VISION AND MISSION OF INSTITUTE

VISION

To contribute valuable graduates for industry and society through excellence in technical & management education and research.

MISSION

CM 1: To offer state-of-the-art undergraduate, postgraduate and doctoral programmes.
CM 2: To empower the students with Technical, Managerial skills and professional ethics.
CM 3: To collaborate with academia and industries for skill development.

VISION AND MISSION OF DEPARTMENT

VISION

To create a centre of excellence in teaching, learning and research that meets technological challenges.

MISSION

M1: To provide quality teaching and learning environment to produce competent graduates.
M2: To impart knowledge relevant to industry and research.
M3: To develop the students with professional, leadership qualities and lifelong learning skills.

Program Educational Objectives (PEOs)

	Program Educational Objectives
PEO-1	To prepare graduates to excel in professional career by acquiring the broad knowledge of electrical engineering.
PEO-2	To develop graduates to engage in lifelong learning, professional development and career enhancing activities.
PEO-3	To prepare graduates with leadership qualities, ethics and skills necessary to be successful in their career.

Mapping of PEOs with Mission of the department

PEO Statements	M1 Quality teaching & learning environment	M2 Industry & research	M3 Leadership qualities & Lifelong learning skills
PEO1	3	2	1
PEO2	2	2	3
PEO3	1	2	3

PROGRAM OUTCOMES (POs)

Electrical and Electronics Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

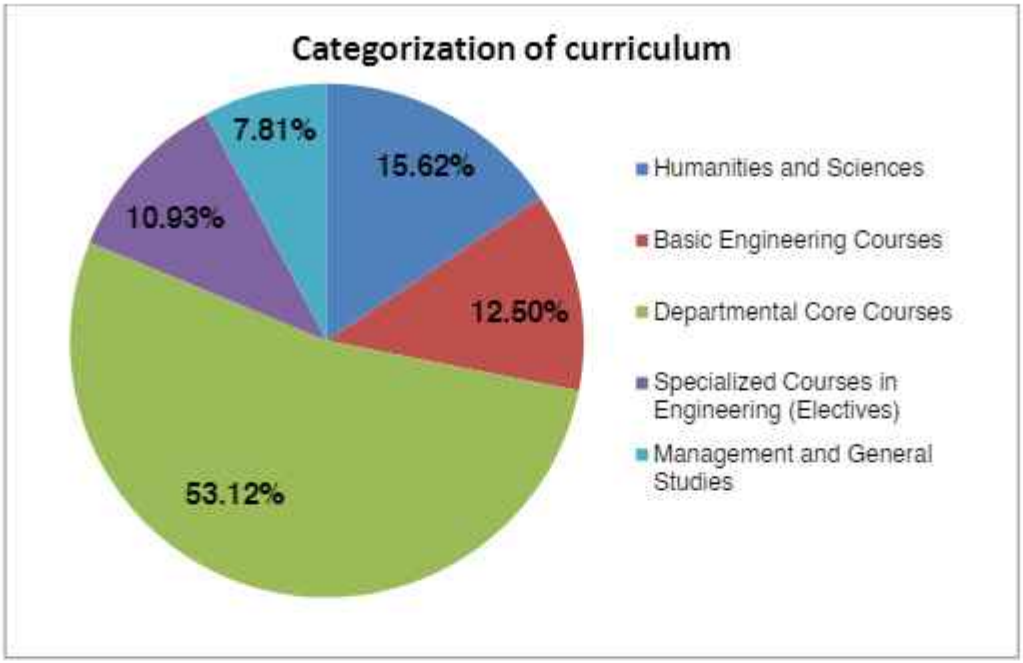
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

1. Analyze, design and solve problems in the field of electrical and electronics engineering by applying knowledge acquired from core subjects and other allied topics.

2. Develop products/ software using technological developments to cater the needs of society and industry.


Categorization of curriculum
15.62%
12.50%
53.12%
10.93%
7.81%
Humanities and Sciences
Basic Engineering Courses
Departmental Core Courses
Specialized Courses in Engineering (Electives)
Management and General Studies

COURSE OUTLINE

Pre Requisites:

Students should have knowledge about the classification of materials with respect to their properties, basics of units and dimensions and their conversions, usage of scientific calculators. Basic knowledge of oscillations, waves, elasticity and Plasticity, basics of semiconductors and dielectrics, properties of light, atomic structure, states of matter, mechanics, sound, principles of electricity, magnetism and electromagnetism

Model 1: Quantum Mechanics

Wave particle dualism, de-Broglie hypothesis, Matter waves, de-Broglie wavelength and extension to electron. Heisenberg's uncertainty principle. Application of uncertainty principle - Non-existence of electron in the nucleus. Setting up of one-dimensional time independent Schrödinger wave equation. Wave function: Physical significance, Probability density and normalization, properties of wave function. Eigen functions and Eigen values, Applications of Schrodinger's wave equation: Particle in a one dimensional potential well of infinite height.

Model 2: Materials Science

Conductor: Assumptions of classical free electron theory, failures of classical free electron theory. Fermi energy, Fermi-dirc statistics, Fermi factor. Assumptions of quantum free electron theory, Density of states only expression, Expression for Fermi energy (derivation), expression for conductivity, merits of quantum free electron theory.

Semiconductor: Fermi level in intrinsic semiconductors, Relation between Fermi energy and energy gap (Derivation), Conductivity of semiconductors (derivation), Hall effect, Expression for Hall coefficient (derivation), Applications of Hall effect.

Dielectrics: Polar and non-polar dielectrics, Dielectric constant, Relation between P and ε_r, Types of polarization, Internal field in solids and liquids (only expression), Classius - mossotti equation (Derivation), Applications.

Model 3: Lasers and Optical Fibers

Lasers: Induced absorption, spontaneous emission and stimulated emission. Expression for power of Laser, Expression for energy density in terms of Einstein's coefficients (derivation). Requisites of lasers system. Condition for laser action. Construction and working of laser sources CO_2 and semiconductor lasers, Applications of laser: Material processing – Laser welding, Laser range finder.

Optical fibers: Working principle and Structure of optical fiber, Propagation mechanism, Expression for acceptance angle and numerical aperture (derivation), Modes of propagation, Types of optical fibers, Expression for attenuation coefficient (Derivation), Causes for attenuation, Application: Point-point optical communication.

Model 4: Elastic properties of materials

Elasticity: Concept of elasticity, Plasticity, Stress, Strain, Hooke's law, Stress-strain curve, Different elastic module, Poisson's ratio, Expression for Young's modulus, Bulk modulus and Rigidity modulus, Relation between Y, η, K and σ (Derivations). Limitations of Poisson's ratio, Expression for bending movement (Derivation), Young's modulus by Single cantilever (Derivation), Expression for couple per unit twist of a solid cylinder (Derivation), Torsion pendulum.

Model 5: Oscillations and Measurement techniques

Oscillations: Simple Harmonic Motion, Differential equation of SHM (derivation), Expression for time, Natural frequency, Springs in series and parallel, Theory of free oscillations, damped oscillations and forced oscillations with three cases, Resonance, Sharpness of resonance, Helmholtz resonator.

Instrumentation techniques: Introduction of nano-materials and nano-composites, X-ray diffractomenter: Principle, Constriction and working, Scanning electron microscope: Principle, constriction and working, Applications in instrumentation techniques.

Course objectives:

1. Learn the basic concepts in Quantum Mechanics and its applications to understand various physical properties of materials.
2. Gain the knowledge of advanced concepts like lasers, optical fiber and measuring techniques for nano-composites.
3. Considerate the various oscillations and elastic properties of materials with their future engineering applications.

Course Outcomes:

Course Outcomes: Upon completion of this course, students will be able to:

[CO1]. Apply the principles of quantum mechanics and compute Eigen values and Eigen function using Schrodinger's equation.

[CO2]. Explain various electrical and thermal properties of materials like conductors, semiconductors, and dielectrics using different theatrical models.

[CO3]. Understanding the theoretical background of laser and optical fibers, working of different types of lasers and optical fibers with their application.

[CO4]. Derive the various relations among elastic constants and Explain the properties of elastic materials for engineering applications.

[CO5].Describe the theories of various types of oscillation and apply the measurement techniques like X-RD & SEM to analyze nano-composites.

Course Outcome Assessment Matrix:

Course Objectives	Program Outcomes											
	a	b	c	d	e	f	g	h	i	j	k	l
CO 1	L	L	-	-	-	-	-	-	-	-	-	-
CO 2	L	L	-	-	-	-	-	-	-	-	-	-
CO 3	L	L	-	-	-	-	-	-	-	-	-	-
CO 4	L	L	-	-	-	-	-	-	-	-	-	-
CO 5	L	L	-	-	-	-	-	-	-	-	-	-

BALLARI INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF HUMANITIES AND SCIENCE

Course: Professional English - I
Course Code: 21PEH16
Hours per Week : 2:1:0
Total Hours: 30

Credit : 02
Exam Hours: 3
CIE Marks: 50
SEE Marks: 50

Course Learning Objectives: The course Professional English I (21PEH16) will enable the students

CLO1: To impart basic English grammar and essentials of language skils
CLO2: To train to identify the nuance of Phonetics, accent, stress shift, and enhance pronunciation skills
CLO3: To enhance English vocabulary and professional language proficiency

Module 1: Basic English Grammar

Parts of Speech, Usage of Articles, Verb: Types of the verb, Tenses, Usage of Modal Auxiliaries, The Sequence of Tenses. Subject-verb Agreement.

[6 Hours, RBT levels: L1 & L2]

Module 2: Essential Grammar

Question Tags- Rhetorical questions (YES/NO Questions). 'Wh' questions, Voice, Reported speech. Punctuation marks, Spotting Errors

[6 Hours, RBT levels: L1 & L2]

Module 3: Fundamentals of Phonetics

Phonetics- Introduction to Phonetics, IPA Chart, Transcription, Speech sound, Vowel and consonant, Syllable, Structure, Accent, Stress shift, Spelling Rules. Silent, and non-silent letters, Minimal pairs-Consonant clusters

[7 Hours, RBT levels: L1 & L2]

Module 4: Role Of English In Professional Life

Professional Communication, Importance of English Language, Fundamentals of communication, The flow of communication, Hindrances of Communication, Mother Tongue Influence, Causes of MTI. Neutralization of MTI, Indianism.

[7 Hours, RBT levels: L1 & L2]

Module 5: Vocabulary And Comprehension

Synonyms, Antonyms, Homonyms, Homophones, and Homographs, One-word substitutesIdioms and Phrases, Analogies, comprehension- Passage

[4 Hours, RBT levels: L1 & L2]

Course Outcomes: On completion of this course students will be able to

CO1: Reproduce Grammatical English and construct formal sentences.
CO2: Develops English speaking and writing skills.
CO3: Articulate English vocabulary at command and language proficiency.
CO4: Understand professional communication and improves speaking skills
CO5: Develops Vocabulary and language proficiency

Course Outcome Assessment Matrix:

COURSE OUTCOMES	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-

Textbooks:

1. Technical Communication: By Gajendra Singh Chauhan
2. Communication skills: By Sanjay Kumar and Pushpa Latha
3. English Language Communication Skills: Lab Manual cum work-book

Reference Books:

1. Technical Communication Skills, By- Meenakshi Raman, Sangeeta Sharma
2. Effective Technical Communication, By- M Ashraf Rizvi
3. High School English Grammar- Wren and Martin

Question paper pattern :

The SEE question paper will be set for 100 marks the pattern of question paper will be objective type (MCQ) and reduced to 50 marks.

COURSE OUTLINE

Pre Requisites:

KNOWLEDGE ABOUT:

***IDENTIFYING COMMON ERRORS IN WRITING AND SPEAKING ENGLISH**
***NATURE AND STYLE OF SENSIBLE WRITING**
***TECHNICAL READING AND WRITING PRACTICES**
***COMMUNICATION FOR EMPLOYMENT**
***COMMUNICATION AT WORKPLACE**

Brief Note on Course Description:

Module 1: Communication Skills

Non-Verbal Communication- Body language and Paralinguistic features, Intonations, Listening Process- Introduction, Definition, and Scope, Listening Barriers, How to improve listening skills.

Module 2 : Business Communication 1

Technical Report Writing, Technical Proposal Writing, Business Letter Writing: - Components of Business Letters, Types of Business Letters, Job Application Letter, Cover Letter, Resume, Email Writing, Blog Writing

Module 3: Business Communication 2

The Art of Condensation: Precis Writing, Story Writing, Abstract Writing, Synopsis, Paraphrasing, and Summary, Paragraph Writing, Essay Writing

Module 4: Public Speaking Skills

Introduction Public speaking, Story-telling, Elocution, and Extempore, Tips to develop Public Speaking, Conversation: Introduction, Purpose, and Features of General Conversation, Short Conversation, Tips for Improving Conversation

Module 5: Professional Speaking Skills

Professional Presentation, Group Discussion, Job Interviews, Preparation for Job interview, Dialogue Writing, The Art of Negotiation

COURSE OBJECTIVES:

- **TO IMPLEMENT ENGLISH VOCABULARY AT COMMAND AND ENSURE LANGUAGE PROFICIENCY**
- **TO ACHIEVE BETTER TECHNICAL WRITING AND PRESENTATION SKILLS**
- **IDENTIFY THE COMMON ERRORS IN SPEAKING AND WRITING ENGLISH**
- **ACQUIRE EMPLOYMENT AND WORKPLACE COMMUNICATION SKILLS**

Course Outcomes:

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

COURSE OUTCOME:

CO1: IDENTIFY COMMON ERRORS IN SPOKEN AND WRITTEN COMMUNICATION
CO2: GET FEMILIARIZED WITH ENGLISH VOCABULARY AND LANGUAGE PROFICIENCY
CO3: IMPROVE NATURE AND STYLE OF SENSIBLE WRITING AND ACQUIRE EMPLOYMENT AND WORKPLACE COMMUNICATION SKILLS
CO4: IMPROVE THEIR TECHNICAL COMMUNICATION SKILLS THROUG TECHNICAL READING AND WRITING PRACTICES
CO5: PERFORM WELL CAMPUS RECRUITMENT, ENGINEERING AND ALL OTHER GENERAL COMPETITIVE EXAMINATIONS

Course Outcome Assessment Matrix:

Course Learning Objectives	Program Outcome's											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	-	-	-	-	-	-	-	3	-	-
CO 3	-	-	-	-	-	-	-	-	-	3	-	-
CO 4	-	-	-	-	-	-	-	-	-	3	-	-
CO 5	-	-	-	-	-	-	-	-	-	3	-	-

TEACHING / LEARNING PLAN

HIGH VOLTAGE ENGINEERING (Core Course)
B.E., VII Semester, Electrical and Electronics Engineering [As per Choice Based Credit System (CBCS) scheme]

Course Code	17EE73	CIE Marks	40
Number of Lecture Hours/Week	04	SEE Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

Credits - 04

Course objectives:

- To discuss conduction and breakdown in gases, liquid dielectrics.
- To discuss breakdown in solid dielectrics.
- To discuss generation of high voltages and currents and their measurement.
- To discuss overvoltage phenomenon and insulation coordination in electric power systems.

	Teaching Hours
Module-1	
Conduction and Breakdown in Gases: Gases as Insulating Media, Collision Process, Ionization Processes, Townsend's Current Growth Equation, Current Growth in the Presence of Secondary Processes, Townsend's Criterion for Breakdown, Experimental Determination of Coefficients α and γ, Breakdown in Electronegative Gases, Time Lags for Breakdown, Streamer Theory of Breakdown in Gases, Paschen's Law, Breakdown in Non-Uniform Fields and Corona Discharges. **Conduction and Breakdown in Liquid Dielectrics:** Liquids as Insulators, Pure Liquids and Commercial Liquids, Conduction and Breakdown in Pure Liquids, Conduction and Breakdown in Commercial Liquids. **Breakdown in Solid Dielectrics:** Introduction, Intrinsic Breakdown, Electromechanical Breakdown, Thermal Breakdown.	10
Revised Bloom's Taxonomy Level L_1 – Remembering, L_2 – Understanding.	
Module-2	
Generation of High Voltages and Currents: Generation of High Direct Current Voltages, Generation of High Alternating Voltages, Generation of Impulse Voltages, Generation of Impulse Currents, Tripping and Control of Impulse Generators.	10
Revised Bloom's Taxonomy Level L_1 – Remembering , L_2 – Understanding L_3 – Applying.	
Module-3	
Measurement of High Voltages and Currents: Measurement of High Direct Current Voltages, Measurement of High AC and Impulse Voltages, Measurement of High Currents – Direct, Alternating and Impulse, Cathode Ray Oscillographs for Impulse Voltage and Current Measurements.	10
Revised Bloom's Taxonomy Level L_1 – Remembering , L_2 – Understanding L_3 – Applying.	
Module-4	
Overvoltage Phenomenon and Insulation Coordination in Electric Power Systems: National Causes for Overvoltages - Lightning Phenomenon, Overvoltage due to Switching Surges, System Faults and Other Abnormal, Principles of Insulation Coordination on High Voltage and Extra High Voltage Power Systems. ■	10
Revised Bloom's Taxonomy Level L_1 – Remembering, L_2 – Understanding.	
Module-5	
Non-Destructive Testing of Materials and Electrical Apparatus: Introduction, Measurement of Dielectric Constant and Loss Factor, Partial Discharge Measurements.	10

B.E ELECTRICAL AND ELECTRONICS ENGINEERING(EEE)
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER - VII
17EE73 HIGH VOLTAGE ENGINEERING (Core Course) (continued)

Module-5 (continued)	**Teaching Hours**
High Voltage Testing of Electrical Apparatus: Testing of Insulators and Bushings, Testing of Isolators and Circuit Breakers, Testing of Cables, Testing of Transformers, Testing of Surge Arrestors, Radio Interference Measurements, Testing of HVDC Valves and Equipment. ■	
Revised Bloom's Taxonomy Level L_1 – Remembering, L_2 – Understanding.	

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

- Explain conduction and breakdown phenomenon in gases, liquid dielectrics.
- Explain breakdown phenomenon in solid dielectrics.
- Explain generation of high voltages and currents
- Discuss measurement techniques for high voltages and currents.
- Discuss overvoltage phenomenon and insulation coordination in electric power systems.
- Discuss non-destructive testing of materials and electric apparatus and high-voltage testing of electric apparatus■

Graduate Attributes (As per NBA)
Engineering Knowledge, Problem Analysis, Design/ Development of Solutions, Modern Tool Usage, Ethics, Individual and Team Work, Communication, Life-long Learning.

Question paper pattern:

- The question paper will have ten questions.
- Each full question is for 16 marks.
- There will be 2full questions (with a maximum of four sub questions in one full question) from each module.
- Each full question with sub questions will cover the contents under a module.
- Students will have to answer 5 full questions, selecting one full question from each module. ■

Textbook

1	High Voltage Engineering	M.S. Naidu, V.Kamaraju	McGraw Hill	5th Edition, 2013.

Reference Books

1	High Voltage Engineering Fundamentals	E. Kuffel, W.S. Zaengl, J. Kuffel	Newnes	2nd Edition, 2000
2	High Voltage Engineering	Wadhwa C.L.	New Age International	3rd Edition, 2012
3	High-Voltage Test and Measuring Techniques	Wolfgang Hauschild • Eberhard Lemke	Springer	1st Edition2014
4	High Voltage Engineering	Farouk A.M. Rizk	CRC Press	1st Edition2014

Course Outcomes (in terms of Bullet Points):

At the end of course student will be able to:

CO1: Illustrate conduction & breakdown in gases, liquid and solid dielectrics
CO2: Analyze the generation of high voltages, currents and impulse voltages
CO3: Measure of impulse voltages, currents and high voltages
CO4: Analyze the causes for over voltages and switching surges
CO5: Compare effective techniques for non destructive testing of materials and electrical apparatus

Course Outcome Assessment Matrix:

Course outcomes	Program Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2											3	
CO2	3	2											3	
CO3	3												3	
CO4	3	2											3	
CO5	3												3	
Average Mapping Value	3	2											3	

CO-PO & CO-PSO MAPPING JUSTIFICATION

PO1	All COs requires to apply fundamental engineering concepts to solve engineering problems hence it is mapped high with PO1
PO2	CO1,2,4 requires to identify engineering and other relevant knowledge that applies to a given problem hence it is mapped moderately with PO2
PSO1	All COs requires to identify risks/impacts in the life-cycle of an engineering product or activity hence it is mapped high with PSO1

B. E. ELECTRICAL AND ELECTRONICS ENGINEERING
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
SEMESTER – VII

INTEGRATION OF DISTRIBUTED GENERATION(Professional Elective)

Course Code	18EE733	CIE Marks	40
Number of Lecture Hours/Week (L:T:P)	3:0:0	SEE Marks	60
Credits	03	Exam Hours	03

Course Learning Objectives:

- To explain power generation by alternate energy source like wind power and solar power.
- To explain selection of size of units and location for wind and solar systems.
- Discuss the effects of integration of distributed generation on the performance the system.
- To provide practical and useful information about grid integration of distributed generation.

Module-1

Distributed Generation: Introduction, status, Properties of wind power, Power Distribution as a function of wind speed, Solar Power: Status, Properties, Space requirements, Photovoltaic's, Seasonal variation in production capacity, Combined Heat-and-Power: Status, Options for space Heating, Hydropower: Properties of Large Hydro, Properties of small Hydro, Variation with time, Tidal Power, Wave Power, Geothermal Power, Thermal Power Plant. ■

Module-2

Distributed Generation(continued): Interface with the Grid. Power System Performance: Impact of Distributed Generation on the Power System, Aims of the Power System, Hosting Capacity Approach, Power Quality, Voltage Quality and Design of Distributed Generation, Hosting Capacity Approach for Events, Increasing the Hosting Capacity. Overloading and Losses: Impact of Distributed Generation, Overloading: Radial Distribution Networks, Active Power Flow Only, Active and Reactive Power Flow Overloading: Redundancy and Meshed Operation Redundancy in Distribution Networks Meshed Operation, Losses. ■

Module-3

Over loading and Losses (continued): Increasing the Hosting Capacity: Increasing the Loadability Building New Connections, Inter trip Schemes, Advanced protection Schemes, Energy Management Systems. Power Electronics approach, Demand Control, Prioritizing Renewable Energy, Dynamic Loadability.

Voltage Magnitude Variations: Impact of Distributed Generation, Voltage Marginand Hosting Capacity: Voltage Control in Distribution Systems, Voltage Rise Owing to Distributed Generation, Hosting Capacity, Estimating hosting capacity without Measurements, Sharing hosting capacity. Design of Distribution Feeders: Basic Design Rules, Terminology, An Individual Generator Along a Medium-Voltage Feeder, Low voltage feeders, Series and Shunt Compensation, A Numerical Approach to Voltage Variations: Example for Two-stage Boosting, General Expressions for Two-Stage Boosting Tap Changers with Line- Drop Compensation: Transformer with One Single Feeder, Adding a Generator.ProbabilisticMethodsforDesignofDistributionFeeders:Need for Probabilistic Methods, The System Studied, Generation with Constant Production, Adding Wind Power ■

Module-4

VoltageMagnitudeVariations(continued): StatisticalApproachtoHostingCapacity,IncreasingtheHostingCapacity: New or Stronger Feeders, Alternative Methods for Voltage Control Accurate Measurement of the Voltage Magnitude Variations, Allowing Higher Overvoltage's Overvoltage Protection, Over Voltage Curtailment Compensating the generators voltage variations, Distributed generation with voltage control, Coordinated voltage control.

Power Quality Disturbances: Impact of Distributed Generation, Fast Voltage Fluctuations: Fast Fluctuations in Wind Power, Fast Fluctuations in Solar Power, Rapid Voltage Changes, Very Short Variations. Voltage Unbalance :Weaker Transmission System, Stronger Distribution System, Large Single-Phase Generators, Stronger Distribution Grid VoltageUnbalance. ■

Module-5

Power Quality Disturbances(continued): Low-Frequency Harmonics: Wind Power: Induction Generators, Generators with Power Electronics Interfaces, Synchronous Generators, Measurement Example, Harmonic Resonances, Weaker Transmission Grid, Stronger Distribution Grid. High-Frequency Distortion: Emission by Individual Generators, Grouping Below and Above 2 kHz, Limits Below and Above 2 kHz,Voltage Dips: Synchronous Machines Balanced Dips and Unbalanced Dips, Induction generators and unbalanced dips. Increasing the Hosting Capacity: Strengthening the Grid, Emission Limits for Generator Units, Emission Limits for Other Customers, Higher Disturbance Levels, Passive Harmonic Filters, Power Electronics Converters, Reducing the Number of Dips, Broadband and High-Frequency Distortion. ■

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

- Explain energy generation by wind power and solar power.
- Discuss the variation in production capacity at different time scales,the size of individual units, and the flexibility in choosing locations with respect to wind and solar systems.
- Explain the performance of the system when distributed generation is integrated to the system.
- Discuss effects of the integration of DG: the increased risk of overload, increased losses, increased risk of overvoltages and increased levels of power quality disturbances.
- Discuss effects of the integration of DG: incorrect operation of the protection.
- Discuss the impact the integration of DG on power system stability and operation. ■

Question paper pattern:

- The question paper will have ten questions.
- Each full question is for 20 marks.
- There will be 2 full questions (with a maximum of three sub questions in one full question) from each module.
- Each full question with sub questions will cover the contents under a module.
- Students will have to answer 5 full questions, selecting one full question from each module. ■

Text Book

1	Integration of Distributed Generation in the Power System	Math Bollen	Wiley	2011

Course Learning Objectives :

- To explain power generation by alternate energy source like wind power and solar power.
- To explain selection of size of units and location for wind and solar systems.
- Discuss the effects of integration of distributed generation on the performance the system.
- To provide practical and useful information about grid integration of distributed generation.
- Discuss methods of mitigating voltage rise effect
- To explain hosting capacity and various methods of improving hosting capacity

Course Learning Outcomes *(in terms of Bullet Points) :*

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

CO1: Review the different reasons for new type of power production in the power system

CO2: Analyze the effects of integration of distributed generation on the performance the system.

CO3: Examine increased risk of overloading and losses of DG integration

CO4: Analyze impact of distributed generation on voltage magnitude variation

CO5: Analyze various power quality disturbances developed due to DG integration.

Course Outcome Assessment Matrix:

Course Objectives	Program Outcome's												Program Specific Outcome	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS0 2
CO 1	2	3										2	2	
CO 2	2	3										1	2	
CO 3	2	3										1	2	
CO 4	3	3										1	2	
CO 5	3	3										2	3	1

Prepared by: Dr. T. Machappa
Signature:

Approved by: Dr. YashvanthBhupal
Signature:

PYTHON APPLICATION PROGRAMMING
(OPEN ELECTIVE)
(Effective from the academic year 2018 -2019)
SEMESTER – VI

Course 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 Learning Objectives: This course (18CS752) 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	**Teaching 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",** 2nd Edition, 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",** 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176
5. Reema Thareja, **"Python Programming Using Problem Solving Approach",** Oxford university press, 2017. ISBN-13: 978-0199480173

Course Outcomes (in terms of Bullet Points):

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

- Examine Python syntax, semantics, flow control and functions.
- Make use of strings & file systems to write python programs.
- Develop python programs using core data structures.
- Interpret the concepts of object oriented programming as used in python programming
- Build exemplary application programs related to Network programming, Web services and Databases in python.

Course Outcomes	Program Outcome's												Program Specific Outcomes	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	*2*	*2*												
CO 2	*2*	*2*												
CO 3	*2*	*2*										*2*		*2*
CO 4	*2*	*2*	*2*									*1*		
CO 5	*2*	*2*	*2*									*2*		*2*

Semester 1 - Physics Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT11	Calculus & Linear Algebra	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21PHY12	Engineering Physics	Physics	Physics	2	2	0	3	3	50	50	100
03	21BEE13	Basic Electrical Engineering	E & E Engg.	E & E Engg.	2	2	0	3	3	50	50	100
04	21CIV14	Elements Of Civil Engineering	Civil Engg.	Civil Engg.	2	2	0	3	3	50	50	100
05	21EGDL15	Engineering Graphics	Mech. Engg.	Mech. Engg.	2	0	2	3	3	50	50	100
06	21PEI16	Professional English - I	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21PHYL17	Engineering Physics Laboratory	Physics	Physics	0	0	2	1	3	50	50	100
08	21BEL18	Basic Electrical Engineering Laboratory	E & E Engg.	E & E Engg.	0	0	2	1	3	50	50	100
09	21SSD19	Study Skill & Self Development	Humanities	Humanities	1	0	0	1	3	50	50	100
Total					12	10	6	20	27	450	450	900

Semester 1 - Chemistry Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT11	Calculus & Linear Algebra	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21CHE12	Engineering Chemistry	Physics	Physics	2	2	0	3	3	50	50	100
03	21PSP13	Problem Solving Through C Programming	CSE	CSE	2	2	0	3	3	50	50	100
04	21ELN14	Electronics & Communication – Fundamentals & Applications	E & C Engg.	E & C Engg.	2	2	0	3	3	50	50	100
05	21EME15	Elements of Mechanical Engineering	Mech. Engg.	Mech. Engg.	2	2	2	3	3	50	50	100
06	21PEI16	Professional English - I	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21CHEL17	Engineering Chemistry Laboratory	Chemistry	Chemistry	0	0	2	1	3	50	50	100
08	21CPL18	Computer Programming Laboratory	CSE	CSE	0	0	2	1	3	50	50	100
09	21CEP19	Communicative Skill Enhancement Practice	Humanities	Humanities	0	0	2	1	3	50	50	100
				Total	11	12	6	20	27	450	450	20

Semester 2 - Physics Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT21	Advance Calculus & Numerical Methods	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21PHY22	Engineering Physics	Physics	Physics	2	2	0	3	3	50	50	100
03	21BEE23	Basic Electrical Engineering	E&E Engg.	E & E Engg.	2	2	0	3	3	50	50	100
04	21CIV24	Elements Of Civil Engineering	Civil Engg.	Civil Engg.	2	2	0	3	3	50	50	100
05	21EGDL25	Engineering Graphics	Mech. Engg.	Mech. Engg.	2	0	2	3	3	50	50	100
06	21PEI26	Professional English - II	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21PHYL27	Engineering Physics Laboratory	Physics	Physics	0	0	2	1	3	50	50	100
08	21BEL28	Basic Electrical Engineering Laboratory	E & E Engg.	E & E Engg.	0	0	2	1	3	50	50	100
09	21SSD29	Study Skill & Self Development	Humanities	Humanities	1	0	0	1	3	50	50	100
				Total	12	10	6	20	27	450	450	900

Semester 2 - Chemistry Cycle

SL	Course Code	Course	BOS / Teaching Department	BOE / Paper Setting Board	Teaching Hours per Week			Credits	Duration of Exam	Marks		
					L	T	P			CIE	SEE	Total
01	21MAT21	Advance Calculus & Numerical Methods	Mathematics	Mathematics	2	2	0	3	3	50	50	100
02	21CHE22	Engineering Chemistry	Physics	Physics	2	2	0	3	3	50	50	100
03	21PSP23	Problem Solving Through C Programming	CSE	CSE	2	2	0	3	3	50	50	100
04	21ELN24	Electronics & Communication – Fundamentals & Applications	E & C Engg.	E & C Engg.	2	2	0	3	3	50	50	100
05	21EME25	Elements of Mechanical Engineering	Mech. Engg.	Mech. Engg.	2	2	2	3	3	50	50	100
06	21PEI26	Professional English - II	Humanities	Humanities	1	2	0	2	3	50	50	100
07	21CHEL27	Engineering Chemistry Laboratory	Chemistry	Chemistry	0	0	2	1	3	50	50	100
08	21CPL28	Computer Programming Laboratory	CSE	CSE	0	0	2	1	3	50	50	100
09	21CEP29	Communicative Skill Enhancement Practice	Humanities	Humanities	0	0	2	1	3	50	50	100
				Total	11	12	6	20	27	450	450	20

I Semester
Scheme of Teaching and Examination 2022-23
Outcome-Based Education (OBE) and Choice Based Credit System(CBCS)
(Effective from the academic year 2022-23)

I Semester (Mechanical Engineering Stream) (For Chemistry group)

Sl.No	Course and Course Code		Course Title	TDPSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	22MATM11	Mathematics for ME Streams-I	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	22CHEE12	Chemistry for ME Streams	Chemistry	2	2	2	0	03+02	50	50	100	04
3	ESC	22CED13	Computer Aided Engineering Drawing	Civil/Mech Enggdept	2	0	2	0	03	50	50	100	03
4	ESC-I	22ESC14x	Engineering Science Course-I	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	ETC-I	22ETC15x	Emerging Technology Course-I/	Any Engg Dept	3	0	0	0	03	50	50	100	03
	OR												
	PLC-I	22PLC15x	Programming Language Course-I		2	0	2	0	03+02				
6	AEC	22PWS16	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
7	HSMS	22ICO17	Indian Constitution	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		22KSK17 22KBK17	Samskrutika Kannada/ Balake Kannada										
8	AEC/SEC	22SFH18	Scientific Foundations for Health	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
		22IDT18	Innovation and Design Thinking		1	0	0	0	01				
				TOTAL						400	400	800	20

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**- Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE** -Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

*-**22MATM11** Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers

#-**22CHEM12**- SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0) Questions from the practical component shall be included in SEE, however, there is no SEE for practical component.

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

Credit Definition:	
1-hour Lecture **(L)** per week=**1Credit** 2-2-hoursTutorial**(T)** per week=**1Credit** 3-hours Practical / Drawing **(P)** per week=**1Credit** **2**-hous Skill Development Actives **(SDA)** per week = **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practicalsessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXURE-I of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students
shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC141	Introduction to Civil Engineering	3	0	0	22ETC15A	Smart Materials and Systems	3	0	0
22ESC142	Introduction to Electrical Engineering	3	0	0	22ETC15B	Green Buildings	3	0	0
22ESC143	Introduction to Electronics Engineering	3	0	0	22ETC15C	Operation and Maintenance of Solar ElectricSystems	3	0	0
22ESC144	Introduction to Mechanical Engineering	3	0	0	22ETC15D	Introduction to Embedded System	3	0	0
22ESC145	Introduction to C Programming	2	0	2	22ETC15E	Introduction to Nano Technology	3	0	0
					22ETC15F	Introduction to Drone Technology	3	0	0
					22ETC15G	Introduction to Sustainable Engineering	3	0	0
					22ETC15H	Renewable Energy Sources	3	0	0
					22ETC15I	Waste Management	3	0	0
					22ETC15J	Emerging Applications of Biotechnology	3	0	0
					22ETC15K	Introduction to Internet of Things (IOT)	3	0	0
					22ETC15L	Introduction to Cyber Security	3	0	0
(PLC-I) Programming Language Courses-I									
Code	Title	L	T	P					
22PLC15A	Introduction to Web Programming	2	0	2					
22PLC15B	Introduction to Python Programming	2	0	2					
22PLC15C	Basics to JAVA programming	2	0	2					
22PLC15D	Introduction to C++ Programming	2	0	2					

- The student has to select one course from the ESC-I group.
- MES stream Students shall opt for any one of the courses from the ESC-I group **except, 22ESC144-Introduction to MechanicalEngineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-I or PLC-I group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

II Semester
Scheme of Teaching and Examination 2022-23
Outcome-Based Education (OBE) and Choice Based Credit System(CBCS)
(Effective from the academic year 2022-23)

II Semester (Mechanical Engineering Stream. (For the students who have attended 1semster under Chemistry Group)

Sl.No	Course and CourseCode		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	22MATM21	Mathematics for ME Streams-II	Maths	3	0	2	0	03	50	50	100	04
2	#ASC(IC)	22PHYM22	Physics for ME Streams	PHY	2	2	2	0	03+02	50	50	100	04
3	ESC	22EME23	Elements of Mechanical Engineering	Mechanical	If offered as theory course: 2	2	0	0	03	50	50	100	03
					If offered as Integrated course: 2	0	2	0					
4	ESC-II	22ESC24x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	22PLC25x	Programming Language Course-II	Any Engg Dept	2	0	2	0	03+02	50	50	100	03
	OR												
	ETC-II	22ETC25x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	22ENG26	Communicative English	Humanities	0	2	0	0	01	50	50	100	01
7	HSMC	22KSK27 22KBK27	Samskrutika Kannada/ Balake Kannada	Humanities	0	2	0	0	01	50	50	100	01
		OR											
		22ICO27	Indian Constitution										
8	AEC/SDC	22IDT28	Innovation and Design Thinking	Any Dept	0	0	2	0	02	50	50	100	01
		OR											
		22SFH28	Scientific Foundations of Health		1	0	0	0	01				
				TOTAL						400	400	800	20

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**- Emerging

Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

*-**22MATM21** Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers

#-**22PHYM22** SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0),.

All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
22ESC241	Introduction to Civil Engineering	3	0	0	22ETC25A	Smart materials and Systems	3	0	0
22ESC242	Introduction to Electrical Engineering	3	0	0	22ETC25B	Green Buildings	3	0	0
22ESC243	Introduction to Electronics Engineering	3	0	0	22ETC25C	Operation and Maintenance of Solar ElectricSystems	3	0	0
22ESC244	Introduction to Mechanical Engineering	3	0	0	22ETC25D	Introduction to Embedded System	3	0	0
22ESC245	Introduction to C Programming	2	0	2	22ETC25E	Introduction to Nano Technology	3	0	0
					22ETC25F	Introduction to Drone Technology	3	0	0
					22ETC25G	Introduction to Sustainable Engineering	3	0	0
					22ETC25H	Renewable Energy Sources	3	0	0
					22ETC25I	Waste Management	3	0	0
					22ETC25J	Emerging Applications of Biotechnology	3	0	0
					22ETC25K	Introduction to Internet of Things(IoT)	3	0	0
					22ETC25L	Introduction to Cyber Security	3	0	0

(PLC-II) Programming Language Courses-II				
Code	**Title**	**L**	**T**	**P**
22PLC25A	Introduction to Web Programming	2	0	2
22PLC25B	Introduction to Python Programming	2	0	2
22PLC25C	Basics to JAVA programming	2	0	2
22PLC25D	Introduction to C++ Programming	2	0	2

- The student has to select one course from the ESC-II group.
- Mechanical Engineering stream Students shall opt for any one of the courses from the ESC-II group **except, 22ESC244-Introduction to Mechanical Engineering**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester
- The students must select one course from either ETC-II or PLC-II group.
- If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa

Semester: I

(COMMON TO ALL BRANCHES)

Course Title: Computer Aided Engineering Drawing

Course Code	**22CAED13/23**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P)	**2:0:2**	**SEE Marks**	**50**
Credits	**03**	**Exam Hours**	**03**
Total Number of Pedagogy Hours	**40**	**Total Marks**	**100**

Pre-requisites: Knowledge of basic geometrical shapes and instruments, measurement, unit conversions

Course objectives:

- Understand drawing as a communication mode
- Expose students to standards and conventions followed in preparation of engineering drawings
- Develop the ability of conveying the engineering information through drawings
- Acquire the knowledge of generating the orthographic views of lines, planes and solids.
- Understand the development of surfaces and isometric projections.
- To make them understand the relevance of engineering drawings to different engineering domains

Module – 1

Introduction to Sketching: Principles of Engineering Graphics and their significance, Drawing Instruments and their uses, BIS conventions, free hand sketching, Drawing sheets, Fundamentals of Scales, Introduction to Software (solid edge): Creation of 2D/3D environment, selection of drawing sheet size and scale, different commands, Dimensioning rules, Line Conventions.

Introduction to Orthographic Projections, planes of projection, reference line and conventions employed, First and Third angle of projection,

Orthographic Projections of points situated in all four quadrants.

Orthographic Projection of straight lines located in first quadrant with inclined to VP and HP. Problems on applications of straight lines without traces.

Orthographic Projection of plane surfaces (First angle projection only) Projection of regular plane surfaces- triangle, square, rectangle, pentagon, hexagon and circular laminae in simple positions resting on HP/ VP and inclined to HP/ VP using change of position method. (No problems on punched and composite plates).

10 Hours

Module - 2

Orthographic Projection of Solids: Introduction, Projections of right regular solids- prisms & pyramids (triangle, square, rectangle, pentagon and hexagon), cones, cubes (hexahedron) and tetrahedron, solids resting on HP ONLY

10 Hours

Module – 3

Isometric Projection: Introduction, Isometric scale, Isometric projection of- simple plane figures, individual solids and combination of two simple solids, Conversion of Isometric to orthographic views. Problems on applications of Isometric projection of simple Engineering components and conversion to orthographic projections (Mechanical, electrical and electronic components for CIE only).

10 Hours

Module - 4

Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular prisms, pyramids, cylinders and cones resting with base on HP only. Development of lateral surfaces of Sphere, frustums and truncation. Problems on applications of Development of lateral surfaces viz, funnel, tray, transition pieces, connecting two ducts

10 Hours

Module – 5

Engineering Applications of Engineering Graphics: Sketching and drawing simple Mechanisms, wiring and lighting diagrams, Basic building Drawings, Electronic Drawing- PCB Drawings. Introduction to Development of Computer Graphical Packages

10 Hours

COURSE OUTCOMES:

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

CO1	Understand the basics of Engineering graphics and to implement the principles of orthographic projections of points, lines and planes,
CO2	Analyze and draw the orthographic projections of solids.
CO3	Visualize three dimensional objects and to draw Isometric projection
CO4	Develop the lateral surfaces of solids
CO5	Visualize the components used in Engineering disciplines.

Assessment Details

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks) and that for SEE minimum passing marks is 35% of the maximum marks (18 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Examination / Evaluation (CIE):

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The Alternate Assessment Tools are Quiz, Assignments, Presentations, Open Book, Self E-Learning and Model Making.

Semester End Examination (SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionally reduced to 50.

1. The question paper will have 8 full questions from module-1 to module-4 as per below tabled weightage details.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Preparatory sketching (b)
Module 1	20	13	07
Module 2	30	19	11
Module 3	25	16	09
Module 4	25	16	09
Total	**100**	**64**	**36**
Consideration of SEE Marks		**Total of (a) + (b) ÷ 2 = Final SEE marks**	

2. The students will have to answer 4 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	Engineering Drawing: Plane and Solid Geometry	Bhatt, N.D	53rd Edition, Charotar Publishing House Pvt. Limited, Gujarat	2019
2	Engineering Graphics	GopalakrishnaK.R	32nd Edition, Subash Stores, Bangalore	2005
3				
		Reference Books		
1	A Textbook of Engineering Drawing	Dhawan R. K	3/e, S. Chand Publishing	2019
2	A Textbook of Engineering Graphics	Venugopal K., and Prabhuraj	New Age International Publishers	2014
3	Engineering Drawing	Parthasarathy N. S., Vela Murali,	Oxford University Press	2015

E-Resources:

1. https://www.youtube.com/watch?v=p62LPzFqGQw: Engineering Graphics and Design - Intro, IIT Delhi
2. https://youtu.be/26-RdMraMAY: Orthographic Projections, NPTEL
3. https://youtu.be/DW7dpKdxVrA: Orthographic Projections, NPTEL
4. https://www.youtube.com/watch?v=AoNIOxnxDO0&list=PLIhUrsYr8yHx7TVB51jN3HZVyW3R6RiBg
5. https://www.youtube.com/watch?v=7JpSSBVeSpI
6. https://www.youtube.com/watch?v=66R4esOwuAg&list=RDCMUCNQHebTzfRahptcsmuOVufg&index=4

Semester: I/II
(ETC-I/II) Emerging Technology Courses-I/II
(Mechanical Engineering stream)
Course Name: INTRODUCTION TO SUSTAINABLE ENGINEERING

Course Code	22ETC15g/25g	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Total Number of Pedagogy Hours	40	Total Marks	100

Pre-requisites:

Course Learning Objectives:

- To familiarize the students to the area of sustainability and concepts of sustainability engineering.
- To enable students with an understanding of principles and frame work of sustainable engineering
- To provide students with an understanding of Life Cycle Assessment tool in sustainable engineering.
- To provide students with understanding of integration of sustainability with design. Teaching-Learning Process.

Module – 1

Sustainable Development and Role of Engineers: Introduction, Why and What is Sustainable Development, THE SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering
Sustainable Engineering Concepts: Key concepts – Factor 4 and Factor 10: Goals of sustainability,
System Thinking, Life Cycle Thinking and Circular Economy

08 Hours

Module - 2

Sustainable Engineering and Concepts, Principles and Frame Work: Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering.
Tools for sustainability Assessment: Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental

08 Hours

Module – 3

Fundamentals of Life Cycle Assessment
Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, Strength and Limitations of LCA.

08 Hours

Module - 4

Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment: Introduction, Environmental Life Cycle Costing, Social Life Cycle Assessment, Life Cycle Sustainability, LCA Applications in Engineering: Environmental Product Declarations and Product Category Rules, Carbon and Water Foot Printing, Energy systems, Buildings and the Built Environment, Chemical and Chemical Production Food and Agriculture

Introduction to Environmental Economics: Introduction – What Is Environmental Economics?, Valuing the Environment, Market-based Incentives (or Economic Instruments) for Sustainability

08 Hours

Module – 5

Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process – Sustainable Process Design, Sustainable Production Design.

08 Hours

COURSE OUTCOMES:

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

CO1	Elucidate the basics of sustainable development, sustainable engineering and its role in engineering
CO2	Application of Sustainable Engineering Concepts and Principles in Engineering
CO3	Apply the Principle, and methodology of Life Cycle Assessment Tool to engineering systems.
CO4	Outline the concept of integration methods of sustainability to Engineering Design
CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

Assessment Details:

CIE:

(Preferred pattern of the all test are similar to the SEE pattern, however; teacher may follow the CIE test pattern of other engineering courses)

Two assignments each of 10 Marks

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Three Unit Tests each of 20 Marks (duration 01 hour)

First test at the end of 5th week of the semester

- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours) t the end of the 13th week of the semester.

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Suggested Learning Resources:

SN	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Introduction to Sustainability for Engineers	Toolseeram Ramjeawon	CRC Press	1stEdn., 2020
2	Sustainability Engineering: Concepts, Design and Case studies,	Prentice Hall		1stEdn, 2015
3	System Analysis for sustainable Engineering: Theory and applications, ,	Ni bin Chang	McGraw Hill Publications	1stEdn., 2010
Reference Books				
1	Engineering for Sustainable development: Delivery a sustainable development goals, ,	UNESCO	International Centre for Engineering Education, France,	1stEdn., 2021
2	Introduction to Sustainable Engineering	Rag. R.L. and Ramesh Lakshmi Dinachandran,	PHI Learning Pvt. Ltd.	2ndEdn, 2016

Web links and Video Lectures (e-Resources):

- VTU/EDUSAT/SWAYAM/NPTEL/MOOC.
- https://nptel.ac.in/courses/127105018
- https:/https://nptel.ac.in/courses/107103081/www.macfound.org
- https://unesdoc.unesco.org/
- https://unesdoc.unesco.org/ark:/48223/pf0000375644.locale=en
- https://engineeringforoneplanet.org/

Semester: I/II
(ETC-I/II) Emerging Technology Courses-I/II
(Mechanical Engineering stream)
Course Name: SMART MATERIALS AND SYSTEM

Course Code	22ETC15a/25a	**CIE Marks**	50
Teaching Hours/Week (L:T:P:S)	3:0:0:0	**SEE Marks**	50
Total Hours of Teaching-Learning	40	**Total Marks**	100
Credits	03	**Exam Hours**	03

Pre-requisites: Knowledge of Basic mathematics and sciences.

Course objectives:

1. To develop the students ability to learn emerging materials.
2. To make students to learn prefabricated building components
3. To understand the Actuators deployed in smart materials and shape memory alloys
4. To learn building information modeling for building design
5. To learn the concepts of 3-D printing

Teaching-Learning Process These is sampling Strategies; which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby sites to give brief information about the Civil Engineering structures.
3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle. 4. Encourage collaborative (Group) Learning in the class.
5. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
10. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module – 1

Emerging Materials Honey comb structure (Carbon composites), Nano-materials, engineered polymers, emerging sustainable by products (Fly ash and GGBS) and construction chemicals.

Alternative Assessment Activities:
1. Demonstration of emerging materials properties.
2. Laboratory demonstration and Experiments on solid materials.

08 Hours

Module - 2

Prefabricated/ Manufactured building components Definition, types of prefabricated/ manufactured building components and infrastructure, modular coordination, standardization, materials, systems, production, transportation and installation.

Alternative Assessment Activities:

1. Demonstration of manufactured components

2.Video demonstration prefabricated/ manufactured building

08 Hours

Module – 3

Smart Materials: Definition, Principles of Piezo-electricity, materials (Polymers and Ceramics), sensors (Piezo-electric sensor, strain gauge, shear sensor) smart composites, Overview **Magneto rheological Fluids**, **Magnetostrictive and shape memory Materials.**

Alternative Assessment Activities:

1. Demonstration of Piezo-electricity, materials

2. Laboratory demonstration and Experiments.

08 Hours

Module - 4

Actuators, Piezoelectric Ceramic, Functional Gradient

Introduction, Actuators, Piezoelectric Ceramics, Functionally Graded Materials.

Electroceramics: Introduction Electroceramics and Smart Systems Electromechanical Actuators, Actuator Materials

Alternative Assessment Activities:

1. *Demonstration of various smart materials.*
2. *Laboratory Demonstrations and Practical Experiments*

08 Hours

Module – 5

3-D Printing Importance, Historic development, advantages, common terminologies, classification, Process chain, 3 – D modeling, Data conversion and transmission, checking and preparation, Building, Post processing, Applications

Alternative Assessment Activities:

1. *Demonstration of 3D Models.*
2. *Laboratory Demonstrations and Practical Experiments*

08 Hours

COURSE OUTCOMES:

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

CO1	Make use emerging materials for construction
CO2	Decide the proper prefabricated building component
CO3	Use smart materials and methods in building construction
CO4	Use smart materials and shape memory alloys in building actuators
CO5	Prepare 3-D modeling and manufacture building component

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

Two Unit Tests each of 30 Marks (duration 01 hour) First test after the completion of 30-40 % of the syllabus• Second test after completion of 80-90% of the syllabus• One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Suggested Learning Resources:

Text Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Essentials of Materials Science and Engineering,	Donald R. Askeland and Pradeep P. Fulay	Cengage Learning	2009,
2	Smart Materials Volume 1 And Volume 2	I Schwartz, Mel M.	A Wiley-Interscience Publication **John Wiley & Sons, Inc.** The *Encyclopedia of Smart Materials is available Online at www.interscience.wiley.com/reference/esm*	ISBN 0-471-17780-6 (cloth : alk.paper)
3	Materials Science and Engineering	Callister Jr, W.D., Rethwisch, D.G.,	Hoboken, NJ: Wiley	10th Ed., 2018

Reference Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Materials 1: An Introduction to Properties, Application and Design	Jones, D.R.H., and Ashby,M.F	Butterworth-Heinemann	4th Ed., 2011
2	Engineering Materials 2: An Introduction to Microstructure and Processing	. Jones, D.R.H., and Ashby,M.F	Butterworth-Heinemann	4th Ed., 2012
3	Physical Metallurgy Principles	Abbaschian, R., Abbaschian, L., Reed-Hill, R. E	Cengate Learning	4th Ed., 2009

Web links and Video Lectures (e-Resources): YouTube Videos.

- Activity Based Learning (Suggested Activities in Class)/ Practical Based learning Site visits to understand the prefabricated building components.
- Visit to Smart material manufacturing facilities
- Visit to 3-D printing facility

Semester: I/II
Engineering Science Course-I/II
Course Name: **INTRODUCTION TO MECHANICAL ENGINEERING**

Course Code	22ESC144/244	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:0	SEE Marks	50
Credits	3	Exam Hours	03
Total Hours of Pedagogy	40	Total Marks	100

Course Learning Objectives

- To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
- Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
- To know the concept of IC engines and Future Mobility vehicles.
- To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications

To acquire a basic understanding role of Mechanical Engineering in the Robotics and Automation in industry.

Teaching-Learning Process

Adopt Problem Based Learning (PBL), which fosters students Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

- Adopt different types of teaching methods to develop the outcomes throughPowerPoint presentations and Video demonstrations or Simulations.
- Arrange visits to show the live working models other than laboratory topics.
- Adopt collaborative (Group Learning) Learning in the class.

Module – 1

Introduction to Emerging Technologies

Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Energy Sources and Power Plants: Review of energy sources; Construction and working of Hydel power plant, Thermal power plant, Solar power plant by photovoltaic (PV) cell, Wind power plant.

08 Hours

Module - 2

Energy and I C Engine

Introduction to IC Engines: Components and Working Principles, 4-Strokes Petrol and Diesel Engines, Application of IC Engines.

Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles

08 Hours

Module – 3

Machine Tool Operations:
Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest,
Drilling Machine: Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring,
Milling Machine: Working, milling methods(Up milling down milling) operations milling: plane milling, end milling and slot milling.
Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC,

08 Hours

Module - 4

Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, graphite, and polymer. Shape Memory Alloys.
Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.

08 Hours

Module – 5

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.
Automation in industry: Definition, types – Fixed, programmable and flexible automation , advantages and disadvantages.
Evolution of technologies; Introduction to Industrial revolution, Fourth industrial revolution (IR 4.0) Industrial IOT defination, merit, demerit and application.

08 Hours

COURSE OUTCOMES:

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

CO1	Explain the concepts of Role of Mechanical Engineering and Evolution of technologies
CO2	Explain the Working Principle of Energy sources and IC engines
CO3	Describe the Machine Tool Operations and advanced Manufacturing process. and various Metal Joining Processes
CO4	Describe the advanced Manufacturing process and EV vehicles.
CO5	Explain the Concepts of evolution technologies automation and Robotics

Assessment Details

CIE:

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools(AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications and other cooperative and problem based learning.

(Preferred pattern of the all test are similar to the SEE pattern, however; teacher may follow the CIE test pattern of other engineering courses)

Two assignments each of 10 Marks

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Three Unit Tests each of 20 Marks (duration 01 hour)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours) t the end of the 13th week of the semester.

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.

The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Suggested Learning Resources :

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

E-Resources:

1. www.tutor2u.net/business/presentations/. /product lifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. https://www.mindtools.com/brainstm.html
5. https://www.quicksprout.com/. /how-to-reverse-engineer-your-competitor
6. www.vertabelo.com/blog/documentation/reversengineering
7. \https://support.microsoft.com/en-us/kb/273814
8. https://support.google.com/docs/answer/179740?hl=en
9. https://www.youtube.com/watch?v=2mjSDIBaUIMthevirtualinstructor.com/foreshortening.html
10. https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf
11. https://dschool.stanford.edu/use-our-methods/
12. https://www.interaction-design.org/literature/article/stages-in-the-design-

thinking-process
13. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49 8.
14. https://www.nngroup.com/articles/design-thinking/
15. https://designthinkingforeducators.com/design-thinking/
16. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
http://dschool.stanford.edu/dgift/

Semester: I

Engineering science course

Course Name: **ELEMENTS OF MECHANICAL ENGINEERING**

Course Code	**22EME13/23**	CIE Marks	50
Teaching Hours/Week (L: T:P)	1:0:0	SEE Marks	50
Credits	3	Exam Hours	03
Total Hours of Pedagogy	40	Total Marks	100

Course Learning Objectives

- To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
- Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
- To know the concept of IC engines and Future Mobility vehicles.
- To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications

To acquire a basic understanding role of Mechanical Engineering in the Robotics andAutomation in industry.

Teaching-Learning Process

Teaching-Learning Process

Adopt Problem Based Learning (PBL), which fosters students' Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
- Arrange visits to show the live working models other than laboratory topics.
- Adopt collaborative (Group Learning) Learning in the class.

Module – 1

Introduction to Mechanical Engineering (Overview only):
Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Steam Formation and Application:
Modes of heat transfer, Steam formation, Types of steam, Steam properties and applications of steam (simple numerical problems).

Energy Sources and Power Plants:
Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant and Wind power plant.

08 Hours

Module - 2

Machine Tool Operations:

Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swiveling the compound rest,

Drilling Machine: Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring,

Milling Machine: Working methods of milling (up milling and Down milling), milling operations: plane milling, end milling and slot milling.

(No sketches of machine tools, sketches to be used only for explaining the operations).

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC,advantages and applications of CNC, 3D printing.

08 Hours

Module – 3

Introduction to IC Engines: Components and working principles, 4-Stroke Petrol and Diesel engines, Application of IC Engines, performance of IC engines (Simple numerical).

Introduction to Refrigeration and Air Conditioning: Principle of refrigeration, Refrigerants, and their desirable properties. Working principle of VCR and VAR refrigeration system, working principle of room air conditioner & Applications of air Conditioners.

08 Hours

Module - 4

Mechanical Power Transmission:

Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)

Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive)

Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames), TIG welding, MIG welding, Thermit welding, Laser beam welding and Electron beam welding processes

08 Hours

Module – 5

Insight into future mobility technology; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles.

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Robot anatomy, Applications of Robots in material handling, processing and assembly and inspection.

08 Hours

COURSE OUTCOMES:

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

CO1	Acquire a basic understanding about scope of mechanical engineering, fundamentals about steam and nonconventional energy sources.
CO2	Acquire a basic knowledge about conventional and advanced manufacturing processes.
CO3	Acquiring a basic understanding about IC engines, propulsive devices, and air-conditioner
CO4	Acquiring a basic knowledge about power transmission and joining processes.
CO5	Acquiring a basic insight into future mobility and mechatronics and robotics.

Assessment Details:

CIE:

	Components	Number	Weightage	Max. Marks
(i)	Tests (A)	3*	60%	30
(ii)	Alternate Assessment Tools (AAT) (B)	3-4	40%	20
	Total Marks			50

Final CIE Marks = (A) + (B)

The following are the Alternate Assessment Tools and not limited to: Quiz, Assignments, Presentations, Paper Publications, MOOCs, Industrial Visits and Report Writing, Open Book, Self E-Learning with Certifications, and other cooperative and problem-based learning.

(Preferred pattern of all tests are like the SEE pattern, however; teacher may follow the CIE test pattern of other engineering courses)

Two assignments each of 10 Marks

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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- Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

First assignment at the end of 4th week of the semester

Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours) at the end of the 13th week of the semester.

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.

The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students must answer 5 full questions, selecting one full question from each module. The student must answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Suggested Learning Resources:

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

E-Resources:

17. www.tutor2u.net/business/presentations/. /Product lifecycle/default.html
18. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
19. www.bizfilings.com › Home › Marketing › Product Development
20. https://www.mindtools.com/brainstm.html
21. https://www.quicksprout.com/. /How-to-reverse-engineer-your-competitor
22. www.vertabelo.com/blog/documentation/reversengineering
23. \https://support.microsoft.com/en-us/kb/273814
24. https://support.google.com/docs/answer/179740?hl=en
25. https://www.youtube.com/watch?v=2mjSDIBaUlMthevirtualinstructor.com/foreshortening.html
26. https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf
27. https://dschool.stanford.edu/use-our-methods/
28. https://www.interaction-design.org/literature/article/stages-in-the-design-thinking-process
29. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49 8.
30. https://www.nngroup.com/articles/design-thinking/
31. https://designthinkingforeducators.com/design-thinking/
32. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
http://dschool.stanford.edu/dgift/

YADAVALLI BASAVARAJ

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