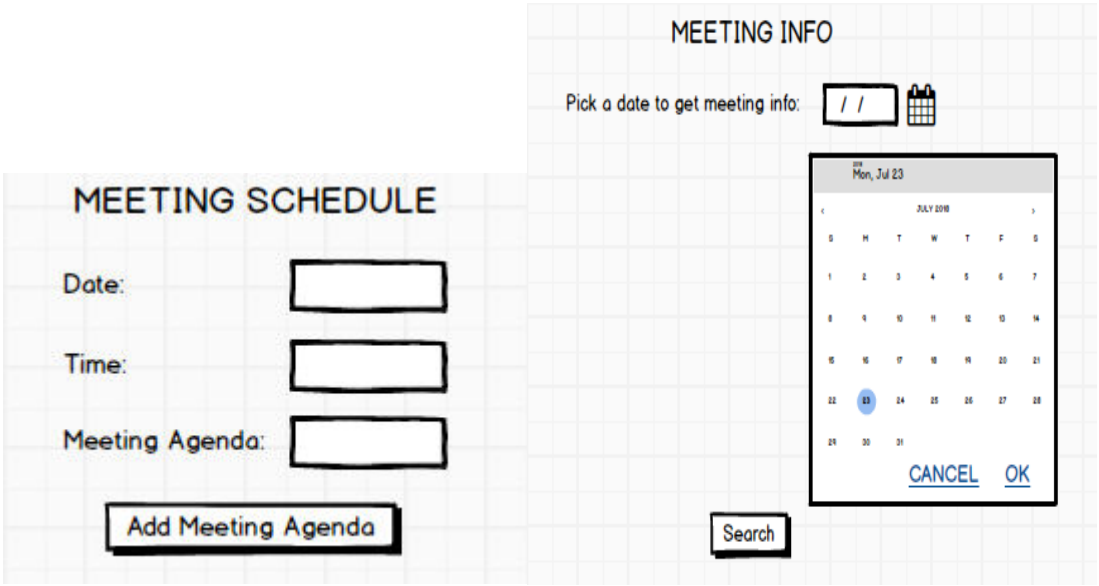
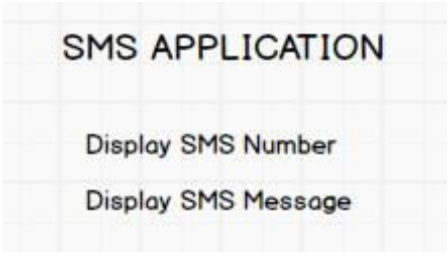
PART – A

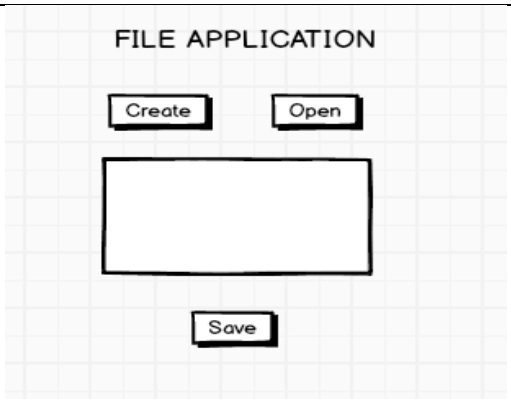
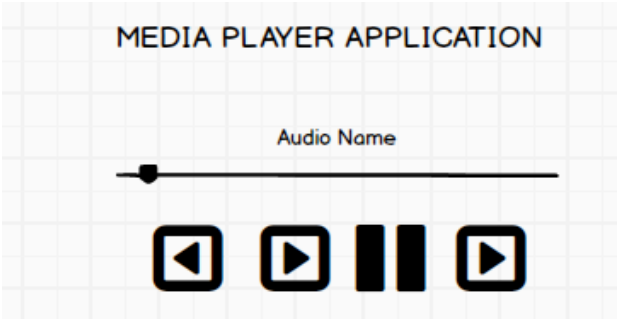
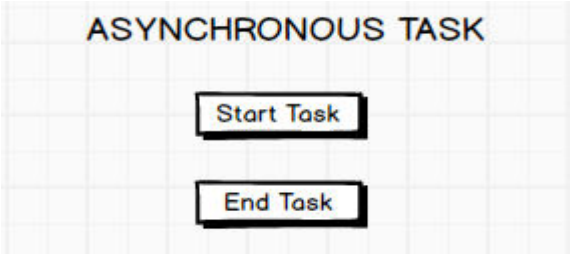
1	Create an application to design aVisiting Card. The Visiting card should haveacompanylogoatthe top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address isto be displayed. Insert a horizontal line between the job title and the phone number. 
2	Develop an Android application usingcontrols like Button, TextView, EditText for designing a calculatorhaving basic functionality like Addition, Subtraction, Multiplication,andDivision.

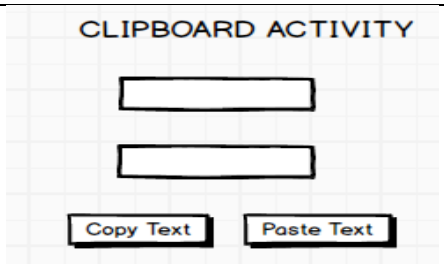
	
3	Create a SIGN Up activity with Username and Password. Validation of password should happen based on the following rules: • Password should contain uppercase and lowercaseletters. • Password should contain letters andnumbers. • Password should contain specialcharacters. • Minimum length of the password (the default value is8). On successful **SIGN UP** proceed to the next Login activity. Here the user should **SIGN IN** using the Username and Password created during signup activity. If the Username and Password are matched then navigate to the next activity whichdisplays a message saying "Successful Login" or else display a toast message saying "Login Failed".The user is given only two attempts and after thatdisplay a toast message saying "Failed Login Attempts" and disable the SIGN IN button. Use Bundle to transfer information from one activity to another. 

4	Develop an application to set an image as wallpaper. On click of a button, the wallpaper image should start to change randomly every 30 seconds. 
5	Write a program to create an activity with two buttons START and STOP. On pressin g of the START button, the activity must start the counter by displaying the numbers from One and the counter must keep on counting until the STOP button is pressed. Display the counter value in a TextViewcontrol. 
6	Create two files of XML and JSON type with values for City_Name, Latitude, Longitude, Temperature, and Humidity. Develop an application to create an activity with two buttons to parse the XML and JSON files which when clicked should display the data in their respective layouts side by side. 

7	Develop a simple application with one Edit Text so that the user can write some text in it. Create a button called “Convert Text to Speech” that converts the user input text into voice. 
8	Create an activity like a phone dialer with CALL and SAVE buttons. On pressing the CALL button, it must call the phone number and on pressing the SAVE button it must save the number to the phonecontacts. 
PART - B	
1	Write a program to enter Medicine Name, Date and Time of the Day as input from the user and store it in the SQLite database. Input for Time of the Day should be either Morning or Afternoon or Evening or Night. Trigger an alarm based on the Date and Time of the Day and display the Medicine Name. 

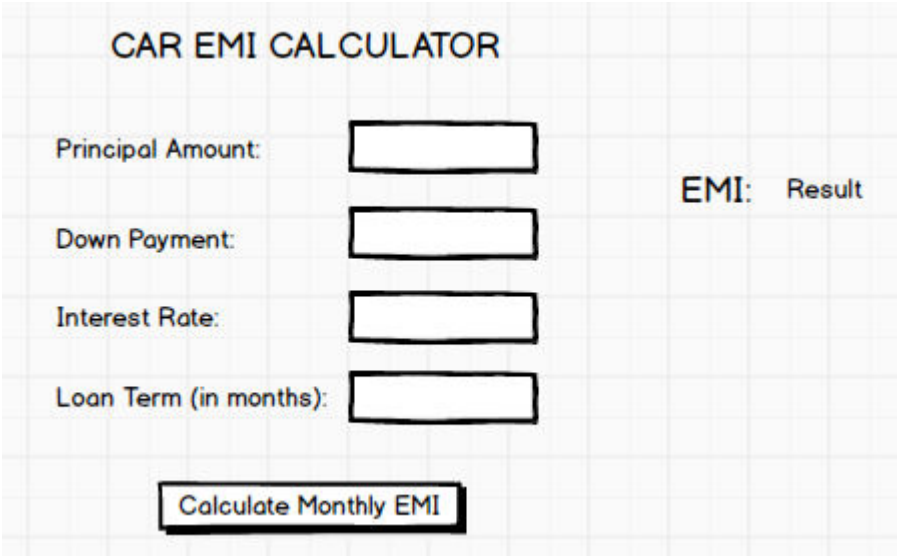
2	Develop a content provider application with an activity called “Meeting Schedule” which takes Date, Time and Meeting Agenda as input from the user and store this information into the SQLite database. Create another application with an activity called “Meeting Info” having DatePicker control, which on the selection of a date should display the Meeting Agenda information for that particular date, else it should display a toast message saying “No Meeting on this Date”. 
3	Create an application to receive an incoming SMS which is notified to the user. On clicking this SMS notification, the message content and the number should be displayed on the screen. Use appropriate emulator control to send the SMS message to your application. 
4	Write a program to create an activity having a Text box, and also Save, Open and Create buttons. The user has to write some text in the Text box. On pressing the Create button the text should be saved as a text file in MkSDcard. On subsequent changes to the text, the Save button should be pressed to store the latest content to the same file. On pressing the Open button, it should display the contents from the previously stored files in the Text box. If the user tries to save the contents in the Textbox to a file without creating it, then a toast message has to be displayed saying “First Create aFile”.

	
5	Create an application to demonstrate a basic media player that allows the user to Forward, Backward, Play and Pause an audio. Also, make use of the indicator in the seek bar to move the audio forward or backward as required. 
6	Develop an application to demonstrate the use of Asynchronous tasks in android. The asynchronous task should implement the functionality of a simple moving banner. On pressing the **Start Task** button, the banner message should scroll from right to left. On pressing the **Stop Task** button, the banner message should stop. Let the banner message be "Demonstration of Asynchronous Task". 
7	Develop an application that makes use of the clipboard framework for copying and pasting of the text. The activity consists of two Edit Text controls and two Buttons to trigger the copy and paste functionality.

<table>
<tr><td></td><td> 
</td></tr>
<tr><td>8</td><td>Create an AIDL service that calculates Car Loan EMI. The formula to calculate EMI is

$E = P * (r(1+r)^n)/((1+r)^n-1)$
where
E = The EMI payable on the car loan amount
P = The Car loan Principal Amount
r = The interest rate value computed on a monthly basis
n = The loan tenure in the form of months

The down payment amount has to be deducted from the principal amount paid towards buying the Car. Develop an application that makes use of this AIDL service to calculate the EMI. This application should have four Edit Text to read the Principal Amount, Down Payment, Interest Rate, Loan Term (in months) and a button named as “Calculate Monthly EMI”. On click of this button, the result should be shown in a Text View. Also, calculate the EMI by varying the Loan Term and Interest Rate values.

 
</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">Laboratory Outcomes: After studying these laboratory programs, students will be able to</td></tr>
<tr><td colspan="2">• Create, test and debug Android application by setting up Android developmentenvironment.
• Implement adaptive, responsive user interfaces that work across a wide range ofdevices.
• Infer long running tasks and background work in Androidapplications.
• Demonstrate methods in storing, sharing and retrieving data in Androidapplications.</td></tr>
</table>

- Infer the role of permissions and security for Androidapplications.

Procedure to Conduct Practical Examination

- **Experiment distribution**
  - **For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.**
  - **For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A with equal opportunity and in Part B demonstrate the Mini project.**
- **Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.**
- **Marks Distribution** ***(Subjected to change in accoradance with university regulations)***
  - **q) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks**
  - **r) For laboratories having PART A and PART B**
    - **i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks**
    - ii. **Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks**

Text Books:

1. Google Developer Training, **"Android Developer Fundamentals Course – Concept Reference",** Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details
(Download pdf file from the above link)

Reference Books:

1. Erik Hellman, **"Android Programming – Pushing the Limits",** 1st Edition, Wiley India Pvt Ltd, 2014. ISBN-13: 978-8126547197
2. Dawn Griffiths and David Griffiths, **"Head First Android Development",** 1st Edition, O'Reilly SPD Publishers, 2015. ISBN-13:978-9352131341
3. Bill Phillips, Chris Stewart and Kristin Marsicano, **"Android Programming: The Big Nerd Ranch Guide",** 3rd Edition, Big Nerd Ranch Guides, 2017. ISBN-13:978-0134706054

ADVANCED ARTIFICIAL INTLLIGENCE (Effective from the academic year 2018 -2019) SEMESTER – VII			
Subject Code	18AI71	**CIE Marks**	40
Number of Contact Hours/Week	4:0:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	3 Hrs
CREDITS –4			

Course Learning Objectives: This course will enable students to:

- Demonstrate the fundamentals of Intelligent Agents
- Illustrate the reasoning on Uncertain Knowledge
- Explore the explanation based learning in solving AI problems
- Demonstrate the applications of Rough sets and Evolutionary Computing algorithms

Module 1	**Contact Hours**
IntelligentAgents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents **Problem Solving :**Game Paying **T1: Chapter 2, Chapter 5 (2.1 to 2.4, 5.1 to 5.6)**	10
Module 2	
Uncertain knowledge and Reasoning: Quantifying Uncertainty**,** Acting under Uncertainty , Basic Probability Notation, Inference Using Full Joint Distributions, Independence , Bayes'Rule and Its Use The WumpusWorld Revisited, **T1: Chapter 13**	10
Module 3	
Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks , Efficient Representation of Conditional Distributions Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks. **T1: Chapter 14**	10
Module 4	
Perception: Image Formation, Early Image-Processing Operation, Object Recognition by Appearance, Reconstructing the 3DWorld. Object Recognition from Structural Information, Using Vision **T1: Chapter 24**	10
Module 5	
Overview and language modeling: Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages- NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model. **T2: Chapter 1, 2**	10

Course Outcomes: The student will be able to :

- Demonstrate the fundamentals of Intelligent Agents
- Illustrate the reasoning on Uncrtain Knowledge

- Explore the explanation based learning in solving AI problems
- Demonstrate the applications of Rough sets and Evolutionary Computing algorithms

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Artificial Intelligence, A Modern Approach, Stuart J. Russell and Peter Norvig, Third Edition, Pearson, 2010
2. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

Reference Books:

1. An Introduction to Multi Agent Systems, Michael Wooldridge, Second Edition, John Wiley & Sons

ADVANCED MACHINE LEARNING (Effective from the academic year 2018 -2019) SEMESTER – VII			
Subject Code	18AI72	**CIE Marks**	40
Number of Contact Hours/Week	4:0:0	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	3 Hrs
CREDITS –4			

Course Learning Objectives: This course will enable students to:

- Demonstrate the fundamentals of GDT
- Illustrate the use of KNN
- Explore the Text feature Engineering concepts with Applications
- Demonstrate the use of Ensemble Methods

Module 1	**Contact Hours**
Advanced Machine Learning: Overview, Gradient Descent algorithm, Scikit-learn library for ML, Advanced Regression models, Advanced ML algorithms, KNN, ensemble methods. **T2: Chapter 6 (upto 6.5.4)** **Forecasting:**Overview, components, moving average, decomposing time series, auto-regressive Models. **T2: Chapter: 8**	10
Module 2	
Hidden Markov Model: Introduction, Issues in HMM(Evalution, decoding, learning, classifier) **T3: Chapter 12** **CLUSTERING** **Introduction,** Types of clustering, Partitioning methods of clustering (k-means, k-medoids), hierarchical methods **T3: Chapter 13**	10
Module 3	
Recommender System: Datasets, Association rules, Collaborative filtering, User-based similarity, item-based similarity, using surprise library, Matrix factorization **Text Analytics:** Overview, Sentiment Classification, Naïve Bayes model for sentiment classification, using TF-IDF vectorizer, Challenges of text analytics **T2: Chapter 9 and** 10	10
Module 4	
Neural networks and genetic algorithms: Brief history and Evolution of Neural network, Biological neuron, Basics of ANN,Activation function, MP model. **T3: Chapter 6** Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Genetic Algorithms – Hypothesis Space Search – Genetic	10

Programming – Models of Evolution and Learning. **T1: Chapter 4 & 9**	
Module 5	
Instant based learning and learning set of rules: Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. Instance Based Learning: Introduction, k-nearest neighbor learning(review), locally weighted regression, radial basis function, cased-based reasoning, Reinforcement Learning: Introduction, Learning Task, Q Learning **T1 :Sections: 5.1-5.6, 8.1-8.5, 13.1-13.3**	10

Course Outcomes: The student will be able to :

- Apply effectively ML algorithmsto solve real world problems.
- Apply Instant based techniques and derive effectively learning rules to real world problems.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

T1. Tom M. Mitchell, Machine Learning, McGraw-Hill Education, 2013

T2. Machine Learning using Python ,Manaranjan Pradhan, U Dinesh Kumar, Wiley 2019

T3. Machine Learning, Anuradha Srinivasaraghavan, VincyJoeph, Wiley 2019

Reference Books:

1. EthemAlpaydin, Introduction to Machine Learning, PHI Learning Pvt. Ltd, 2nd Ed., 2013
2. T. Hastie, R. Tibshirani, J. H. Friedman, The Elements of Statistical Learning, Springer, 1st edition, 2001
3. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson,2020

INTERNET OF THINGS (Effective from the academic year 2018 -2019) SEMESTER – VII			
Subject Code	18AI731	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.

Module 1	**Contact Hours**
What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack. **Textbook 1: Ch.1, 2** **RBT: L1, L2, L3**	08
Module 2	
Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies. **Textbook 1: Ch.3, 4** **RBT: L1, L2, L3**	08
Module 3	
IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods. **Textbook 1: Ch.5, 6** **RBT: L1, L2, L3**	08
Module 4	
Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment **Textbook 1: Ch.7, 8** **RBT: L1, L2, L3**	08
Module 5	
IoT Physical Devices and Endpoints – Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints –RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture,	08

Smart City Use-Case Examples. **Textbook 1: Ch.12** **Textbook 2: Ch.7.1 to 7.4, Ch.8.1 to 8.4, 8.6** **RBT: L1, L2, L3**	

Course Outcomes: The student will be able to :

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,**"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things",** 1st Edition, Pearson Education (Cisco Press Indian Reprint). (**ISBN:** 978-9386873743)
2. Srinivasa K G, **"Internet of Things",**CENGAGE Leaning India, 2017

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1st Edition, VPT, 2014. (**ISBN:** 978-8173719547)
2. Raj Kamal, **"Internet of Things: Architecture and Design Principles",** 1st Edition, McGraw Hill Education, 2017. (**ISBN:** 978-9352605224)

Mandatory Note:

Distribution of CIE Marks is a follows (Total 40 Marks):

- 20 Marks through IA Tests
- 20 Marks through practical assessment

Maintain a copy of the report for verification during LIC visit.

Posssible list of practicals:

1. Transmit a string using UART
2. Point-to-Point communication of two Motes over the radio frequency.
3. Multi-point to single point communication of Motes over the radio frequency.LAN (Sub-netting).
4. I2C protocol study
5. Reading Temperature and Relative Humidity value from the sensor

MULTIAGENT SYSTEMS (Effective from the academic year 2018 -2019) SEMESTER – VII			
Subject Code	18AI732	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS – 03			

Course Learning Objectives: This course will enable students to:

- To introduce the concept of amultiagent systems and Distributed Constraints
- To explore the main issues surrounding the 93omputer and extended form games.
- To understand learning in Multiagent Systems
- To introduce a contemporary platform for implementing agents and multiagent systems.

Module – 1	**Contact Hours**
Multiagent Problem Formulation: Utility, Markov Decision Processes, Planning **Distributed Constraints**:Distributed Constraint Satisfaction, Distributed Constraint Optimization **T1: Chapters 1 &2, T2: Chapter 1**	08
Module – 2	
Standard and Extended Form Games: Games in Normal Form, Games in Extended Form, Self-interested agents, Characteristic Form Games, Coalition Formation **T1: Chapters 3&4, T2: Chapter 3**	08
Module – 3	
Learning in Multiagent Systems: The Machine Learning Problem, Cooperative Learning, Repeated Games, Stochastic Games, General Theories for Learning Agents, Collective Intelligence **T1: Chapters 5**	08
Module – 4	
Negotiation: The Bargaining Problem, Monotonic Concession Protocol, Negotiation as Distributed Search, Ad-hoc Negotiation Strategies, The Task Allocation Problem. **Protocols for Multiagent Resource Allocation: Auctions:** Simple Auctions,Combinatorial Auctions **T1: Chapters 6&7,** **T2: Chapter 11**	08
Module – 5	
Voting and Mechanism Design: The Voting Problem, Mechanism Design. **Nature-Inspired Approaches:**Ants and Termites, Immune System **T1: Chapters 8&10,** **T2: Chapter 10**	08

Course outcomes: The students should be able to:

- Explain the concept of anmulti-agent systems and Distributed Constraints
- Explore the applications of 93omputer and extended form games.
- Understand learning in Multiagent Systems
- Introduce a contemporary platform for implementing agents and multi-agent systems.

Question Paper Pattern:

- The question paper will have ten questions.

- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Fundamentals of Multiagent Systems by Jos´e M. Vidal, 2006, available online http://jmvidal.cse.sc.edu/papers/mas.pdf
2. Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations, By YoavShoham, Kevin Leyton-Brown, Cambridge University Press, 2008, 2nd edhttp://www.masfoundations.org/mas.pdf

Reference Books:

1. Multiagent Systems : A Modern Approach to Distributed Artificial IntelligenceGerhard Weiss The MIT Press 2000

BLOCKCHAIN TECHNOLOGY
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18AI733	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

- Define and Explain the fundamentals of Blockchain
- Illustrate the technologies of blockchain
- Decribe the models of blockchain
- Analyze and demonstrate the Ethereum

Module – 1	**Contact Hours**
Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain. **Text Book 1: Chapter 1**	08
Module-2	
Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys **Text Book 1: Chapter 2,Chapter 4**	08
Module-3	
Bitcoin and Alternative Coins A: Bitcoin, Transactions, Blockchain, Bitcoin payments B: Alternative Coins Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash **Text Book 1: Chapter 3, Chapter 6, Chapter 8**	08
Module-4	
Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts. **Text Book 1: Chapter 10**	08
Module-5	
Alternative Blockchains: Blockchains Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance,	08

Media **Text Book 1: Chapter 17**	

Course outcomes: The students should be able to:

- Define and Explain the fundamentals of Blockchain
- Illustrate the technologies of blockchain
- Decribe the models of blockchain
- Analyze and demonstrate the Ethereum
- Analyze and demonstrate Hyperledger fabric

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbook:

1.**Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017**

Reference Books:

1. Blockchain Technology (Concepts and applications), Kumar saurabh, Ashutosh saxena, Wiley, 2020
2. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten,2016
3. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, First Edition, 2017
4. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014

CLOUD COMPUTING AND VIRTUALIZATION
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18AI734	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Interpret the data in the context of cloud computing.
- Identify an appropriate method to analyze the data in cloud enviornmnet
- Understanding of virtalization concept

Module – 1	**Contact Hours**
Introduction, Cloud Infrastructure: Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, Service level agreements, Exercises and problems. **Textbook 1: Chapter 1 (1.3-1.6), Chapter 3 (3.1-3.5, 3.7,3.8)** RBT: L1, L2	08
Module – 2	
Cloud Computing: Application Paradigms.: Challenges of cloud computing, Architectural styles of cloud computing, Workflows: Coordination of multiple activities, Coordination based on a state machine model: The Zookeeper, The Map Reduce programming model, A case study: The GreThe Web application, Cloud for science and engineering, High-performance computing on a cloud, Cloud computing for Biology research, Social computing, digital content and cloud computing. **Textbook 1: Chapter 4 (4.1-4.11)** RBT:L1,L2	08
Module – 3	
Cloud Resource Virtualization: Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and paravirtualization, Hardware support for virtualization, Case Study: Xen a VMM based paravirtualization, Optimization of network virtualization, vBlades, Performance comparison of virtual machines, The dark side of virtualization, Exercises and problems	08

Textbook 1: Chapter 5 (5.1-5.9, 5.11,5.12,5.16) RBT:L1,L2	
Module – 4	
Cloud Resource Management and Scheduling: Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling MapReduce applications subject to deadlines, Resource management and dynamic scaling, Exercises and problems. **Textbook1: Chapter 6 (6.1-6.14, 6.16)** RBT : L1, L2, L3	08
Module – 5	
Cloud Security, Cloud Application Development: Cloud security risks, Security: The top concern for cloud users, Privacy and privacy impact assessment, Trust, Operating system security, Virtual machine Security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management OS, A trusted virtual machine monitor, Amazon web services: EC2 instances, Connecting clients to cloud instances through firewalls, Security rules for application and transport layer protocols in EC2, How to launch an EC2 Linux instance and connect to it, How to useS3 in java **Textbook1: Chapter 9 (**9.1-9.9, 11.1-11.5) RBT: L1, L2, L3	08
Course outcomes: The students should be able to:	
• Understand the concepts of cloud computing, virtualization and classify services of cloud computing • Illustrate architecture and programming in cloud • Define the platforms for development of cloud applications and List the application of cloud.	
Question Paper Pattern:	
• The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module.	

• The students will have to answer 5 full questions, selecting one full question from each module.
Text Books:
1. Cloud Computing Theory and Practice, Dan C. Marinescu, Morgan Kaufmann, Elsevier 2013.
Reference Books:
1. Mastering Cloud Computing Rajkumar Buyya, Christian Vecchiola, and ThamaraiSelvi McGraw Hill Education

FUZZY LOGIC AND ITS APPLICATION (Effective from the academic year 2018 -2019) SEMESTER – VII			
Subject Code	18AI741	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS – 03			
Course Learning Objectives: This course will enable students to:			
• Define crisp set and fuzzy set theory. • Identify the requirements to make calculation of fuzzy set theory. • Describe fuzzy arithmetic principles. • Explain fuzzy rules based systems. • Apply fuzzy graphical techniques to draw inference over the computing problems.			
Module – 1			**Contact Hours**
Introduction: Historical perspective, utility of fuzzy systems, limitations of fuzzy systems, statistics andrandom processes, uncertainty in information, fuzzy sets and membership, chance versus fuzziness, sets aspoints in Hypercube.**Classical Sets and Fuzzy Sets:** classical sets, operations on them, mapping of classical sets to functions, fuzzysets, fuzzy set operations, properties of fuzzy sets, non-interactive fuzzy sets. **RBT: L1, L2**			08
Module – 2			
Classical Relations and Fuzzy Relations: Cartesian Product, Crisp Relations – Cardinality of Crisp Relations,Operations on Crisp Relations, and Properties of Crisp Relations, Composition. Fuzzy Relations –Cardinalityof Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Productand Composition, Non-interactive Fuzzy Sets. **RBT: L1, L2**			08
Module – 3			
Membership Functions: Features of the Membership Function, Standard Forms and Boundaries,Fuzzification, defuzzification to crisp sets, Lambda-Cuts for Fuzzy Sets, Lambda-Cuts for Fuzzy Relations,DefuzzificationMethods.Development of membership Functions: Membership value assignments **RBT: L1, L2**			08
Module – 4			
Fuzzy Arithmetic and the Extension Principle : Crisp Functions, Mapping and Relations,			08

Functions of fuzzySets – Extension Principle, Fuzzy Transform (Mapping), Practical Considerations. Fuzzy Numbers IntervalAnalysis in Arithmetic, Approximate Methods of Extension – Vertex method, DSW Algorithm, RestrictedDSW Algorithm, Comparisons. Fuzzy Vectors. **RBT: L1, L2**	
Module – 5	
Fuzzy Rule Based Systems: Natural Language, Linguistic Hedges, Rule-Based Systems – Canonical RuleForms, Decomposition of Compound Rules, Likelihood and Truth Qualification, Aggregation of Fuzzy Rules.Graphical Techniques of Inference. **RBT: L1, L2**	08
Course outcomes: The students should be able to:	
• Provide basic elements of fuzzy sets. • Differentiate between fuzzy set and classical set theory. • Apply fuzzy membership functions to solve value assignment problems. • Explain approximate methods of fuzzy arithmetic and extension principle. • Discuss the applications of fuzzy rule based systems.	
Question Paper Pattern:	
• The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module.	
Textbooks:	
1. Fuzzy Logic with EngineeringApplicationsTimothy J. Ross Wiley IndiaInternational edition,2010 reprint	
Reference Books:	
1. Fuzzy Logic- Intelligence,Control, and informationJohnYenRezaLangariPearson Education 1st Edition, 2004 2. Fuzzy Sets and Fuzzy Logic-Theory and ApplicationsGeorge J. KlirBoYuanPrentice Hall of India 1st Edition, 2000 3. Fuzzy Mathematical approach to pattern Recognition, S K Pal, and D Dutta majumder , John wiley 1986 4. Neuro-fuzzy pattern recognition: methods in Soft computing, S K Pal and S Mitra 5. Fuzzy set theory and its applications by H J Zimmermann, Springer Publications	

COMPUTER VISION **(Effective from the academic year 2018 -2019)** **SEMESTER – VII**			
Subject Code	18AI742	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS – 03			
Course Learning Objectives: This course will enable students to:			
• Learn basic principles of image formation, image processing algorithms and different			

algorithms for recognition from single or multiple images (video).

- Understand the core vision tasks of scene understanding and recognition.
- Applications to 3D modelling, video analysis, video surveillance, object recognition

Module – 1	**Contact Hours**
Introduction and Image Formation: What is computer vision? A brief history, Geometric primitives and transformations, Photometric image formation, The digital camera. Pinhole Perspective, Weak Perspective, Cameras with Lenses, The Human Eye, Intrinsic Parameters and Extrinsic Parameters, Geometric Camera Calibration **T1: Chap 1-1.1 & 1.2, Chap 2-2.1 to 2.3. T2:Chap 1-1.1 to 1.3**	08
Module – 2	
Early Vision – One Image: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Local Image Features, Texture **T2:Chap 4-4.1 to 4.5, Chap5-5.1 to 5.5, Chap6-6.1 to 6.3, 6.5**	08
Module – 3	
Early Vision – Multiple Images: Stereopsis and Structure from Motion **T2:Chap7-7.1 to 7.7, Chap 8-8.1 to 8.3**	08
Module – 4	
Mid-level Vision: Segmentation by Clustering, Grouping and Model fitting, Tracking **T2:Chap9-9.1 to 9.4, Chap 10-10.1 to 10.7, Chap 11-11.1 to 11.3**	08
Module – 5	
High-level Vision: Registration, Smooth Surface and their Outlines, Range Data Detecting Objects in Images, Recognition **T2:Chap12-12.1 to 12.3, Chap 13-13.1 to 13.3, Chap 14-14.1 to 14.4, Chap 17-17.1 to 17.3. T1:Chap 6-6.1 to 6.6**	08

Course outcomes: The students should be able to:

- Implement fundamental image processing techniques required for computer vision
- Understand Image formation process
- Perform shape analysis
- Develop applications using computer vision techniques
- Understand video processing and motion computation

Question Paper Pattern:

- The question paper will have ten questions.

- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Computer Vision: Algorithms and Applications (CVAA), Richard Szeliski, Springer, 2nd edition, 2020, http://szeliski.org/Book/
2. Computer Vision – A modern approach, by D. Forsyth and J. Ponce, Prentice Hall, 2nd edition, 2012

Reference Books:

1. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
2. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
3. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
4. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University, Press, 2012
5. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.
6. Building Computer Vision Applications Using Artificial Neural Networks - With Step-by-step Examples in OpencvAndTensorflow With Python, Shamshad Ansari,Apress, 2020

SEMANTIC WEB AND SOCIAL NETWORKS

(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18AI743	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

- To understand the components of the social network.
- To model and visualize the social network.
- To mine the users in the social network.
- To understand the evolution of the social network.
- To know the applications in real time systems.

Module – 1	**Contact Hours**
Web Intelligence: Thinking and Intelligent Web Applications, The Information Age ,The World Wide. Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map,Logic on the semantic Web. **T1: Chapter 1,3,4**	08

RBT: L1, L2	
Module – 2	
Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema. **T1: Chapter 2,5** **RBT: L1, L2**	08
Module – 3	
Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools,Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic,Rule and Inference Engines. **T1: Chapter 7,8** **RBT: L1, L2**	08
Module – 4	
Semantic Web Applications, Services and Technology: Semantic Web applications and services,Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services,Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods **T1: Chapter 10,11,12** **RBT: L1, L2**	08
Module – 5	
Social Network Analysis and semantic web. What is social Networks analysis, development of the social networks analysis, Electronic Sources forNetwork Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features. **T2: Chapter 2,3** **RBT: L1, L2**	08
Course outcomes: The students should be able to:	
• Work on the internal components of the social network. • Model and visualize the social network. • Analyse the behaviour of the users in the social network. • Predict the possible next outcome of the social network. • Apply social network in real time applications.	
Question Paper Pattern:	
• The question paper will have ten questions. • Each full Question consisting of 20 marks	

- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Thinking on the Web – Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

Reference Books:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen,Springer Publications.
4. Programming the Semantic Web, T. Segaran, C.Evans, J. Taylor, O'Reilly, SPD.

BUSINESS INTELLIGENCE
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18AI744	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS – 03

Course Learning Objectives: This course will enable students to:

- Explain the Decision Support systems and Business Intelligence framework.
- Illustrate the significance of computerized Decision Support, and understand the mathematicalmodelling behind decision support.
- Explain Data warehousing, its architecture and Extraction, Transformation, and Load (ETL) Processes.Explore knowledge management, explain its activities, approaches and its implementation.
- Describe the Expert systems , areas suitable for application of experts system

Module – 1	**Contact Hours**
Decision Support and Business Intelligence: Opening Vignette, Changing Business Environments andComputerized Decision Support, Managerial Decision Making, Computerized Support for Decision Making, AnEarly Framework for Computerized Decision Support, The Concept of Decision Support Systems (DSS), Aframework for Business Intelligence (BI), A Work System View of Decision Support. **Text Book 1: Chapter 1** **RBT: L1, L2**	08
Module – 2	
Computerised Decision Support: Decision Making, Models, Phases of the Decision-Making Process, TheIntelligence Phase, The Design Phase, The Choice Phase, The Implementation Phase, How Decisions AreSupported.**Modelling and Analysis:**Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, andRisk, Management Support Systems, Multiple Goals, Sensitivity Analysis, What-If Analysis, andGoal Seeking **Text Book 1: Chapter 2** **RBT: L1, L2**	08
Module – 3	
Data Warehousing: Data Warehousing Definitions and Concepts, Data Warehousing Process Overview, DataWarehousing Architectures, Data Integration and the Extraction, Transformation, and Load (ETL) Processes. **Text Book 1: Chapter 5** **RBT: L1, L2**	08
Module – 4	
Knowledge Management: Introduction to Knowledge Management, Organizational Learning andTransformation, Knowledge Management Activities, Approaches to Knowledge Management, InformationTechnology (IT) In Knowledge Management, Knowledge Management Systems Implementation. **Text Book 1: Chapter 11** **RBT: L1, L2**	08

Module – 5	
Expert Systems: Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of ExpertSystems, Knowledge Engineering, Problem Areas Suitable for Expert Systems, Development of Expert Systems,Benefits, Limitations, and Critical Success Factors of Expert Systems. **Text Book 1: Chapter 12** **RBT: L1, L2**	08
Course outcomes: The students should be able to:	
• Apply the basics of data and business to understand Decision Support systems and Business Intelligence framework. • Describe the significance of 106omputerized Decision Support, apply the basics of mathematics to understand the mathematical modelling behind decision support. • Explain Data warehousing , its architecture and Extraction, Transformation, and Load (ETL) Processes. • Analyze the importance of knowledge management and explain its activities, approaches and its implementation. • Describe the Expert systems and analyze its development , discuss areas suitable forapplication of experts system.	
Question Paper Pattern:	
• The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module.	
Textbooks:	
1. Business Intelligence and Analytics: Systems for decision support, RameshSharda,DursunDelden, Efraim Turban, Pearson Tenth edition	
Reference Books:	
1. Data Mining Techniques. ForMarketing, Sales and CustomerRelationshipManagementBerry M.&Linoff G. Wiley Publishing Inc 2004 2. Data Science for Business, Foster Provost and Tom Fawcett, O'Reilly Media,Inc2013	

INTRODUCTION TO BIG DATA ANALYTICS
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18CS751	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Interpret the data in the context of the business.
- Identify an appropriate method to analyze the data
- Show analytical model of a system

Module – 1	**Contact Hours**
Introduction to Data Analytics and Decision Making: Introduction, Overview of the Book, The Methods, The Software, Modeling and Models, Graphical Models, Algebraic Models, Spreadsheet Models, Seven-Step ModelingProcess.**Describing the Distribution of a Single Variable**:Introduction,Basic Concepts, Populations and Samples, Data Sets,Variables,and Observations, Types of Data, Descriptive Measures for Categorical Variables, Descriptive Measures for Numerical Variables, Numerical Summary Measures, Numerical Summary Measures with StatTools,Charts for Numerical Variables, Time Series Data, Outliers and Missing Values,Outliers,Missing Values, Excel Tables for Filtering,Sorting,and Summarizing. **Finding Relationships among Variables**: Introduction, Relationships among Categorical Variables, Relationships among Categorical Variables and a Numerical Variable, Stacked and Unstacked Formats, Relationships among Numerical Variables, Scatterplots, Correlation and Covariance, Pivot Tables. **Textbook 1: Ch. 1,2,3** **RBT: L1, L2, L3**	08
Module – 2	
Probability and Probability Distributions:Introduction,Probability Essentials, Rule of Complements, Addition Rule, Conditional Probability and the Multiplication Rule, Probabilistic Independence, Equally Likely Events, Subjective Versus Objective Probabilities, Probability Distribution of a Single Random Variable, Summary Measures of a Probability Distribution, Conditional Mean and Variance, Introduction to Simulation. **Normal,Binormal,Poisson,and Exponential Distributions**:Introduction,The Normal Distribution, Continuous Distributions and Density Functions, The Normal Density,Standardizing:Z-Values,Normal Tables and Z-Values, Normal Calculations in Excel, Empirical Rules Revisited, Weighted Sums of Normal Random Variables, Applications of the Normal Random Distribution, The Binomial Distribution, Mean and Standard Deviation of the Binomial Distribution, The Binomial Distribution in the Context of Sampling, The Normal Approximation to the Binomial, Applications of the Binomial Distribution, The Poisson and Exponential Distributions, The Poisson Distribution, The Exponential Distribution. **Textbook 1: Ch. 4,5** **RBT: L1, L2, L3**	08

Module – 3	
Decision Making under Uncertainty:Introduction,Elements of Decision Analysis, Payoff Tables, Possible Decision Criteria, Expected Monetary Value(EMY),Sensitivity Analysis, Decision Trees, Risk Profiles, The Precision Tree Add-In,Bayes' Rule, Multistage Decision Problems and the Value of Information, The Value of Information, Risk Aversion and Expected Utility, Utility Functions, Exponential Utility, Certainty Equivalents, Is Expected Utility Maximization Used? **Sampling and Sampling Distributions**: Introduction, Sampling Terminology, Methods for Selecting Random Samples, Simple Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling, Multistage Sampling Schemes, Introduction to Estimation, Sources of Estimation Error, Key Terms in Sampling, Sampling Distribution of the Sample Mean, The Central Limit Theorem, Sample Size Selection, Summary of Key Ideas for Simple Random Sampling. **Textbook 1: Ch. 6,7** **RBT: L1, L2, L3**	08
Module – 4	
Confidence Interval Estimation: Introduction, Sampling Distributions, The t Distribution, Other Sampling Distributions, Confidence Interval for a Mean, Confidence Interval for a Total, Confidence Interval for a Proportion, Confidence Interval for a Standard Deviation, Confidence Interval for the Difference between Means, Independent Samples, Paired Samples, Confidence Interval for the Difference between Proportions, Sample Size Selection, Sample Size Selection for Estimation of the Mean, Sample Size Selection for Estimation of Other Parameters. **Hypothesis Testing**:Introduction,Concepts in Hypothesis Testing, Null and Alternative Hypothesis, One-Tailed Versus Two-Tailed Tests, Types of Errors, Significance Level and Rejection Region, Significance from p-values, Type II Errors and Power, Hypothesis Tests and Confidence Intervals, Practical versus Statistical Significance, Hypothesis Tests for a Population Mean, Hypothesis Tests for Other Parameters, Hypothesis Tests for a Population Proportion, Hypothesis Tests for Differences between Population Means, Hypothesis Test for Equal Population Variances, Hypothesis Tests for Difference between Population Proportions, Tests for Normality, Chi-Square Test for Independence. **Textbook 1: Ch. 8,9** **RBT: L1, L2, L3**	08
Module – 5	
Regression Analysis: Estimating Relationships: Introduction, Scatterplots : Graphing Relationships, Linear versus Nonlinear Relationships,Outliers,Unequal Variance, No Relationship,Correlations:Indications of Linear Relationships, Simple Linear Regression, Least Squares Estimation, Standard Error of Estimate, The Percentage of Variation Explained:R-Square,Multiple Regression, Interpretation of Regression Coefficients, Interpretation of Standard Error of Estimate and R-Square, Modeling Possibilities, Dummy Variables, Interaction Variables, Nonlinear Transformations, Validation of the Fit. **Regression Analysis**: Statistical Inference:Introduction,The Statistical Model, Inferences About the Regression Coefficients, Sampling Distribution of the Regression Coefficients, Hypothesis Tests for the Regression Coefficients and p-Values, A Test for the Overall Fit: The ANOVA Table,Multicollinearity,Include/Exclude Decisions, Stepwise Regression,Outliers,Violations of Regression Assumptions,Nonconstant Error Variance,Nonnormality of Residuals,Autocorrelated Residuals ,Prediction. **Textbook 1: Ch. 10,11** **RBT: L1, L2, L3**	08

Course outcomes: The students should be able to:

- Explain the importance of data and data analysis
- Interpret the probabilistic models for data
- Define hypothesis, uncertainty principle
- Evaluate regression analysis

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. S C Albright and W L Winston, Business analytics: data analysis and decision making, 5/e Cenage Learning

Reference Books:

1. ArshdeepBahga, Vijay Madisetti, "Big Data Analytics: A Hands-On Approach", 1st Edition, VPT Publications, 2018. ISBN-13: 978-0996025577
2. Raj Kamal and Preeti Saxena, "Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning", McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966

PYTHON APPLICATION PROGRAMMING
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18CS752	**IA Marks**	40
Number of Lecture Hours/Week	3:0:0	**Exam Marks**	60
Total Number of Lecture Hours	40	**Exam Hours**	03

CREDITS – 03

Course Objectives: This course will enable students to

- Learn Syntax and Semantics and create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Implement Object Oriented Programming concepts in Python
- Build Web Services and introduction to Network and Database Programmingin Python.

Module – 1	**Contact Hours**
Why should you learn to write programs, Variables, expressions and statements, Conditional execution, Functions **Textbook 1: Chapters 1 – 4** **RBT: L1, L2, L3**	08
Module – 2	
Iteration, Strings, Files **Textbook 1: Chapters 5– 7** **RBT: L1, L2, L3**	08
Module – 3	
Lists, Dictionaries, Tuples, Regular Expressions **Textbook 1: Chapters 8 – 11** **RBT: L1, L2, L3**	08
Module – 4	
Classes and objects, Classes and functions, Classes and methods **Textbook 2: Chapters 15 – 17** **RBT: L1, L2, L3**	08
Module – 5	
Networked programs, Using Web Services, Using databases and SQL **Textbook 1: Chapters 12– 13, 15** **RBT: L1, L2, L3**	08

Course Outcomes: After studying this course, students will be able to

- Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Charles R. Severance, **"Python for Everybody: Exploring Data Using Python 3",** 1st Edition, CreateSpace Independent Publishing Platform, 2016. (http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf)
2. Allen B. Downey, **"Think Python: How to Think Like a Computer Scientist",** 2ndEdition, Green Tea Press, 2015. (http://greenteapress.com/thinkpython2/thinkpython2.pdf) (Download pdf files from the above links)

Reference Books:

1. Charles Dierbach, **"Introduction to Computer Science Using Python",**1st Edition, Wiley India Pvt Ltd, 2015. ISBN-13: 978-8126556014
2. Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
3. Mark Lutz, **"Programming Python",**4th Edition, O'Reilly Media, 2011.ISBN-13: 978-9350232873
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, **"Data Structures and Algorithms in Python",**1stEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176
5. ReemaThareja, **"Python Programming Using Problem Solving Approach",** Oxford university press, 2017. ISBN-13: 978-0199480173

INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18CS753	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Identify the problems where AI is required and the different methods available
- Compare and contrast different AI techniques available.
- Define and explain learning algorithms

Module – 1	**ContactHours**
What is artificial intelligence?, Problems, Problem Spaces and search **TextBook1: Ch 1, 2** **RBT: L1, L2**	08

Module – 2	
Knowledge Representation Issues, Using Predicate Logic, Representing knowledge using Rules, **TextBoook1: Ch 4, 5 and 6.** **RBT: L1, L2**	08
Module – 3	
Symbolic Reasoning under Uncertainty, Statistical reasoning **TextBoook1: Ch 7, 8** **RBT: L1, L2**	08
Module – 4	
Game Playing, Natural Language Processing **TextBoook1: Ch 12 and 15** **RBT: L1, L2**	08
Module – 5	
Learning, Expert Systems. **TextBook1: Ch 17 and 20** **RBT: L1, L2**	08

Course outcomes: The students should be able to:

- Identify the AI based problems
- Apply techniques to solve the AI problems
- Define learning and explain various learning techniques
- Discuss on expert systems

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. E. Rich , K. Knight & S. B. Nair – Artificial Intelligence, 3/e, McGraw Hill.

Reference Books:

1. Artificial Intelligence: A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition.
2. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem Solving", Fourth Edition, Pearson Education, 2002.
4. Artificial Intelligence and Expert Systems Development by D W Rolston-Mc Graw hill.
5. N.P. Padhy "Artificial Intelligence and Intelligent Systems" , Oxford University Press-2015

INTRODUCTION TO DOT NET FRAMEWORK FOR APPLICATION DEVELOPMENT
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18CS754	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- Inspect Visual Studio programming environment and toolset designed to build applications for Microsoft Windows
- Understand Object Oriented Programming concepts in C# programming language.
- Interpret Interfaces and define custom interfaces for application.
- Build custom collections and generics in C#
- Construct events and query data using query expressions

Module – 1	**Contact Hours**
Introducing Microsoft Visual C# and Microsoft Visual Studio 2015: Welcome to C#, Working with variables, operators and expressions, Writing methods and applying scope, Using decision statements, Using compound assignment and iteration statements, Managing errors and exceptions **T1: Chapter 1 – Chapter 6** **RBT: L1, L2**	08
Module – 2	
Understanding the C# object model: Creating and Managing classes and objects, Understanding values and references, Creating value types with enumerations and structures, Using arrays **Textbook 1: Ch 7 to 10** **RBT: L1, L2**	08
Module – 3	
Understanding parameter arrays, Working with inheritance, Creating interfaces and defining abstract classes, Using garbage collection and resource management **Textbook 1: Ch 11 to 14** **RBT: L1, L2**	08
Module – 4	
Defining Extensible Types with C#: Implementing properties to access fields, Using indexers, Introducing generics, Using collections **Textbook 1: Ch 15 to 18** **RBT: L1, L2**	08
Module – 5	
Enumerating Collections, Decoupling application logic and handling events, Querying in-memory data by using query expressions, Operator overloading **Textbook 1: Ch 19 to 22** **RBT: L1, L2**	08

Course outcomes: The students should be able to:

- Build applications on Visual Studio .NET platform by understanding the syntax and semantics of

C#

- Demonstrate Object Oriented Programming concepts in C# programming language
- Design custom interfaces for applications and leverage the available built-in interfaces in building complex applications.
- Illustrate the use of generics and collections in C#
- Compose queries to query in-memory data and define own operator behaviour

Question paper pattern:

The question paper will have TEN questions.
There will be TWO questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer FIVE full questions, selecting ONE full question from each module.

Text Books:

1. John Sharp, Microsoft Visual C# Step by Step, 8th Edition, PHI Learning Pvt. Ltd. 2016

Reference Books:

1. Christian Nagel, "C# 6 and .NET Core 1.0", 1st Edition, Wiley India Pvt Ltd, 2016. Andrew Stellman and Jennifer Greene, "Head First C#", 3rd Edition, O'Reilly Publications, 2013.
2. Mark Michaelis, "Essential C# 6.0", 5th Edition, Pearson Education India, 2016.
3. Andrew Troelsen, "Prof C# 5.0 and the .NET 4.5 Framework", 6th Edition, Apress and Dreamtech Press, 2012.

AI AND ML APPLICATION DEVELOPMENT LABORATORY
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18AIL76	**CIE Marks**	40
Number of Contact Hours/Week	0:2:2	**SEE Marks**	60
Total Number of Lab Contact Hours		**Exam Hours**	3 Hrs

Credits – 2

Course Learning Objectives: This course will enable students to:

- Explore the knowledge of AI and ML concepts and practice to groom students into well-informed application developers.
- Demonstrate the knowledge of human cognition, Artificial Intelligence, Machine Learning and data engineering for designing intelligent systems
- Apply computational knowledge and project development skills to provide innovative solutions.
- Strong practice in AI and ML programming through a variety of AI and ML problems.
- Develop AI and ML applications using front-end and back-end tools

Descriptions (if any): 1. The programs can be implemented in either JAVA or Python.

2. Data sets can be taken from standard repository

Part A

1. Write a program to implement **k-Nearest Neighbour algorithm** to classify the iris data set. Print both correct and wrong predictions.
2. Develop a program to apply K-means algorithm to cluster a set of data stored in .CSV file. Use the same data set for clustering using **EM algorithm**. Compare the results of these two algorithms and comment on the quality of clustering.
3. Implement the non-parametric **Locally Weighted Regressionalgorithm** in order to fit data points. Select appropriate data set for your experiment and draw graphs
4. Build an Artificial Neural Network by implementing the **Backpropagation algorithm** and test the same using appropriate data sets
5. Demonstrate **Genetic algorithm** by taking a suitable data for any simple application.
6. Demonstrate **Q learning** algorithm with suitable assumption for a problem statement.

PART B

Mini Project

- Use Java, C#, PHP, Python, or any other similar front-end tool. Developed mini projectns must be demonstrated on desktop/laptop as a stand-alone or web based application
- Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.
- Indicative areas include: health care, education, agriculture, banking, library, agent based systems, registration systems, industry, reservation systems, facility management, super market etc.,Similar to but not limited to:

  Handwritten Digit Recognition
  Prediction of Cardiac Arrhythmia type using Clustering and Regression Approach
  Hybrid Regression Technique for House Prices Prediction
  An Iris Recognition Algorithm for Identity Authentication
  An Approach to Maintain Attendance using Image Processing Techniques
  Unconstrained Face Recognition
  Vehicle Number Plate Detection System
  Detection of Fake News
  Stock Prediction using Linear Regression
  Prediction of Weather Report
  Analyzing Bike Sharing Trends
  Sentiment Analysis for Movie Reviews
  Analyzing and Recommendations of Music Trends
  Forecasting Stock and Commodity Prices
  Diabetes Prediction
  Speech Recognition
  Spam Detection using neural Networks in Python
  Combining satellite imagery and to predict poverty

Conduct of Practical Examination:

- Experiment distribution

- For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
- For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.

- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution *(Subjected to change in accordance with university regulations)*
  s) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  t) For laboratories having PART A and PART B
    i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
    ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

NEURAL NETWORKS AND DEEP LEARNING **(Effective from the academic year 2018 -2019)** **SEMESTER – VIII**			
Subject Code	18AI81	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS – 03			

Course Learning Objectives: This course will enable students to:

- Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
- Implement deep learning algorithms and solve real-world problems.
- Execute performance metrics of Deep Learning Techniques.

Module – 1	**Contact Hours**
Introduction to ANN: Biological to Artificial neuron, Training an MLP, Training a DNN with TensorFlow , Fine tuning NN HyperParametersUp and Running with TensorFlow **Chapter 9 and 10**	08
Module-2	
Deep Neural network: Introduction, Vanishing Gradient problems, Reusing Pretrained layers, Faster optimizers, avoiding over fitting through regularization **Chapter 11**	08
Module-3	
Distributing Tensor flow across devices and servers: Multiple devices on a single machine, multiple servers, parallelizing NN on a Tensor Flow cluster **Convolution Neural Network**: Architecture of the visual cortex, Convolutional layer, Pooling layer, CNN architecture	08

Chapter 12 and 13	
Module-4	
Recurrent Neural Network: Recurrent neurons, Basic RNN in Tensor Flow, Training RNN , Deep RNNs, LSTM Cell, GRU Cell, NLP **Chapter 14**	08
Module-5	
Autoencoders: Efficient data representation, Performing PCA, Stacked autoencoders, Unsupervised pretraining using SA, Denoising, Sparse autoencoders, variational and other autoencoders. **Reinforcement Learning:** Learning to optimize rewards, policy search, Introduction to OpenAI Gym, Neural network polices, Evaluating actions, Policy gradients, Markov decision processes, TDL and Q-learning, Learning to play Ms.Pac-man using Deep Q Learning **Chapter 15 and 16**	08

Course outcomes: The students should be able to:

- Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
- Implement deep learning algorithms and solve real-world problems.
- Execute performance metrics of Deep Learning Techniques.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Hands on Machine Learning with Scikit-Learn &TensorFlow, AurelienGeron, O'Reilly, 2019

Reference Books:

1. Deep Learning Lan Good fellow and YoshuaBengio and Aaron CourvilleMIT Press2016.
2. Neural Networks and Deep Learning, Charu C. Aggarwal, Springer International Publishing, 2018

SYSTEM MODELLING AND SIMULATION (Effective from the academic year 2018 -2019) SEMESTER – VIII			
Subject Code	18AI821	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS –3			

Course Learning Objectives: This course will enable students to:

- Explain the basic system concept and definitions of system;
- Discuss techniques to model and to simulate various systems;
- Analyze a system and to make use of the information to improve the performance.

Module 1	**Contact Hours**
Introduction: When simulation is the appropriate tool and when it is not appropriate, Advantages and disadvantages of Simulation; Areas of application, Systems and system environment; Components of a system; Discrete and continuous systems, Model of a system; Types of Models, Discrete-Event System Simulation Simulation examples: Simulation of queuing systems. **General Principles.** **Textbook 1: Ch. 1, 2, 3.1.1, 3.1.3** **RBT: L1, L2, L3**	08
Module 2	
Statistical Models in Simulation :Review of terminology and concepts, Useful statistical models,Discrete distributions. Continuous distributions,Poisson process, Empirical distributions. **Queuing Models:**Characteristics of queuing systems,Queuingnotation,Long-run measures of performance of queuing systems,Long-run measures of performance of queuing systems cont…,Steady-state behavior of M/G/1 queue, Networks of queues, **Textbook 1: Ch. 5,6.1 to 6.3, 6.4.1,6.6** **RBT: L1, L2, L3**	08
Module 3	
Random-NumberGeneration: Properties of random numbers; Generation of pseudo-random numbers, Techniques for generating random numbers,Tests for Random Numbers, **Random-Variate Generation:** ,Inverse transform technique Acceptance-Rejection technique. **Textbook 1: Ch. 7,8.1, 8.2** **RBT: L1, L2, L3**	08
Module 4	
Input Modeling: Data Collection; Identifying the distribution with data, Parameter estimation, Goodness of Fit Tests, Fitting a non-stationary Poisson process, Selecting input models without data, Multivariate and Time-Series input models. **Estimation of Absolute Performance:** Types of simulations with respect to output analysis ,Stochastic nature of output data, Measures of performance and their estimation, **Textbook 1: Ch. 9, 11.1 to 11.3** **RBT: L1, L2, L3**	08
Module 5	
Measures of performance and their estimation,Output analysis for terminating simulations Continued..,Output analysis for steady-state simulations. **Verification, Calibration And Validation:** Optimization: Model building, verification and validation, Verification of simulation models, Verification of simulation models,Calibration and validation of models, Optimization via Simulation.	08

Textbook 1: Ch. 11.4, 11.5, 10 **RBT: L1, L2, L3**	
Course Outcomes: The student will be able to :	
• Explain the system concept and apply functional modeling method to model the activities of a static system • Describe the behavior of a dynamic system and create an analogous model for a dynamic system; • Simulate the operation of a dynamic system and make improvement according to the simulation results.	
Question Paper Pattern:	
• The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module.	
Textbooks:	
1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation, 5 th Edition, Pearson Education, 2010.	
Reference Books:	
1. Lawrence M.Leemis, Stephen K. Park: Discrete – Event Simulation: A First Course, Pearson Education, 2006. 2. Averill M. Law: Simulation Modeling and Analysis, 4 th Edition, Tata McGraw-Hill, 2007	

SOFT AND EVOLUTIONARY COMPUTING (Effective from the academic year 2018 -2019) SEMESTER – VIII			
Subject Code	18AI822	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS – 03			

Course Learning Objectives: This course will enable students to:

- Describe the basics of Soft computing
- Explain the process Fuzzy &Genetic Algorithm to solve the optimization problem.
- Analyse the Neuro Fuzzy system for clustering and classification.
- Illustrate the process of swarm intelligence system to solve real world problems.

Module – 1	**Contact Hours**
Introduction to Soft computing: Neural networks, Fuzzy logic, Genetic algorithms, Hybrid systems and its applications. **Introduction to classical sets and fuzzy sets:** Classical relations and fuzzy relations, Membership functions. **T1: Chapter 1 and 7& 8**	08
Module – 2	
Fuzzification and Defuzzification **T1: Chapter 9 & 10**	08
Module – 3	
Genetic algorithms: Introduction, Basic operations, Traditional algorithms, Simple GA General genetic algorithms, Operators, Stopping conditions for GA flow. **T1: Chapter 15.1 To 15.10** **RBT: L1, L2**	08
Module – 4	
Swarm Intelligence System: Introduction, background of SI, Ant colony system Working of ant colony optimization, ant colony for TSP. **T2: 8.1 to 8.5** **RBT: L1, L2**	08
Module – 5	
Unit commitment problem, particle Swarm Intelligence system Artificial bee colony system, Cuckoo search system. **T2: 8.6 to 8.9** **RBT: L1, L2**	08

Course outcomes: The students should be able to:

- Implement machine learning through neural networks.
- Design Genetic Algorithm to solve the optimization problem.
- Develop a Fuzzy expert system.

- Model Neuro Fuzzy system for clustering and classification

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Principles of Soft computing, Shivanandam, Deepa S. N, Wiley India, 2011/Reprint2014
2. Soft Computing with MATLAB Programming, N. P. Padhy, S.P. Simon, Oxford, 2015.

Reference Books:

1. Neuro-fuzzy and soft computing, .S.R. Jang, C.T. Sun, E. Mizutani, Phi (EEE edition), 2012
2. Soft Computing, SarojKaushik, SunitaTiwari, McGrawHill, 2018

ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT
(Effective from the academic year 2018 -2019)
SEMESTER – VII

Subject Code	18AI823	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course will enable students to:

- To understand basic concepts of RPA
- To DescribeRPA,where it can be applied and how it is implemented
- To Describe the different types of variables,Control Flow and data manipulation techniques
- To Underst and Image,Text and DataTables Automation
- To Describe various types of Exceptions and strategies to handle

Module – 1	**Contact Hours**
RPA Foundations- What is RPA – Flavors of RPA- History of RPA- The Benefits of RPA- The downsides of RPA- RPA Compared to BPO, BPM and BPA – Consumer Willingness for Automation- The Workforce of the Future- RPA Skills-On-Premise Vs. the Cloud- Web Technology- Programming Languages and Low Code- OCR-Databases-APIs- AI-Cognitive Automation-Agile, Scrum, Kanban and Waterfall0 DevOps- Flowcharts. **Textbook 1: Ch 1, Ch 2** **RBT:L1,L2**	08
Module – 2	
RPA Platforms- Components of RPA- RPA Platforms-About Ui Path- About UiPath - The future of automation - Record and Play - Downloading and installing UiPath Studio - Learning Ui Path Studio- - Task recorder - Step-by-step examples using the recorder. **Textbook 2: Ch 1, Ch 2** **RBT: L1, L2**	08
Module – 3	
Sequence, Flowchart, and Control Flow-Sequencing the workflow-Activities-Control flow, various types of loops, and decision making-Step-by-step example using Sequence and Flowchart-Step-by-step example using Sequence and Control flow-Data Manipulation-Variables and Scope-Collections-Arguments – Purpose and use-Data table usage with examples-Clipboard management-File operation with step-by-step example-CSV/Excel to data table and vice versa (with a step-by-step example). **Textbook 2: Ch 3, Ch 4** **RBT:L1,L2**	08
Module – 4	
Taking Control of the Controls- Finding and attaching windows- Finding the control- Techniques for waiting for a control- Act on controls – mouse and keyboard activities- Working with UiExplorer- Handling events- Revisit recorder- Screen Scraping- When to use OCR- Types of OCR available- How to use OCR- Avoiding typical failure points. **Text book 2: Ch 5** **RBT:L1,L2**	08
Module – 5	

Exception Handling, Debugging, and Logging- Exception handling- Common exceptions and ways to handle them- Logging and taking screenshots- Debugging techniques- Collecting crash dumps- Error reporting- Future of RPA **Text book 2: Ch 8** **Text book 1: Ch 13** **RBT:L1,L2**	08

Course outcomes: The students should be able to:

- ToUnderstand the basicconcepts of RPA
- To Describe various components and platforms of RPA
- To Describe the different types of variables,control flow and data manipulation techniques
- To Understand various control techniques and OCR in RPA
- To Describe varioustypes and strategies to handle exceptions

Question paper pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Tom Taulli , The Robotic Process Automation Handbook : A Guide to Implementing RPA Systems,2020, ISBN-13 (electronic): 978-1-4842-5729-6, Publisher : Apress
2. Alok Mani Tripathi, Learning Robotic Process Automation, Publisher:Packt Publishing Release Date: March 2018 ISBN:9781788470940

Reference Books:

1. Frank Casale,Rebecca Dilla,Heidi Jaynes,Lauren Livingston,"Introductionto Robotic Process Automation :A Primer",Institute of Robotic Process Automation.
2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots,Automate Repetitive Tasks& Become An RPA Consultant
3. Srikanth Merianda,Robotic Process Automation Tools,Process Automation and their benefits:Understanding RPA and Intelligent Automation
https://www.uipath.com/rpa/robotic-process-automation

MODERN INFORMATION RETRIEVAL (Effective from the academic year 2018 -2019) SEMESTER – VIII			
Subject Code	18AI824	**CIE Marks**	40
Number of Contact Hours/Week	3:0:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs
CREDITS – 03			

Course Learning Objectives: This course will enable students to:

- To learn the classical techniques of Information Retrieval and extract meaningful patterns from it.
- To get an insight into practical algorithms of textual document indexing, relevant ranking, web mining, text analytics and their performance evaluations.
- To acquire the necessary experience to design, and implement applications using Information Retrieval systems

Module – 1	**Contact Hours**
Introduction: Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval – Set Theoretic, Algebraic and Probabilistic Models. **Text Book 1: Chapter 1, Chapter 2**	08
Module – 2	
Retrieval Techniques: Structured Text Retrieval Models –Retrieval Evaluation – Word Sense Disambiguation. **Text Book 1: Chapter 3**	08
Module – 3	
Querying: Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations – User Relevance Feedback – Local and Global Analysis **Text Book 1: Chapter 4, Chapter 5**	08
Module – 4	
Text Operations: Document Pre-processing – Clustering – Text Compression - Indexing and Searching – Inverted files – Boolean Queries – Sequential searching – Pattern matching. **Text Book 1: Chapter 7, Chapter 8**	08
Module – 5	
User Interface&Applications: User Interface and Visualization – Human Computer Interaction – Access Process – Starting Points – Query Specification - Context – User relevance Judgment – Interface for Search. Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Metasearchers – Online IR systems – Online Public Access Catalogs. **Text Book 1: Chapter 10, Chapter 13, Chapter 14**	08

Course outcomes: The students should be able to:

- Apply information retrieval principles to locate relevant information in large collections of data
- Implement features of retrieval systems for web-based search tasks.
- Apply the common algorithms and techniques for information retrieval related to document indexing and query processing
- Demonstrate a thorough understanding and solid knowledge of the principles and techniques of

human-computer interaction

- Implement graphical user interfaces with modern software tools
- Develop and design interactive software systems applications for real time applications
- Design and develop web applications for the effective informational retrieval

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. Ricardo Baeza-Yate, Berthier Ribeiro-Neto, Modern Information Retrieval, Pearson Education Asia, 2012.

Reference Books:

1. G.G. Chowdhury, Introduction to Modern Information Retrieval, Second Edition, Neal- Schuman Publishers, 2010.

YADAVALLI BASAVARAJ

Digitally signed by YADAVALLI BASAVARAJ
DN: cn=YADAVALLI BASAVARAJ c=IN o=Personal
Reason: I am the author of this document
Location:
Date: 2023-04-12 11:26+05:30