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Course Structure and Syllabus SITE-23

Electronics and Communication Technology

First Year Course structure and Syllabus

Group-A

I Sem B.Tech (AIML, CIC, CSE, CSD, CSM & CST)

S.No.	Subject Code	Course	L	T	P	C
1	23CMEGT1010	Communicative English	2	0	0	2
2	23CMMAT1020	Linear Algebra & Calculus	3	0	0	3
3	23AMCHT1030 23CICHT1030 23CSCHT1030 23CDCHT1030 23CACHT1030 23CTCHT1030	Chemistry	3	0	0	3
4	23CMCET1040	Basic Civil & Mechanical Engineering	3	0	0	3
5	23CMCST1050	Introduction to C-Programming	3	0	0	3
6	23CMEGL1060	Communicative English Lab	0	0	2	1
7	23AMCHL1070 23CDCHL1070 23CACHL1070 23CICHL1070 23CSCHL1070 23CTCH1L070	Chemistry Lab	0	0	2	1
8	23CMCSL1080	Computer Programming Lab	0	0	3	1.5
9	23CMMEL1090	Engineering Workshop	0	0	3	1.5
10	23CMPES1100	Health and wellness, Yoga and Sports	-	-	1	0.5
Total			**14**	**0**	**11**	**19.5**

Group-B

I Sem B.Tech (CE, ME, EEE, ECT, ECE & IT)

S.No.	Subject Code	Course	L	T	P	C
1	23CMMAT1010	Linear Algebra & Calculus	3	0	0	3
2	23CMPHT1020	Engineering Physics	3	0	0	3
3	23CMCST1030	Introduction to C-Programming	3	0	0	3
4	23CMEET1040	Basic Electrical & Electronics Engineering	3	0	0	3
5	23CMMET1050	Engineering Graphics	1	0	4	3
6	23CMCSL1060	IT Workshop	0	0	2	1
7	23CMCHL1070	Engineering Physics Lab	0	0	2	1
8	23CMCSL1080	Computer Programming Lab	0	0	3	1.5
9	23CMEEL1090	Electrical & Electronics Engineering Workshop	0	0	3	1.5
10	23CMNSS1100	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total			**13**	**0**	**15**	**20.5**

Group-A

II Sem B.Tech (AIML, CIC, CSE, CSD, CSM & CST)

S.No.	Subject Code	Course	L	T	P	C
1	23CMMAT2010	Differential Equations & Vector Calculus	3	0	0	3
2	23CMPHT2020	Engineering Physics	3	0	0	3
3	23CMEET2030	Basic Electrical & Electronics Engineering	3	0	0	3
4	23CMMET2040	Engineering Graphics	1	0	4	3
5	23AMAMT2050 23CICIT2050 23CDCDT2050 23CSCST2050 23CACAT2050 23CTCTT2050	Data Structures	3	0	0	3
6	23CMPHL2060	Engineering Physics Lab	0	0	2	1
7	23CMCSL2070	IT Workshop	0	0	2	1
8	23CMEEL2080	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	23AMAML2090 23CICIL2090 23CDCDL2090 23CSCSL2090 23CACAL2090 23CTCTL2090	Data Structures Lab	0	0	3	1.5
10	23CMNSS2100	NSS/NCC/Scouts Guides/Community Service	-	-	1	0.5
Total			**13**	**0**	**15**	**20.5**

Group-B

II Sem B.Tech (CE, ME, EEE, ECT, ECE & IT)

S.No.	Subject Code	Course	L	T	P	C
1	23CMEGT2010	Communicative English	2	0	0	2
2	23CMMAT2020	Differential Equations & Vector Calculus	3	0	0	3
3	23CECHT2030 23MECHT2030	Engineering Chemistry	3	0	0	3
	23ECCHT2030 23ETCHT2030 23EECHT2030 23ITCHT2030	Chemistry	3	0	0	3
4	23CMCET2040	Basic Civil & Mechanical Engineering	3	0	0	3
5	23CECET2050 23MEMET2050 23ECECT2050 23ETETT2050 23EEEET2050 23ITITT2050	Engineering Mechanics Engineering Mechanics Network Analysis Network Analysis Electrical Circuit Analysis-I Data Structures	3	0	0	3
6	23CMEGL2060	Communicative English Lab	0	0	2	1
7	23CECHL2070 23CECHL2070	Engineering Chemistry Lab	0	0	2	1
7	23ECCHL2070 23ETCHL2070 23EECHL2070 23ITCHL2070	Chemistry	0	0	2	1
8	23CMMEL2080	Engineering Workshop	0	0	3	1.5
9	23CECEL2090 23MEMEL2090 23ECECL2090 23ETETL2090 23EEEEL2090 23ITITL2090	Engineering Mechanics & Building Practices Lab Engineering Mechanics Lab Network Analysis & Simulation Lab Network Analysis & Simulation Lab Electrical Circuits Lab Data Structures Lab	0	0	3	1.5
10	23CMPES2100	Health and wellness, Yoga and Sports	-	-	1	0.5
Total			**14**	**0**	**11**	**19.5**

<table>
<tr><th colspan="4">COMMUNCATIVE ENGLISH</th></tr>
<tr><td>Subject Code</td><td>23CMEGT 1010/2010</td><td>IA Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/ Week</td><td>02</td><td>Exam Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>32</td><td>Exams Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits -02</td></tr>
<tr><td colspan="4">Course Objectives:
The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready
Course Outcomes:
CO1: Understand the context, topic, and pieces of specific information from social or Transactional
dialogues.
CO2: Apply grammatical structures to formulate sentences and correct word forms.
CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions.
CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.
CO5: Create a coherent paragraph, essay, and resume.</td></tr>
<tr><td colspan="4">Unit I</td></tr>
<tr><td colspan="3">Lesson: HUMAN VALUES: Gift of Magi (Short Story)
Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences. Grammar: Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.</td><td>07 hours</td></tr>
<tr><td colspan="4">Unit II</td></tr>
<tr><td colspan="3">Lesson: NATURE: The Brook by Alfred Tennyson (Poem)
Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary: Homonyms, Homophones, Homographs</td><td>06 hours</td></tr>
<tr><td colspan="4">Unit III Lesson: BIOGRAPHY: Elon Musk</td></tr>
<tr><td colspan="3">Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.</td><td>07 hours</td></tr>
</table>

Writing: Summarizing, Note-making, paraphrasing **Grammar:** Verbs - tenses; subject-verb agreement; Compound words, Collocations **Vocabulary:** Compound words, Collocations	
Unit IV	
Lesson: INSPIRATION: The Toys of Peace by Saki **Listening:** Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Letter Writing: Official Letters, Resumes **Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice **Vocabulary:** Words often confused, Jargons	07 hours
Unit V	
Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay) **Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts **Reading:** Reading comprehension. **Writing:** Writing structured essays on specific topics. **Grammar:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement) **Vocabulary:** Technical Jargons	06 Hours
Textbooks: **1. Pathfinder:** Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3) **2. Empowering with Language** by Cengage Publications, 2023 (Units 4 & 5)	
Reference Books: 1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020 2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014. 3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019. 4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.	
Web Resources: GRAMMAR: 1. www.bbc.co.uk/learningenglish 2. https://dictionary.cambridge.org/grammar/british-grammar/ 3. www.eslpod.com/index.html 4. https://www.learngrammar.net/ 5. https://english4today.com/english-grammar-online-with-quizzes/ 6. https://www.talkenglish.com/grammar/grammar.aspx VOCABULARY 1. https://www.youtube.com/c/DailyVideoVocabulary/videos 2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA	

LINEAR ALGEBRA & CALCULUS

Subject Code	23CMMAT1010/1020	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	48	Exam Hours	03

Credits – 03

Course Objectives:

- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Unit -1 Matrices	
Rank of a matrix by echelon form, normal form, PAQ form. Cauchy – Binet formulae (without proof). Inverse of Non-singular matrices by Gauss –Jordan method, System of linear equations: Consistent and inconsistent, Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods .Applications: Finding the current in a electrical circuit	**Hours 10**
Unit -2- Eigen values, Eigen vectors and Orthogonal Transformation	
Eigen values, Eigen vectors and their properties, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Diagonalization of a matrix, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.	**Hours 10**
Unit – 3- Calculus	
Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.	**Hours 10**
Unit – 4- Partial differentiation and Applications (Multi variable calculus)	
Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Euler's theorem, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobian, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.	**Hours 10**
Unit – 5- Multiple Integrals (Multi variable Calculus	
Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).	**Hours 10**

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for Practical applications.

CO2: Utilize mean value theorems to real life problems.

CO3: Familiarize with functions of several variables which is useful in Optimization.

CO4: Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

Question paper pattern:

1. Question paper consists of 6 questions and all questions are compulsory.
2. Question 1 shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.
3. There shall be 2 short answer questions from each unit.

4. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
5. The questions from 2 to 6, shall be set by covering one unit of the syllabus for each question.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10thEdition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, PearsonPublishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, AlphaScience International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5thEdition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9thedition.
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021).
6. B. V. Ramana, Higher Engineering Mathematics, 2013 Edition, Tata Mc. Graw Hill Education.

ENGINEERING PHYSICS			
Subject Code	**23CMPHT1020 23CMPHT2020**	IA Marks	30
Number of Lecture Hours/Week	**03**	Exam Marks	70
Total Number of Lecture Hours	**48**	Exam Hours	03
Credits – 3			

COURSE OBJECTIVES:

The objectives of this course, help the students:

- To bridge the gap between the Physics in school at 10+2 level and UG level engineering coursesby identifying the importance of the optical phenomenon like interference, diffraction etc., enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Unit -1 Wave Optics	
Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index. **Diffraction:** Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). **Polarization:** Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.	**Hours – 12**
Unit -2 Crystallography and X-ray diffraction	
Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC. **X-ray diffraction:** Miller indices – separation between successive (hkl) planes.Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.	**Hours – 8**
Unit – 3 Dielectric and Magnetic Materials	
Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation – Frequency dependence of polarization – dielectric loss. **Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization- Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept forFerromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.	**Hours –10**
Unit – 4 Quantum Mechanics and Free electron Theory	
Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependentwave equations– Particle in a one-dimensional infinite potential well.	**Hours – 10**

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits anddemerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy	
Unit – 5 Semiconductors	
Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effectand its applications.	**Hours – 8**

COURSE OUTCOMES:

On completion of the course student will able to

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.
CO2: Familiarize with the basics of crystals and their structures.
CO3: Summarize various magnetic and dielectric properties to design engineering materials.
CO4: Summarize various types of polarization of dielectrics and classify the magneticmaterials.
CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids.
CO6: Identify the type of semiconductor using Hall effect.

QUESTION PAPER PATTERN:

i) There shall be 6 questions and all questions are compulsory.
ii) Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.
iii) There shall be 2 short answer questions from each unit.
a) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
iv) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

TEXT BOOKS:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

REFERENCE BOOKS:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University

CHEMISTRY			
Subject Code	23AMCHT1030/23CICHT1030/23CDCHT1030/23CSCHT1030/23CACHT10230/23CTCHT1030/23ECCHT2030/23ETCHT2030/23EECHT2030/23ITCHT2030	IA Marks	30
Number of Lecture Hr	3	Exam Marks	70
Total Number Hr	48	Exam Hours	03
Credits – 03			

COURSE OBJECTIVES:

The objectives of this course, help the students to

1. Familiarize modern engineering materials and its applications
2. Train the students on the principles and applications of electrochemistry and polymers
3. Introduce instrumental methods and chromatography.

Unit-1 Structure and Bonding Models	
Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo- and hetero nuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.	**Hours –9**
Unit -2 Modern Engineering materials	
Semiconductors: Introduction, preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling, epitaxy, diffusion and ion implantation), applicationsSuperconductors: Introduction - Types, properties and applications.Supercapacitors: Introduction, basic concept - Classification - Applications.Nano materials: Introduction, classification of carbon nanotubes, properties and applications of fullerenes, carbon nanotubes and Graphene nanoparticles.	**Hours –9**
Unit-3Electrochemistry and Applications	
Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry - potentiometric titrations (redoxtitrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.Primary cells – Zinc-air battery, Secondary cells – lithium–ion batteries – working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell – working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).	**Hours –10**
Unit – 4 Polymer Chemistry	

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanism of free radical addition polymer formation. Poly Dispersity Index.Plastics – Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon -6,6, carbon fibres. Elastomers – Buna-S, Buna-N – preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, mechanism of conduction and applications. Bio - Degradable polymers – Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).	**Hours –10**
Unit – 5 Instrumental Methods and Applications	
Electro-magnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy - Instrumentation, applications, IR spectroscopy - Instrumentation, applications. Chromatography - Basic Principle, Classification – Thin Layer and Paper Chromatography, HPLC: Instrumentation and Applications.	**Hours –10**

COURSE OUTCOMES:

On completion of the course student will be able to

1. Interpret the bond order and magnetic character of molecules.
2. Recall the properties and applications of nano materials.
3. Outline the applications of semiconductors and super conductors.
4. Compare the materials of construction for battery and electrochemical cells.
5. Explain the preparation, properties and applications of thermo and thermosetting plastics and rubbers
6. Summarize the concepts of Instrumental methods.

QUESTION PAPER PATTERN:

SECTION A:

1. This section contains ten questions carrying 2 marks each.
2. Two questions from each unit should present.

SECTION B:

6. This section will have 5 questions with internal choice.
7. Each full question carries 10 marks.
   Each full question may have sub question covering all topics under a unit.

TEXT BOOKS:

1. P.C. Jain and M. Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Fundamentals of Molecular Spectroscopy, by C. N. Banwell.
3. Peter Atkins, Juliode Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

REFERENCE BOOKS:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D.Lee, Concise Inorganic Chemistry, 5thEdition ,Wiley Publications, Feb.2008
3. Text book of Polymer Science, Fred W.Billmayer Jr, 3rdEdition

BASIC CIVIL AND MECHANICAL ENGINEERING			
Subject Code	23CMCET1040/ 23CMCET2040	Internal Marks	30
Number of Lecture Hours / Week	03	External Marks	70
Total Number of Lecture Hours		Exam Hours	3Hrs
Credits – 03			

BASIC CIVIL ENGINEERING

Course Objectives:

1. Get familiarized with the scope and importance of Civil Engineering sub-divisions.
2. Introduce the preliminary concepts of surveying.
3. Acquire preliminary knowledge on Transportation and its importance in nation's economy.
4. Get familiarized with the importance of quality, conveyance and storage of water.
5. Introduction to basic civil engineering materials and construction techniques.

Unit-1	**Hours**
Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.	
Unit-2	
Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on leveling and bearings-Contour mapping.	
Unit-3	
Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering. **Water Resources and Environmental Engineering**: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).	
Course outcomes: On completion of the course, the student should be able to: 1. Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.	

2. Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. 3. Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation. 4. Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated. **5.** Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.	
Text Books: 1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition. 2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition. 3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.	
References: 1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition. 2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016 3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition. 4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition. 5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.	
BASIC MECHANICAL ENGINEERING	
Course Objectives: The students after completing the course are expected to 1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries. 2. Explain different engineering materials and different manufacturing processes. 3. Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.	
Unit-I	
Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. **Engineering Materials** - Metals-Ferrous and Non-ferrous, Ceramics,\ Composites, Smart materials.	
Unit-II	
Manufacturing Processes: Principles of Casting**,** Forming, and joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.	

Thermal Engineering – Working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.	
Unit-III	
Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants. **Mechanical Power Transmission -** Belt Drives, Chain, Rope drives, Gear Drives and their applications. **Introduction to Robotics -** Joints & links, configurations, and applications of robotics.	
Course outcomes: On completion of the course, the student should be able to 1. Understand the different manufacturing processes. 2. Explain the basics of thermal engineering and its applications. 3. Describe the working of different mechanical power transmission systems and power plants. 4. Describe the basics of robotics and its applications.	
Text Books: 1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd. 2. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd. 3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.	
References: 1. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd. 2. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd. 3. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications 4. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I	
Question paper pattern:	

BASIC ELECTRICAL & ELECTRONICS ENGINEERING			
Subject Code	23CMEET1040 23CMEET2030	IA Marks	30
Number of Lecture Hours/Week	3L	Exam Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Credits-03			
PART A: BASIC ELECTRICAL ENGINEERING			

Course Objectives:

To expose to the field of electrical & electronics engineering, laws and principles of electrical/electronic engineering and to acquire fundamental knowledge in the relevant field.

Unit -1	
DC & AC Circuits **DC Circuits:** Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems. **AC Circuits:** A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period,frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).	**Hours – 7**
Unit -2	
Machines and Measuring Instruments **Machines:** Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines. **Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.	**Hours – 8**
Unit – 3	
Energy Resources, Electricity Bill & Safety Measures **Energy Resources:** Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation. **Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops,Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. **Equipment Safety Measures:** Working principle of Fuse and Miniature circuit breaker(MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types,Safety Precautions to avoid shock.	**Hours – 9**

Course Outcomes:

On completion of the course student will be able to:

1. Describe fundamental laws, operating principles of motors/generators, MC/MIinstruments. (L2)
2. Demonstrate the working of electrical machines, measuring instruments and powergeneration stations. (L2)
3. Apply mathematical tools and fundamental concepts to derive various equations relatedto electrical circuits and machines. (L3)
4. Calculate electrical load and electricity bill of residential and commercial buildings. (L4)

Textbooks:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, FirstEdition.
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti,Dhanpat Rai & Co, 2013.
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, ThirdEdition.

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019,Fourth Edition.
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020.
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford UniversityPress, 2017.
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications,2018, Second Edition.

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

To teach the fundamentals of semiconductor devices and its applications, principles ofdigital electronics.

Unit – 1

SEMICONDUCTOR DEVICES Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.	**Hours – 8**

Unit – II

BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION **Rectifiers and Power Supplies**: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.	**Hours – 8**

Unit – III

DIGITAL ELECTRONICS Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic	**Hours – 8**

Theorems and properties of BooleanAlgebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).	

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall,India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version,Pearson Education, 2009.

INTRODUCTION TO PROGRAMMING			
Subject Code	23CMCST1030/1050	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Credits – 03			

Course Objectives:

1. To introduce students to the fundamentals of computer programming.
2. To provide hands-on experience with coding and debugging.
3. To foster logical thinking and problem-solving skills using programming.
4. To familiarize students with programming concepts such as data types, control structures,functions, and arrays.
5. To encourage collaborative learning and teamwork in coding projects.

Course Outcomes: A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

Unit -1	Hours
Introduction to Programming and Problem Solving **History of Computers, Basic organization of a computer:** ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. **Problem solving techniques:** Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.	**08**
Unit -2	
Control Structures Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.	**10**
Unit – 3	
Arrays and Strings Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.	**10**
Unit – 4	
Pointers & User Defined Data types Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.	**10**

Unit – 5	
Functions & File Handling Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling.	**10**

Text Books/ Reference Books:	
T1	"The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988
T2	Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996
R1	Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 200
R2	Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
R3	C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

DIFFERENTIAL EQUATIONS &VECTOR CALCULUS

Subject Code	23CMMAT2010/20	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	48	Exam Hours	03

Credits – 03

Course Objectives:

- To enlighten the learners in the concept of differential equations and multi variable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead the min to advanced level by handling various real-world applications.

Unit -1 Differential equations of first order and first degree	
Linear differential equations - Bernoulli's equations - Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay-Electrical circuits.	10 Hr
Unit -2Linear differential equations of higher order (Constant Coefficients)	
Homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.	
Unit – 3 Partial Differential Equations	
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Non linear PDE - Standard forms. Homogeneous Linear Partial differential equations with constant coefficients.	**Hours – 10**
Unit – 4 Vector differentiation	
Scalar and vector point functions, vector operator Del, Del applies to scalar point functions-Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.	**Hours – 08**
Unit – 5 Vector integration	
Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stokes theorem (without proof), volume integral, Divergence theorem (without proof) and related problems. (evaluation only)	**Hours – 10**

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

CO1: Solve the differential equations related to various engineering fields.
CO2: Solve the differential equations of higher order related to various engineering fields
CO3: Identify solution methods for partial differential equations that model physical Processes.
CO4: Interpret the physical meaning of different operators such as gradient, curl and Divergence.
CO5: Estimate the work done against a field, circulation and flux using vector calculus.

Question paper pattern:

8. Question paper consists of 6 questions and all questions are compulsory.
9. Question 1 shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.
10. There shall be 2 short answer questions from each unit.

11. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
12. The questions from 2 to 6, shall be set by covering one unit of the syllabus for each question.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017,44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weirand Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zilland Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S.R.K. Iyengar, Alpha Science International Ltd., 20215thEdition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana Mc Graw Hill Education, 2017.

ENGINEERING CHEMISTRY			
Subject Code	23CECHT2030/23MECHT2030	IA Marks	30

Number of hours/Week	3	Exam Marks	70
Total Number of Lecture Hr	48	Exam Hours	03

Credits – 03

Course Objectives:

The objectives of this course, help the students to

4. Impart the concept of soft and hard water, softening methods of hard water
5. Train the students on the principles and applications of electrochemistry, polymers, surface chemistry and cement
6. Familiarize modern engineering materials

Unit-1 Water Technology	
Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen – Boiler troubles –Priming, foaming**,** scale and sludge, Caustic embrittlement, Industrial water treatment –Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.	**Hours –9**
Unit -2 Electrochemistry and Applications	
Electrodes – electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel -Cadmium (NiCad), and lithium ion batteries – working principle of the batteries including cell reactions; Fuelcells – Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell. Corrosion: Introduction to corrosion, electrochemical theory of corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, Corrosion control methods – Control by proper design**,** cathodic and anodic protection - electroplating and electroless plating (Nickel and Copper).	**Hours –10**
Unit -3 Polymers and Fuel Chemistry	
Introduction to polymers, functionality of monomers, Tacticity, Mechanism of free radical chain growth polymerization. Thermoplastics and Thermo - setting plastics: Preparation, properties and applications of polystyrene. PVC Nylon 6,6 and Bakelite. Elastomers – Preparation, properties and applications of Buna-S, Buna-N, Thiokol rubbers. Fuels **–** Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number – alternative fuels -propane, methanol, ethanol and bio fuel-bio diesel.	**Hours –10**
Unit – 4 Modern Engineering Materials	
Composites- Definition, Classification- Particle, Fibre reinforced composites, properties and Engineering applications. Refractories - Classification, Properties, Factors affecting the refractory materials and Applications. Lubricants - Classification, Functions of lubricants, Properties of lubricating oils –Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, Saponification and Applications. Building materials – Manufacturing of Portland Cement, Constituents, Setting and Hardening of cement.	**Hours –10**
Unit – 5	

Surface Chemistry and Nanomaterials Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, chemical methods of preparation of nano metals by Chemical reduction method and metal oxides by Sol-gel method, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.	**Hours –9**

COURSE OUTCOMES:

On completion of the course student will be able to

1. Interpret the various problems faced in industries due to boiler troubles.
2. Demonstrate the corrosion prevention methods and factors affecting corrosion.
3. Outline the preparation, properties and applications of thermoplastics & thermosetting, elastomers & conducting polymers.
4. Explain calorific values, octane number, refining of petroleum and cracking of oils.
5. Outline the setting and hardening of cement.
6. Summarize the concepts of colloids, micelle and nanomaterials.

QUESTION PAPER PATTERN:

SECTION A:

3. This section contains ten questions carrying 2 mark each.
4. Two questions from each unit should present.

SECTION B:

13. This section will have 5 questions with internal choice.
14. Each full question carries 10 marks.
    Each full question may have sub question covering all topics under a unit.

TEXT BOOKS:

4. P.C. Jain and M. Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
5. Fundamentals of Molecular Spectroscopy, by C. N. Banwell.
6. Peter Atkins, Juliode Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

ReferenceBooks:

1. H.F.W.Taylor, Cement Chemistry, 2/e, Thomas Telford Publications,1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth - Heineman, 1992.
3. Text book of Polymer Science, Fred W.Billmayer Jr, 3rd Edition

ENGINEERING GRAPHICS			
Subject Code	23CMMET1050 23CMMET2040	Internal Marks	30
Number of Lecture Hours / Week	1+4	External Marks	70
Total Number of Lecture Hours		Exam Hours	100
Credits – 03			
Course Objectives:			

1. To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing 2. To impart knowledge on the projection of points, lines and plane surfaces 3. To improve the visualization skills for better understanding of projection of solids 4. To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces. 5. To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.	
Unit-1	**Hours**
Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. **Curves:** construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. **Scales:** Plain scales, diagonal scales and vernier scales.	
Unit-2	
Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants. **Projections of Straight Lines:** Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes **Projections of Planes:** regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.	
Unit-3	
Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.	
Unit-4	
Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only. **Development of Surfaces:** Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.	
Unit-5	
Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views. **Computer graphics**: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).	
Course outcomes:	

1. Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. 2. Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. 3. Understand and draw projection of solids in various positions in first quadrant. 4. Explain principles behind development of surfaces. 5. Prepare isometric and perspective sections of simple solids.
Text Books: 1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.
References: 1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013. 2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009. 3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.
Question paper pattern:

ENGINEERING MECHANICS			
Subject Code	23CECET2050 23MEMET2050	Internal Marks	30
Number of Lecture Hours / Week	03	External Marks	70
Total Number of Lecture Hours		Exam Hours	100
Credits – 03			

Course Objectives:

1. To get familiarized with different types of force systems.
2. To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
3. To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
4. To apply the Work-Energy method to particle motion.
5. To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

Unit-1 Introduction to Engineering Mechanics	**Hrs**
– Basic Concepts. Scope and Applications **Systems of Forces:** Coplanar Concurrent Forces– Components in Space–Resultant–Moment of Force and its Application – Couples and Resultant of Force Systems. **Friction:** Introduction**,** limiting friction and impending motion, Coulomb'slaws of dryfriction, coefficient of friction, Cone of Static friction.	
Unit-2 Equilibrium of Systems of Forces	
: Free Body Diagrams, Lami's Theorm, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples	
Unit-3	
Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures. **Centre of Gravity:** Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems. **Area Moments of Inertia:** Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.	
Unit-4 Rectilinear and Curvilinear motion of a particle	
Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.	
Unit-5 Rigid body Motion	
Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.	

Course Outcomes:

On Completion of the course, the student should be able to

1. Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.
2. Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.
3. Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.
4. Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.
5. Solve the problems involving the translational and rotational motion of rigid bodies.

Text Books:

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

References:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition

Question paper pattern:

DATA STRUCTURES			
Subject Code	23AMAMT2050/23CACAT2050/23CICIT2050 23CDCDT2050/23CSCST2050/23CTCTT2050 23ITITT2050	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Credits – 03			

Course Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

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

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.

CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.

CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

Unit -1	Hours
Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort	**08**
Unit -2	
Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.	**10**
Unit – 3	
Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc	**10**
Unit – 4	
Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.	**10**

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.	
Unit – 5	
Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal **Hashing: Brief** introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.	**10**

Text Books/ Reference Books:	
T1	Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
T2	Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Silicon Press, 2008
R1	Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
R2	C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
R3	Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
R4	Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
R5	Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

ELECTRICAL CIRCUIT ANALYSIS -I			
Subject Code	23EEEET2050	IA Marks	30
Number of Lecture Hours/Week	3L	Exam Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Credits-03			

Course Objectives:

To develop an understanding of the fundamental laws, elements of electrical circuits and to apply circuit analysis to DC and AC circuits.

Unit -1	
INTRODUCTION TO ELECTRICAL CIRCUITS: Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent andindependent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysisand mesh analysis to DC networks with dependent and independent voltage and current sources, node and mesh analysis.	**Hours – 10**
Unit -2	
MAGNETIC CIRCUITS Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.	**Hours – 10**
Unit – 3	
SINGLE PHASE CIRCUITS Characteristics of periodic functions, Average value, R.M.S. value, form factor, representationof a sine function, concept of phasor, phasor diagrams, node and mesh analysis. Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit, parallel RL circuit, parallel RC circuit.	**Hours – 10**
Unit – 4	
RESONANCE AND LOCUS DIAGRAMS Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity andbandwidth; Locus diagram: RL, RC, RLC with R, L and C variables.	**Hours – 9**
Unit – 5	
NETWORK THEOREMS (DC & AC EXCITATIONS) Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.	**Hours – 9**

Course Outcomes:

On completion of the course student will be able to:

1. Remembering the basic electrical elements and different fundamental laws.
2. Understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance, phasor diagrams, resonance and network theorems.
3. Apply the concepts to obtain various mathematical and graphical representations.
4. Analyse nodal and mesh networks, series and parallel circuits, steady state response, different circuit topologies (with R, L and C components).
5. Evaluation of Network theorems, electrical, magnetic and single-phase circuits.

Text Books:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, TataMc Graw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised ThirdEdition.

Reference Books:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku,Mc Graw Hill Education (India), 2013, Fifth Edition.
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and **K. Rao, Mc Graw Hill Education, 2017, Fifth Edition.**
3. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
4. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023,Fourteenth Edition.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018,Seventh Revised Edition.

NETWORK ANALYSIS			
Subject Code	23ECECT2050/23ETETT2050	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Credits – 03			

Course Objectives:

This course will enable students to:

1. To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
2. To impart knowledge on applying appropriate theorem for electrical circuit analysis
3. To explain transient behavior of circuits in time and frequency domains
4. To teach concepts of resonance
5. To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

Unit -1	**Hours**
Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and Nodal analysis, problem solving with resistances only including dependent sources also. Principal of Duality with examples. Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens - problem solving using dependent sources also	**8**
Unit -2	
Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, Heaviside's expansions, problem solving using Laplace transform.	**10**
Unit – 3	
Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-LC circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving using Laplace transforms also.	**10**
Unit – 4	
Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in both branches, anti-resonance at all frequencies. Coupled Circuits: Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.	**8**
Unit – 5	
Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also.	**10**

Image and iterative impedances. Image and iterative transfer constants. Insertion loss. Attenuators and pads. Lattice network and its parameters. Impedance matching networks.	
Total	**48**

Course outcomes:

On completion of the course student will be able to

1. Understand basic electrical circuits with nodal and mesh analysis.
2. Analyse the circuit using network simplification theorems.
3. Find Transient response and Steady state response of a network.
4. Analyse electrical networks in the Laplace domain.
5. Compute the parameters of a two-port network.

Text Books:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.
3. Network lines and Fields by John. D. Ryder 2nd Edition, PHI

Reference Books

1. D. Roy Choudhury, Networks and Systems, New Age International Publications, 2013.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7 th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill Education.

COMMUNICATVIE ENGLISH LAB			
Subject Code	23CMEGL1050/2060	IA Marks	30
Number of Practical Hours/Week	02	Exam Marks	70
Total Number of Practical Hours	32	Exam Hours	02

Course Objectives:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

Course Outcomes:

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
CO2: Apply communication skills through various language learning activities.
CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.
CO5: Create effective Course Objectives:

List of Topics/Experiments: Vowels & Consonants ,Neutralization/Accent Rules Communication Skills & JAM .Role Play or Conversational Practice ,E-mail Writing
Resume Writing, Cover letter, SOP ,Group Discussions-methods & practice
Debates - Methods & Practice, PPT Presentations/ Poster Presentation Interviews Skill

Suggested Software: Walden Infotech ,Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed) , Kindle, 2013

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

ENGINEERING PHYSICS LAB			
Subject Code	23CMPHL1070 23CMPHL2060	IA Marks	30
Number of Practice Hours/Week	02	Exam Marks	70
Total Number of Practice Hours	14	Exam Hours	02
Credits – 1.0			

COURSE OBJECTIVES: To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

List of Experiments

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum usingdiffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee'sMethod.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Halleffect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsionalpendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determination of Fermi energy of Copper by using meter bridge

TEXT BOOKS:

1. "*Physics Laboratory Manual"* Prepared by Department of Physics, SITE.

REFERENCE BOOKS:

1. S. Balasubrahmanian, M.N. Srinivasan ''A Text book of Practical Physics''- S. Chand Publishers, 2017.
2. Advanced Practical Physics Vol 1& 2 SP Singh & M.S Chauhan Pragati Prakashan, Meerut

WEB SOURCES:

www.vlab.co.in
https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode Or Ten in Physical mode.

CHEMISTRY LABORATORY			
Subject Code	23AMCHL1070/23CACHL1070/23CACHL1070/ 23CDCHL1070/23CICHL1070/23CSCHL1070/2 3CTCHL1070/23ECHLL2070/23ETCHL2070/23 ITCHL2070	IA Marks	30
Number of Hr/Week	3	Exam Mr	70
Total Number Hr	36	Exam Hrs	02
Credits – 1.0			

List of Experiments

(Any 10 experiments must be conducted)

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strongbase
3. Determination of cell constant and conductance of solutions
4. Potentiometry – determination of redox potentials and emfs
5. Potentiometric titration of strong acid vs. strong base
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Determination of pH of the given samples using pH-meter
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry
13. Estimation of Potassium permanganate using oxalic acid
14. Determination of Calcium by complexometry

Demonstration Experiments

1. Thin Layer Chromatography
2. Determination of $Fe^{+3}$by a colorimetric method.

IT WORKSHOP			
Subject Code	23CMCSL1060/2070	Internal Marks	30
Number of Tutorial Hours/Week	03(P)	External Marks	70
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To demonstrate configuring the system as Dual boot both Windows and other OperatingSystems Viz. Linux, BOSS
- To teach basic command line interface commands on Linux.
- To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes:

CO1: Perform Hardware troubleshooting.
CO2: Understand Hardware components and inter dependencies.
CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation.
CO5: Perform calculations using spreadsheets

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Labinstructors should verify the work and follow it up with a Viva. Also students need to go throughthe video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Labinstructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with bothWindows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finallystudents should

demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWWon the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LANproxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and howto use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customizetheir browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Usinghelp and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing,Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeXand Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns,Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS)tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slideslotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the modelresponds. Try asking questions, starting conversations, or even providing incomplete sentencesto see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: Whatis the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a storyor a description of a scene, and let the model generate the rest of the content. This can be a funway to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output tosee how accurate and fluent the translations are.

- Ex:Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech,2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, PearsonEducation, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and KenQuamme. – CISCO Press, Pearson Education, 3rd

COMPUTER PROGRAMMING LAB			
Subject Code	23CMCSL1080	Internal Marks	30
Number of Tutorial Hours/Week	03(P)	External Marks	70
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

Course Objectives:

The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

UNIT I WEEK 1

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.

ii) Exposure to Turbo C, gcc

iii) Writing simple programs using printf(), scanf()

WEEK 2

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers

ii) Conversion of Fahrenheit to Celsius and vice versa

iii) Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

i) Finding the square root of a given number

ii) Finding compound interest

iii) Area of a triangle using heron's formulae

iv) Distance travelled by an object

UNIT II WEEK 4

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:
Lab4: Simple computational problems using the operator' precedence and associativity
i) Evaluate the following expressions.
a. A+B*C+(D*E) + F*G
b. A/B*C-B+A*D/3
c. A+++B---A
d. J= (i++) + (++i)
ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:
Tutorial 5: Branching and logical expressions:
Lab 5: Problems involving if-then-else structures.
i) Write a C program to find the max and min of four numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:
Tutorial 6: Loops, while and for loops
Lab 6: Iterative problems e.g., the sum of series
i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

UNIT III WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:
Tutorial 7: 1 D Arrays: searching.
Lab 7:1D Array manipulation, linear search
i) Find the min and max of a 1-D integer array.
ii) Perform linear search on1D array.
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number.
v) Eliminate duplicate elements in an array.

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that

will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices

ii) Multiplication two matrices

iii) Sort array elements using bubble sort

iv) Concatenate two strings without built-in functions

v) Reverse a string using built-in and without built-in string functions

UNIT IV WEEK 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a 1D array using malloc()

ii) Write a C program to find the total, average of n students using structures

iii) Enter n students data using calloc() and display failed students list

iv) Read student name and marks from the command line and display the student details along with the total.

v) Write a C program to implement realloc()

WEEK 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists

Lab10 : Bitfields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

i) Create and display a singly linked list using self-referential structure.

ii) Demonstrate the differences between structures and unions using a C program.

iii) Write a C program to shift/rotate using bitfields.

iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT V WEEK 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent,

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

i) Write a C function to calculate NCR value.

ii) Write a C function to find the length of a string.

iii) Write a C function to transpose of a matrix.

iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

i) Write a recursive function to generate Fibonacci series.

ii) Write a recursive function to find the lcm of two numbers.

iii) Write a recursive function to find the factorial of a number.

iv) Write a C Program to implement Ackermann function using recursion.

v) Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.

ii) Demonstrate Dangling pointer problem using a C program.

iii) Write a C program to copy one string into another using pointer.

iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

i) Write a C program to write and read text into a file.

ii) Write a C program to write and read text into a binary file using fread() and fwrite()

iii) Copy the contents of one file to another file.

iv) Write a C program to merge two files into the third file using command-line arguments.

v) Find no. of lines, words and characters in a file

vi) Write a C program to print last n characters of a given file.

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

Subject Code	23CMEEL1090/2080	IA Marks	30
Number of Lecture Hours/Week	3P	Exam Marks	70
Total Number of Lecture Hours	36	Exam Hours	03

Credits-1.5

PART A: ELECTRICAL ENGINEERING LAB

Course Objectives:

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions ofelectrical machines and energy calculations.

List of Experiments(Any six experiments must be conducted)

1. Verification of KCL and KVL.
2. Verification of Superposition theorem.
3. Measurement of Resistance using Wheat stone bridge.
4. Magnetization Characteristics of DC shunt Generator.
5. Measurement of Power and Power factor using Single-phase wattmeter.
6. Measurement of Earth Resistance using Megger.
7. Calculation of Electrical Energy for Domestic Premises.

COURSE OUTCOMES:

After competition of this course, the student will be able to:

1. Measure voltage, current and power in an electrical circuit. (L3)
2. Measure of Resistance using Wheat stone bridge (L4)
3. Discover critical field resistance and critical speed of DC shunt generators. (L4)
4. Investigate the effect of reactive power and power factor in electrical loads. (L5)

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

List of Experiments(Any six experiments must be conducted)

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gatesusing ICs.
8. Verification of truth tables of S-R-,J-K & D fillip flops using respective ICs .

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

1. Identify & testing of various electronic components.
2. Understand the usage of electronic measuring instruments.
3. Plot and discuss the characteristics of various electron devices.
4. Explain the operation of a digital circuit.

ENGINEERING WORKSHOP			
Subject Code	23CMMEL1090/2080	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours		Exam Hours	100
Credits –1.5			

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

Syllabus

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
9. **Basic repairs of Two-wheeler vehicle** – Demonstration of working of two-wheeler vehicle and its repairs.

Course outcomes:

1. Identify workshop tools and their operational capabilities.
2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
3. Apply fitting operations in various applications.
4. Apply basic electrical engineering knowledge for House Wiring Practice

ENGINEERING CHEMISTRY LABORATORY			
Subject Code	23CECHL2070 23MECHL2070	IA Marks	30
Number of Peroids/Week	3	Exam Marks	70
Total Number of Practice Hours	36	Exam Hours	02
Credits – 1.0			

List of Experiments

(Any 10 experiments must be conducted)

1. Determination of Hardness of ground water sample.
2. Estimation of Dissolved Oxygen by Winkler's method
3. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH
4. Determination of surface tension of given liquid
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer (Bakelite)
7. Determination of percentage of Iron in Cement sample by colorimetry
8. Estimation of Calcium in Portland Cement
9. Preparation of nano materials by precipitation method.
10. Adsorption of acetic acid by charcoal
11. Determination of Chloride by argentometry.
12. Determination of Viscosity of lubricating oil by Redwood Viscometer1
13. Determination of Viscosity of lubricating oil by Redwood Viscometer2
14. Determination of Cloud and Pour point of oil.

Demonstration Experiments

15. Thin Layer Chromatography
16. Determination of Ferrous iron using potentiometer.

DATA STRUCTURES LAB

Subject Code	23AMAML2090/23CACAL2090 23CDCDL2090/23CICIL2090/23CSCSL2090 23CTCTL2090/23ITITL2090	Internal Marks	30
Number of Tutorial Hours/Week	03(P)	External Marks	70
Total Number of Practice Hours	36	Exam Hours	03

Credits – 1.5

Course Objectives:

The course aims to strengthen the ability of the students to identify and apply the suitable datastructure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

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

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal ingraphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.

CO5: Recognize scenarios where hashing is advantageous, and design hash-based solutions forspecific problems.

List of Experiments:

Exercise 1: Array Manipulation

i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques – Linear & Binary Search
iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understand itsproperties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i) Implement a stack using arrays and linked lists.
ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree

i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 9: Hashing

i) Implement a hash table with collision resolution techniques.
ii) Write a program to implement a simple cache using hashing.

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and PeterSanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E.Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and DavidRanum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching,and Graph Algorithms by Robert Sedgewick.

NETWORK ANALYSIS AND SIMULATION LABORATORY			
Subject Code	23ECECL2090/23ETETL2090	Internal Marks	30
Number Lecture Hr/	03	External Marks	70
Total No Hr	36	Exam Hours	03
Credits – 1.5			

Course Objectives:

This course will enable students to

1. To gain hands on experience in verifying Kirchoff's laws and network theorems
2. To analyze transient behavior of circuits
3. To study resonance characteristics
4. To determine 2-port network parameters

List of Experiments:

The following experiments need to be performed using both Hardware and simulation Software
The experiments need to be simulated using software and the same need to be verified using the hardware.

1. Study of components of a circuit and Verification of KCL and KVL.
2. Verification of mesh and nodal analysis for AC circuits
3. Verification of Superposition, Thevenin's & Norton theorems for AC circuits
4. Verification of maximum power transfer theorem for AC circuits
5. Verification of Tellegen's theorem for two networks of the same topology.
6. Study of DC transients in RL, RC and RLC circuits
7. To study frequency response of various 1st order RL & RC networks
8. To study the transient and steady state response of a 2nd order circuit by varying its various parameters and studying their effects on responses
9. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
10. Determination of open circuit (Z) and short circuit (Y) parameters
11. Determination of hybrid (H) and transmission (ABCD) parameters
12. To measure two port parameters of a twin-T network and study its frequency response

Course outcomes:

On completion of the course student will be able to

1. Verify Kirchoff's laws and network theorems.
2. Measure time constants of RL & RC circuits.
3. Analyze behavior of RLC circuit for different cases.
4. Design resonant circuit for given specifications.
5. Characterize and model the network in terms of all network parameters

Hardware Requirements: Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components

Software requirements: Multisim/ Pspice/Equivalent simulation software tool, Computer Systems with required specifications

References:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.

ELECTRICAL CIRCUITS LAB			
Subject Code	23EEEEL2090	IA Marks	30
Number of Lecture Hours/Week	3P	Exam Marks	70
Total Number of Lecture Hours	36	Exam Hours	03
Credits-1.5			

Course Objectives:

To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usageof different circuits with different conditions.

List of Experiments(Any ten experiments must be conducted)

1. Verification of Kirchhoff's circuit laws.
2. Verification of node and mesh analysis.
3. Verification of network reduction techniques.
4. Determination of cold and hot resistance of an electric lamp
5. Determination of Parameters of a choke coil.
6. Determination of self, mutual inductances, and coefficient of coupling
7. Series and parallel resonance
8. Locus diagrams of R-L (L Variable) and R-C (C Variable) series circuits
9. Verification of Superposition theorem
10. Verification of Thevenin’s and Norton’s Theorems
11. Verification of Maximum power transfer theorem
12. Verification of Compensation theorem
13. Verification of Reciprocity and Millman’s Theorems

COURSE OUTCOMES:

On completion of the course student will be able to:

1. Understand the concepts of network theorems, node and mesh networks, series andparallel resonance and Locus diagrams.
2. Apply various theorems to compare practical results obtained with theoreticalcalculations.
3. Determine self, mutual inductances and coefficient of coupling values, parameters ofchoke coil.
4. Analyse different circuit characteristics with the help of fundamental laws and variousconfigurations.
5. Create locus diagrams of RL, RC series circuits and examine series and parallelresonance.

ENGINEERING MECHANICS & BUILDING PRACTICES LAB			
Subject Code	23CECEL2090	IA Marks	30M
Number of Periods/Week	03	Exam Marks	70M
Total Number of Practice Hours	36	Exam Hours	3
Credits – 1.5			

List of Experiments
(Any 10 experiments must be conducted)

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV
12. Study of Plumbing in buildings.

ENGINEERING MECHANICS LAB			
Subject Code	23MEMEL2090	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours		Exam Hours	100
Credits –1.5			

Course Objectives:

The students completing the course are expected to:

1. Verify the Law of Parallelogram and Triangle of Forces.
2. Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
3. Analyze the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel.

List of Experiments:

1. Verification of Law of Parallelogram of Forces.
2. Verification of Law of Triangle of Forces.
3. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
4. Determination of coefficient of Static and Rolling Frictions
5. Determination of Centre of Gravity of different shaped Plane Lamina.
6. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non-concurrent, parallel force system with the help of a simply supported beam.
7. Study of the systems of pulleys and draw the free body diagram of the system.
8. Determine the acceleration due to gravity using a compound pendulum.
9. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.
10. Determine the Moment of Inertia of a Flywheel.
11. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

Students have to perform any 10 of the following Experiments:

Course outcomes:

1. Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
2. Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever.
3. Determine the Centre of gravity and Moment of Inertia of different configurations.
4. Verify the equilibrium conditions of a rigid body under the action of different force systems.

HEALTH AND WELLNESS, YOGA AND SPORTS

Subject Code	23CMPES1100/2100	IA Marks	
Number of Practica Hours/Week	01	Exam Marks	100
Total Number of Lecture Hours	*00*	*Exam Hours*	*03*

Credits – 0.5

Course Objectives:

The main objective of introducing this course is to make the students maintain their mental andphysical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

Course Outcomes: After completion of the course the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.
CO2: Demonstrate an understanding of health-related fitness components. **CO3:** Compare and contrast various activities that help enhance their health.**CO4:** Assess current personal fitness levels.
CO5: Develop Positive Personality

Unit -1	
Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index(BMI) of all age groups. **Activities:** i) Organizing health awareness programmes in community ii) Preparation of health profile iii) Preparation of chart for balance diet for all age groups	**Hours – 10**
Unit -2	
Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context,classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice. **Activities:** Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar	**Hours – 8**
Unit – 3	
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games. **Activities:** i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping andrunning.	**Hours – 10**

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning,2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to SurvivingAnywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, Inc.2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as manyas Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on this subject.

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

Subject Code	23CMNSNS1100/2100	IA Marks	00
Number of Practical Hours/Week	01	Exam Marks	100
Total Number of Lecture Hours	00	Exam Hours	03

Credits – 0.5

Course Objectives:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork,social consciousness among the students and engaging them in selfless service.

Course Outcomes: After completion of the course the students will be

CO1: Understand the importance of discipline, character and service motto .

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.

CO3: Explore human relationships by analyzing social problems.

CO4: Determine to extend their help for the fellow beings and downtrodden people.

CO5: Develop leadership skills and civic responsibilities.

Unit -1	
Orientation General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance. **Activities:** i) Conducting –ice breaking sessions-expectations from the course-knowing personaltalents and skills ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc. iii) Displaying success stories-motivational biopics- award winning movies on societalissues etc. iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.	**Hours – 10**
Unit -2 Community &Care Activities	
i) Best out of waste competition. ii) Poster and signs making competition to spread environmental awareness. iii) Recycling and environmental pollution article writing competition. iv) Organising Zero-waste day. v) Digital Environmental awareness activity via various social media platforms. vi) Virtual demonstration of different eco-friendly approaches for sustainable living. vii) Write a summary on any book related to environmental issues.	**Hours – 8**
Unit – 3 Community Services	
Activities: i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media- authorities-experts- etc.	**Hours – 10**

i) Conducting awareness programs on Health-related issues such as General Health,Mental health, Spiritual Health, HIV/AIDS,
ii) Conducting consumer Awareness. Explaining various legal provisions etc.
iii) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.
iv) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering",McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to EnvironmentalEngineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

Course Structure for

B. Tech (Electronics and Communication Technology)

III Semester (II Year)

S.No.	Category	Subject Code	Title	L	T	P	Cr
1	BS	23ETETT3010	Probability theory and stochastic process	3	0	0	3
2	HSMC	23ETETT3020	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	ES	23ETETT3030	Signals and Systems	3	0	0	3
4	PC	23ETETT3040	Electronic Devices and Circuits	3	0	0	3
5	PC	23ETETT3050	Switching Theory and Logic Design	3	0	0	3
6	PC	23ETETL3060	Electronic Devices and Circuits Lab	0	0	3	1.5
7	PC	23ETETL3070	Switching Theory and Logic Design Lab	0	0	3	1.5
8	SEC	23ETETS3080	Data Structures using Python	0	1	2	2
9	AC	23CMCEN3090	Environmental Science	2	0	0	-
Total Semester Credits				**16**	**2**	**08**	**20**

IV Semester (II Year)

S.No.	Category	Subject Code	Title	L	T	P	Cr
1	Management Course-1	23CMMST4010	Managerial Economics and Financial Analysis	2	0	0	2
2	ES	23ETETT4020	Linear Control Systems	3	0	0	3
3	PC	23ETETT4030	Electromagnetic Waves and Transmission Lines	3	0	0	3
4	PC	23ETETT4040	Electronic Circuit Analysis	3	0	0	3
5	PC	23ETETT4050	Analog Communications	3	0	0	3
6	PC	23ETETL4060	Signals and Systems Lab	0	0	3	1.5
7	PC	23ETETL4070	Electronic Circuit Analysis lab	0	0	3	1.5
8	SEC	23ETAHS4080	Soft Skills	0	1	2	2
9	ES	23ETETR4090	Design Thinking &Innovation	1	0	2	2
Total Semester Credits				**15**	**1**	**10**	**21**
Mandatory Community Service Project Internship of 08weeks duration during summer Vacation							

PROBABILITY THEORY AND STOCHASTIC PROCESS
(Common to ECE & ECT)
SEMESTER III

Subject Code	23ECECT3010, 23ETETT3010	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:
This course will enable students to

1. This gives basic understanding of random variables and operations that can be performed on them.
2. To know the Spectral and temporal characteristics of Random Process.
3. To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics

Unit -1	**Hours**
Probability & Random Variable: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, Random Variable-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.	10
Unit -2	
Operations on Single Random Variables – Expectations: Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.	8
Unit -3	
Operations on Multiple Random Variables – Expectations: Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.	10

Unit-4	
Random Processes – Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal	10
Unit – 5	
Random Processes – Spectral Characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. **Response of Linear Systems:** System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.	10
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Understand the concepts of Probability Theory and Random Variables.
2. Apply statistical operations and transformations on one Random Variable.
3. Extend the concept of one random variable to multiple random variables and apply statistical operations and transformations on multiple Random Variables.
4. Characterize the random processes in the time domain.
5. Characterize the random processes in the frequency domain and analyze the LTI systems with random inputs.

Text Books:

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles, 4 th Ed, TMH, 2001.
2. Papoulis and S.Unnikrisha, “Probability, Random Variables and Stochastic Processes”, 4th Edition, PHI, 2002.

Reference Books:

1. Bruce Hajck - Random Processes for Engineers, Cambridge unipress, 2015
2. Henry Stark and John W. Woods, “Probability and Random Processes with Applications to Signal Processing”, 3rd Edition, Pearson Education.
3. 2. Gardener W.A, “Introduction to Random Processes with Applications to Signals and Systems”, 2 nd Edition, McGraw-Hill.

Web References:

1. https://nptel.ac.in/courses/117105085/
2. https://ocw.mit.edu/courses/mathematics/18-440-probability-and-random-variables-spring2014/

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT (Common to All) SEMESTER III			
Subject Code	23ECECT3020, 23ETETT3020	Internal Marks	30
Number of Lecture Hours/Week	02	External Marks	70
Number of Tutorial Hours/Week	01		
Total Number of Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:

This course will enable students to

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

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

Unit -1	**Hours**
Introduction to Value Education (6 lectures and 3 tutorials for practice session) Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Lecture 2: Understanding Value Education Tutorial 1: Practice Session PS1 Sharing about Oneself Lecture 3: self-exploration as the Process for Value Education Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations Tutorial 2: Practice Session PS2 Exploring Human Consciousness Lecture 5: Happiness and Prosperity – Current Scenario Lecture 6: Method to Fulfill the Basic Human Aspirations Tutorial 3: Practice Session PS3 Exploring Natural Acceptance	10
Unit -2	
Harmony in the Human Being (6 lectures and 3 tutorials for practice session) Lecture 7: Understanding Human being as the Co-existence of the self and the body. Lecture 8: Distinguishing between the Needs of the self and the body	10

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body. Lecture 9: The body as an Instrument of the self Lecture 10: Understanding Harmony in the self Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self Lecture 11: Harmony of the self with the body Lecture 12: Programme to ensure self-regulation and Health Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body	
Unit -3	
Harmony in the Family and Society (6 lectures and 3 tutorials for practice session) Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction Lecture 14: 'Trust' – the Foundational Value in Relationship Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust Lecture 15: 'Respect' – as the Right Evaluation Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect Lecture 16: Other Feelings, Justice in Human-to-Human Relationship Lecture 17: Understanding Harmony in the Society Lecture 18: Vision for the Universal Human Order Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal	10
Unit – 4	
Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session) Lecture 19: Understanding Harmony in the Nature Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature Lecture 21: Realizing Existence as Co-existence at All Levels Lecture 22: The Holistic Perception of Harmony in Existence Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.	8
Unit – 5	
Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session) Lecture 23: Natural Acceptance of Human Values Lecture 24: Definitiveness of (Ethical) Human Conduct Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order Lecture 26: Competence in Professional Ethics Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies Lecture 28: Strategies for Transition towards Value-based Life and Profession Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order	10
Practice Sessions for UNIT I – Introduction to Value Education PS1 Sharing about Oneself PS2 Exploring Human Consciousness PS3 Exploring Natural Acceptance	

Practice Sessions for UNIT II – Harmony in the Human Being PS4 Exploring the difference of Needs of self and body PS5 Exploring Sources of Imagination in the self PS6 Exploring Harmony of self with the body Practice Sessions for UNIT III – Harmony in the Family and Society PS7 Exploring the Feeling of Trust PS8 Exploring the Feeling of Respect PS9 Exploring Systems to fulfil Human Goal Practice Sessions for UNIT IV – Harmony in the Nature (Existence) PS10 Exploring the Four Orders of Nature PS11 Exploring Co-existence in Existence Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics PS12 Exploring Ethical Human Conduct PS13 Exploring Humanistic Models in Education PS14 Exploring Steps of Transition towards Universal Human Order	
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
2. Identify one's self, and one's surroundings (family, society nature) (L1, L2)
3. Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
4. Relate human values with human relationship and human society. (L4)
5. Justify the need for universal human values and harmonious existence (L5)
6. Develop as socially and ecologically responsible engineers (L3, L6)

Text Books:

Textbook and Teachers Manual

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

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria,Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. JeevanVidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

SIGNALS AND SYSTEMS (Common to ECE & ECT) SEMESTER III			
Subject Code	23ECECT3030, 23ECECT3030	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:

This course will enable students to

1. To study about signals and systems.
2. To analyze the spectral characteristics of signal using Fourier series and Fourier transforms.
3. To understand the characteristics of systems.
4. To introduce the concept of sampling process
5. To know various transform techniques to analyze the signals and systems.

Unit -1	**Hours**
INTRODUCTION: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Related problems.	10
Unit -2	
FOURIER SERIES AND FOURIER TRANSFORM: Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform, Related problems.	10
Unit -3	
ANALYSIS OF LINEAR SYSTEMS: Introduction**,** Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant(LTV)system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. **CORRELATION:** Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.	10
Unit – 4	
SAMPLINGTHEOREM: Graphical and analytical proof for Band Limited Signals,	10

impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to B and Pass sampling, Related problems. **REVIEW OF LAPLACE TRANSFORMS:** Introduction to Laplace transform**,** Concept of region of convergence (ROC), Properties of L.T's, Relation between L.T, and F.T. of a signal.	
Unit – 5	
Z–TRANSFORMS: Concept of Z-Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, properties of Z-transforms, Inverse Z-transform,. Distinction between Laplace, Fourier and Z transforms.	8
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Differentiate the various classifications of signals and systems
2. Analyze the frequency domain representation of signals using Fourier concepts
3. Classify the systems based on their properties and determine the response of LTI Systems.
4. Know the sampling process and various types of sampling techniques.
5. Apply Laplace and z-transforms to analyze signals and Systems (continuous & discrete).

Text Books:

1. Signals and Systems-A.V. Oppenheim, A.S. Willsky Nawab,PHI,2ndEdn,1997
2. Signals, Systems & Communications-B.P.Lathi, BSPublications,2003.
3. Signals & Systems, A Anand Kumar, 3rd Edition, PHI Publication, 2013.

Reference Books:

1. Principles of Linear Systems and Signals–BP Lathi, Oxford University Press,2015
2. Signals&Systems-Simon Haykin and Van Veen,Wiley,2ndEdition,2007
3. Signals and Systems–TK Rawat, Oxford University press,2011

ELECTRONIC DEVICES AND CIRCUITS (Common to ECE & ECT) SEMESTER III			
Subject Code	23ECECT3040, 23ETETT3040	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:

This course will enable students to

1. To learn and understand the basic concepts of semiconductor physics.
2. Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
3. To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
4. Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
5. To learn and understand the purpose of transistor biasing and its significance.
6. Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

Unit -1	**Hours**
Review of Semiconductor Physics: Mobility and Conductivity, Intrinsic and extrinsic semiconductors**,** Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors. **(Text book: 1)** **Junction Diode Characteristics:** energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in p-n junction Diode, Diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance. **(Text book: 1)**	10
Unit -2	
Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, Varactor diode, LED, Photodiode, Tunnel diode, Construction, operation and V-I characteristics. **(Text book: 1)** **Diode Circuits:** The Piecewise Linear Diode model, clipping (limiting) circuits, clipping at Two Independent Levels, Peak Detector, Clamping circuits, Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors. **(Text book: 1, 2)**	10
Unit -3	
Transistor Characteristics: Junction transistor, transistor current components, transistor equation in CB configuration, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values. **(Text book: 1)** **Transistor Biasing and Thermal Stabilization:** Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base	10

bias, self-bias, Stabilization against variations in V_{BE}, Ic, and β, Stability factors, (S,S',S''), Bias compensation, Thermal runaway, Thermal stability. **(Text book: 1)**	
Unit – 4	
Small Signal Low Frequency Transistor Amplifier Models **BJT:** Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. **(Text book: 1, 2)**	8
Unit – 5	
FET: FET types, JFET operation, characteristics, small signal model of JFET. **(Text book: 1) MOSFET:** MOSFET Structure, Operation of MOSFET: operation in saturation region, MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET, Channel length modulation, MOS transconductance, MOS device models: MOS small signal model, PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS devices. **(Text book: 3).**	10
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Apply the basic concepts of semiconductor physics.
2. Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
3. Analyze the construction, working principle of Semiconductor Devices and Diode Circuits
4. Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions
5. Apply small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

Text Books:

1. Millman's Electronic Devices and Circuits- J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4th edition, 2015.
2. Millman's Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2nd Edition, 2009.
3. Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.

Reference Books:

1. Basic Electronics-Principles and Applications, Chinmoy Saha,Arindam Halder, Debarati Ganguly, Cambridge University Press.
2. Electronics devices & circuit theory- Robert L.Boylestad and LouiNashelsky, Pearson, 11th edition, 2015.
3. Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.
4. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5th edition, 2022.

SWITCHING THEORY AND LOGIC DESIGN
(Common to ECE & ECT)
SEMESTER III

Subject Code	23ECECT3050, 23ETETT3050	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:
This course will enable students to

1. To solve a typical number base conversion and analyze new error coding techniques.
2. Theorems and functions of Boolean algebra and behavior of logic gates
3. To optimize logic gates for digital circuits using various techniques.
4. Boolean function simplification using Karnaugh maps and Quine-McCluskey methods
5. To understand concepts of combinational circuits.
6. To develop advanced sequential circuits.

Unit -1	**Hours**
REVIEW OF NUMBER SYSTEMS & CODES: Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members. Gray code ,4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. **BOOLEAN THEOREMS AND LOGIC OPERATIONS:** Boolean theorems, principle of complementation & duality, De-morgan theorems. Logic operations; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations. Standard SOP and POS Forms.	10
Unit -2	
MINIMIZATION TECHNIQUES: Minimization and realization of switching functions using Boolean theorems, K-Map (up to 5 variables) **COMBINATIONAL LOGIC CIRCUITS DESIGN:** Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4-bit adder-subtractor circuit, carry look-a- head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.	10
Unit -3	
COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI &LSI: Design of encoder, decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits. Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bit digital comparator and seven segment decoder. **INTRODUCTION OF PLD's :** PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table.	10
Unit – 4	
SEQUENTIAL CIRCUITS I:	10

Classification of sequential circuits (synchronous and asynchronous), operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip- flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - shift register, bi-directional shift register, universal shift register.	
Unit – 5	
SEQUENTIAL CIRCUITS II: Finite state machine; state diagrams, state tables. Analysis of clocked sequential circuits Mealy to Moore conversion and vice-versa. Realization of sequence generator, Design of Clocked Sequential Circuit to detect the given sequence with overlapping.	8
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Classify different number systems and apply to generate various codes.
2. Use the concept of Boolean algebra in minimization of switching functions
3. Design different types of combinational logic circuits.
4. Apply knowledge of flip-flops in designing of Registers and counters
5. The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
6. Produce innovative designs by modifying the traditional design techniques.

Text Books:

1. Switching and finite automata theory Zvi.KOHAVI, Niraj.K.Jha 3rdEdition,Cambridge UniversityPress,2009

2. Digital Design by M.MorrisMano, Michael D Ciletti,4th editionPHIpublication,2008

3. Switching theory and logic design by Hill and Peterson**,**Mc-Graw Hill TMH edition, 2012.

Reference Books:

1. Fundamentals of Logic Design by Charles H. Roth Jr,JaicoPublishers,2006

2. Digital electronics by R S Sedha.S.Chand &companylimited,2010

3. Switching Theory and Logic Design by A. AnandKumar,PHI Learningpvtltd,2016.

4. Digital logic applications and design by John M Yarbough, Cengagelearning,2006.

5. TTL 74-Seriesdatabook.

ELECTRONIC DEVICES AND CIRCUITS LAB
(Common to ECE & ECT)
SEMESTER III

Subject Code	23ECECL3060, 23ETETL3060	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03

Credits – 1.5

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

List of Experiments: (Minimum of Ten Experiments has to be performed)	**Hours**
1. CRO Operation and its Measurements 2. clipper circuit using diode 3. Clamping circuit using diode 4. Rectifiers (without and with c-filter) Part A: Half-wave Rectifier Part B: Full-wave Rectifier 5. BJT Characteristics (CE Configuration) Part A: Input Characteristics Part B: Output Characteristics 6. FET Characteristics (CS Configuration) Part A: Drain Characteristics Part B: Transfer Characteristics 7. Transistor Biasing 8. BJT-CE Amplifier 9. Emitter Follower-CC Amplifier 10. FET-CS Amplifier 11. Static Characteristics of MOSFET 12. MOSFET CS Amplifier	**36**
Equipment required: 1. Regulated Power supplies 2. Analog/ Digital Storage Oscilloscopes 3. Analog/ Digital Function Generators 4. Digital Multi-meters 5. Decade Resistance Boxes/Rheostats 6. Decade Capacitance Boxes 7. Ammeters (Analog or Digital) 8. Voltmeters (Analog or Digital) 9. Active& Passive Electronic Components.	

SWITCHING THEORY and LOGIC DESIGN LAB (Common to ECE & ECT) SEMESTER III			
Subject Code	23ECECL3070, 23ETETL3070	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments	**Hours**
1. Verification of truth tables of the following Logic gates Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR 2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit. 3. Verification of functional table of 3 to 8-line Decoder /De-multiplexer 4. 4 variable logic function verification using 8 to1 multiplexer. 5. Design full adder circuit and verify its functional table. 6. Verification of functional tables of (i) JK Edge triggered Flip–Flop (ii) JK Master Slave Flip–Flop (iii) D Flip-Flop 7. Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output. 8. Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output 9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation. 10. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms. 11. Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms. 12. (a) Draw the circuit diagram of a single bit comparator and test the output (b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.	**36**
Additional Experiments: 1. Design BCD Adder Circuit and Test the Same using Relevant IC 2. Design Excess-3 to 9- Complement convertor using only four Full Adders a test the Circuit. 3. Design an Experimental model to demonstrate the operation of 74154 D Multiplexer using LEDs for outputs. 4. Design of any combinational circuit using Hardware Description Language 5. Design of any sequential circuit using Hardware Description Language	

DATA STRUCTURES USING PYTHON (Common to ECE & ECT) SEMESTER III			
Subject Code	23ECECS3080, 23ETETS3080	Internal Marks	30
Number of Practical Hours/Week	02	External Marks	70
Number of Tutorial Hours/Week	01		
Total Number of Hours	36	Exam Hours	03
Credits – 2			

List of Experiments:	**Hours**
1. Write a Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type. 2. Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area( ) and perimeter( ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area( ) and perimeter( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter 3. Write a python program to implement Method Overloading and Method Overriding. 4. Write a Python program to illustrate the following comprehensions: a) List Comprehensions b) Dictionary Comprehensions c) Set Comprehensions d) Generator Comprehensions 5. Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. Example: Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5] .... [7, 8] [7, 9] [8, 9]. 6. Write a program for Linear Search and Binary search. 7. Write a program to implement Bubble Sort and Selection Sort. 8. Write a program to implement Merge sort and Quick sort. 9. Write a program to implement Stacks and Queues. 10. Write a program to implement Singly Linked List. 11. Write a program to implement Doubly Linked list. 12. Write a program to implement Binary Search Tree.	**36**

ENVIRONMENTAL SCIENCE (Common to All) SEMESTER III			
Subject Code	23CMCEN3090	Internal Marks	30
Number of Lecture Hours/Week	02	External Marks	--
Total Number of Lecture Hours	32	Exam Hours	1.5
Pre-requisite		**Credits – 0**	

Course Objectives:

This course will enable students to

1. To make the students to get awareness on environment
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
3. To save earth from the inventions by the engineers.
4. To understand pollution control equipments
5. To make the students to get awareness on social issues.

Unit -1	**Hours**
Multidisciplinary Nature of Environmental Studies:– Definition, Scope and Importance– Need for Public Awareness. **Natural Resources :** Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people –Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams–benefits and problems – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, – Energy resources	6
Unit -2	
Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem. b. Grass land ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Biodiversity and Its Conservation**: Introduction and Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels–India as a mega-diversity nation–Hot-sports of biodiversity–Threats to biodiversity: habitat loss, poaching of	8

wild life, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	
Unit -3	
Environmental Pollution: Definition, Cause, effects and control measures of: a. Air Pollution. b. Water pollution c. Soil pollution d. Noise pollution e. Thermal pollution f. Nuclear hazards **Solid Waste Management**: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution – Pollution case studies	6
Unit – 4	
Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rainwater harvesting, – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion– Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.	6
Unit – 5	
Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programs. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies. **Field Work:** Visit to a local area to document environmental assets River/forest grassland/hill/mountain –Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.	6
Total	**32**

Course outcomes:

Upon successful completion of the course student will be able to

1. Grasp multi-disciplinary nature of environmental studies and various renewable and non-renewable resources.
2. Understand flow and bio-geo- chemical cycles and ecological pyramids.
3. Understand various causes of pollution and solid waste management and related preventive measures.
4. Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5. Illustrate the causes of population explosion, value education and welfare programmes.
6. Illustrate the causes of population explosion, value education and welfare programmes.
7.

Text Books:

1. Erach Bharucha,Text book of Environmental Studies for Undergraduate Courses,Universities Press (India) Private Limited, 2019.

2. Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.

3. S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.

4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.

2. M.Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014.

3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.

4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.

5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.

- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- https://www.edx.org/learn/environmental-science/rice-university-ap-renvironmental-science-part-3-pollution-andresources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science+ +Part+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmentalscience
- http://ecoursesonline.iasri.res.in/Courses/Environmental%20ScienceI/Data%20Files/pdf/lec07.pdf
- https://www.youtube.com/watch?v=5QxxaVfgQ3k

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (Common to All) SEMESTER IV			
Subject Code	23CMMST4010	Internal Marks	30
Number of Lecture Hours/Week	02	External Marks	70
Total Number of Lecture Hours	32	Exam Hours	03
Pre-requisite		**Credits – 02**	

Course Objectives:

This course will enable students to

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.

Unit -1	**Hours**
Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity-Types – Measurement. Demand Forecasting Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.	6
Unit -2	
Production and Cost Analysis: Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).	6
Unit -3	
Business Organizations and Markets: Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies	6
Unit – 4	
Financial Accounting and Analysis : Introduction – Concepts and Conventions-Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.	6
Unit – 5	

Capital Budgeting : Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)	8
Total	**32**

Course outcomes:

On completion of the course students will be able to

1. Define the concepts related to Managerial Economics, financial accounting and management(L2)
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
3. Apply the Concept of Production cost and revenues for effective Business decision (L3)
4. Analyze how to invest their capital and maximize returns (L4)
5. Develop the accounting statements and evaluate the financial performance of business entity (L5)
6. Evaluate the capital budgeting techniques. (L5)

Text Books:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

LINEAR CONTROL SYSTEMS (Common to ECE & ECT) SEMESTER IV			
Subject Code	23ECECT4020, 23ETETT4020	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:

This course will enable students to

1. To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback
2. To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis
3. To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices
4. To analyze the system in terms of absolute stability and relative stability by different approaches
5. To design different control systems for different applications as per given specifications
6. To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability.

Unit -1	**Hours**
INTRODUCTION Concepts of System, Control Systems: Open Loop and closed loop control systems and their differences. Different examples of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models, Differential equations, Impulse Response and transfer functions. Translational and Rotational mechanical systems	10
Unit -2	
TRANSFER FUNCTION REPRESENTATION Block diagram algebra–Representation by Signal flow graph-Reduction using mason's gain formula. **TIME RESPONSE ANALYSIS** Standard test signals – Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications – Steady state response - Steady state errors and error constants.	10
Unit -3	
The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. **Root Locus Technique:** The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.	10
Unit – 4	
Frequency response analysis: Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist Stability Criterion	8
Unit – 5	

CLASSICAL CONTROL DESIGN TECHNIQUES State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.	10
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. This course introduces the concepts of feedback and its advantages to various control systems
2. The performance metrics to design the control system intime-domain and frequency domain are introduced.
3. Control systems for various applications can be designed using time-domain and frequency domain analysis.
4. In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.

Text Books:

1. Automatic Control Systems 8th edition– by B.C.Kuo – Johnwiley and son's, 2003.

2. Control Systems Engineering –by I. J.Nagrathand M.Gopal, New Age International (P) Limited, Publishers, 2nd edition, 2007

3. Modern Control Engineering–by Katsuhiko Ogata–Pearson Publications, 5th edition, 2015.

Reference Books:

1. Control Systems by A.Nagoorkani, RB Apublications, 3 edition, 2017.

2. Control Systems by A.Anandkumar, PHI, 2 Edition, 2014.

ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
(Common to ECE & ECT)
SEMESTER IV

Subject Code	23ECECT4030, 23ETETT4030	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:
This course will enable students to

1. Understand the fundamentals of electric fields, coulomb's law and gauss law
2. Familiar with of Biot-Savart Law, Ampere's Circuital Law and Maxwell equations
3. Aware of electromagnetic wave propagation in dielectric and conducting media
4. Study the equivalent circuit of transmission lines and parameters of the transmission lines
5. Learn the working of smith chart and its usage in the calculation of transmission line parameters

Unit -1	**Hours**
Review of Co-ordinate Systems, **Electrostatics:** Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Illustrative Problems	10
Unit -2	
Magnetostatics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Illustrative Problems**.** **Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface, Illustrative Problems.	10
Unit -3	
EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Poynting Vector and Pointing Theorem, Illustrative Problems. Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, , Illustrative Problems.	10
Unit – 4	
Transmission Lines - I : Types, Parameters, T & π Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic	8

Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.	
Unit – 5	
Transmission Lines – II: Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.	10
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Determine electric field intensity using coulomb's law and Gauss law.
2. Determine magnetic field intensity using Biot-Savarts Law and Ampere's Circuital Law.
3. Analyze the electromagnetic wave propagation in dielectric and conducting media.
4. Examine the primary and secondary constants of different types of transmission lines.
5. Derive the expressions for input impedance, reflection coefficient, and VSWR of transmission lines and calculate these parameters using smith chart.

Text Books:

1. Elements of Electromagnetic – Matthew N. O. Sadiku, Oxford University Press, 7th edition, 2018.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2008.

Reference Books:

1. Engineering Electromagnetics – William H. Hayt, John A. Buck, Jaleel M. Akhtar, TMH, 9th edition, 2020.
2. Electromagnetic Field Theory and Transmission Lines –G. S. N. Raju, Pearson Education 2006
3. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao,Wiley India 2013.
4. Networks, Lines and Fields John D. Ryder, Second Edition, Pearson Education, 2015.

ELECTRONIC CIRCUIT ANALYSIS (Common to ECE & ECT) SEMESTER IV			
Subject Code	23ECECT4040, 23ETETT4040	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:

This course will enable students to

1. To learn hybrid- π parameters a thigh frequency and compare with low frequency parameters.
2. Learn and understand the purpose of cascading of single stage amplifiers and derive the overall voltage gain.
3. Analyze the effect of negative feedback on amplifier characteristics and derive the characteristics.
4. Learn and understand the basic principle of oscillator circuits and perform the analysis of different oscillator circuits.
5. Compare and analyze different Power amplifiers like Class A, Class B, Class C, Class AB and other types of amplifiers.
6. Analyze different types of tuned amplifier circuits.

Unit -1	**Hours**
Small Signal High Frequency Transistor Amplifier models: **BJT:** Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid πconductance, Hybrid π capacitances, validity of hybrid π model, determination of high- frequency parameters in terms of low-frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product. **FET:** Analysis of common Source and common drain Amplifier circuits at high frequencies.	10
Unit -2	
Multistage Amplifiers: Classification of amplifiers, methods of coupling**, c**ascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier.	8
Unit -3	
Feedback Amplifiers: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.	10
Unit – 4	

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wien bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT.	10
Unit – 5	
Power Amplifiers: Classification of amplifiers (A to H), Class A power Amplifiers, Class B Push-pull amplifiers, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks. **Tuned Amplifiers**: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier.	10
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
2. Design and analysis of multistage amplifiers using BJT and FET and Differential amplifier using BJT.
3. Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
4. Know the classification of the power and tuned amplifiers and their analysis with performance comparison

Text Books:

1. Integrated Electronics- J.Millman and C.C.Halkias, Tata McGraw-Hill, 2017.
2. Electronic Devices and CircuitsTheory –Robert L.Boylestad and Louis Nashelsky, Pearson/PrenticeHall, TenthEdition, 2009
3. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications, 2006

Reference Books:

1. Electronic Circuit Analysis and Design –Donald A.Neaman, McGrawHill, 2010.
2. Micro electronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition, 2011.
3. Electronic Circuit Analysis-B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, PearsonPublications.

ANALOG COMMUNICATIONS (Common to ECE & ECT) SEMESTER IV			
Subject Code	23ECECT4050, 23ETETT4050	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	48	Exam Hours	03
Pre-requisite		**Credits – 03**	

Course Objectives:

This course will enable students to

1. Describe the Modulation and Demodulation techniques of standard AM.
2. Compare different types of Amplitude Modulation and Demodulation techniques.
3. Analyse the concepts of generation and detection of Angle Modulated signals.
4. Outline the Radio Receivers with different sections.
5. Interpret the Radio Transmitters completely.

Unit -1	
Amplitude Modulation: Introduction to Fourier transform, Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Time domain and Frequency domain descriptions, Single tone modulation, Power relations in AM waves, Generation of AM waves: Square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector, Related problems.	10
Unit -2	
DSB & SSB Modulation: Double sideband suppressed carrier modulator: Time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulator, Ring Modulator, Detection of DSBSC Waves: Coherent detection, Quadrature Null Effect, COSTAS Loop, Squaring Loop. Single sideband suppressed carrier modulator: Time domain and Frequency domain description, Generation of SSBSC Waves: Frequency discrimination method, Phase discrimination method, Demodulation of SSB Waves: Coherent Detection. Vestigial sideband modulation: Time domain description, Frequency domain description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier, Comparison of different AM Techniques, Applications of different AM Systems, Related problems.	10
Unit -3	
Angle Modulation: Introduction, Basic concept of phase modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave, Generation of FM Waves: Direct Method, Indirect Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM, Related problems.	8
Unit – 4	

Radio Transmitters: Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter: Variable reactance type and Phase modulated FM Transmitter, Frequency stability in FM Transmitter. **Radio Receivers:** Receiver Types: Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics, Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Amplitude limiting, Comparison of FM & AM Receivers, Communication Receivers, Extension of super heterodyne principle and additional circuits.	10
Unit – 5	
Noise: Review of noise and noise sources, Noise figure, Noise in Analog communication Systems: Noise in DSB & SSB Systems, Noise in AM System, Noise in Angle Modulation Systems and Pre-emphasis & De-emphasis. **Pulse Analog Modulation:** Types of Pulse modulation, PAM (Single polarity, double polarity), PWM: Generation & Detection of PWM, PPM: Generation and Detection of PPM, Time Division Multiplexing, TDM Vs FDM, Introduction to PCM,DPCM and DM(Transmitter and Receiver Block diagrams).	10
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Describe the Modulation and Demodulation techniques of standard AM.
2. Compare different types of Amplitude Modulation and Demodulation techniques.
3. Analyse the concepts of generation and detection of Angle Modulated signals.
4. Outline the Radio Receivers with different sections.
5. Interpret the Radio Transmitters completely.
6. Illustrate the noise performance in Analog Modulation techniques and also the concepts of Pulse Analog Modulation and Demodulation techniques

Text Books:

1. Communication Systems, Simon Haykin, Michael Moher, Wiley, 5th Edition, 2009.
2. Principles of Communication Systems, H Taub, D L Schilling, Gautam Sahe, TMH, 4th Edition, 2017.
3. Modern Digital and Analog Communication Systems, B.P.Lathi, Zhi Ding, Hari Mohan Gupta, Oxford University Press, 4th Edition, 2017

Reference Books:

1. Electronics & Communication Systems, George Kennedy, Bernard Davis, S R M Prasanna, TMH, 6th Edition, 2017.
2. Communication Systems, R P Singh, S D Sapre, TMH, 3nd Edition, 2017.
3. Communication Systems (Analog and Digital), Dr. Sanjay Sharma, Katson Books, 7th Reprint Edition, 2018

SIGNALS AND SYSTEMS LAB (Common to ECE & ECT) SEMESTER IV			
Subject Code	23ECECL4060, 23ETETL4060	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03
Credits – 1.5			

List of Experiments	**Hours**
1. Introduction to MATLAB and structure of a MATLAB program. 2. Generation of Continuous Time and Discrete Time signals. 3. Perform standard operations on signals with respect to an independent variable time. 4. Perform standard operations on signals with respect to dependent variable time. 5. Exponential Fourier series representation of a periodic Fullwave rectified signal. 6. Determine Fourier Transform and Inverse Fourier Transform of a CT signal. 7. Perform Linear convolution between two signals. 8. Determine Autocorrelation and Cross correlation between signals. 9. Find the Laplace transform of an arbitrary signal. 10. Find the impulse response and step response of a discrete LTI system. 11. Verification of the Sampling theorem. 12. Generate a uniformly distributed random sequence in the range (0,1) and compute it's Mean and Variance. Also plot the Histogram. 13. Generate a discrete time sequence of length N with i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence. 14. Calculate Probability Distribution and Probability Density functions of a Random variable.	**36**

ELECTRONIC CIRCUIT ANALYSIS LAB (Common to ECE & ECT) SEMESTER IV			
Subject Code	23ECECL4070, 23ETETL4070	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03
Credits – 1.5			

Note: The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool**.** Further they are required to verify the result using necessary hardware equipment.

List of Experiments: (Minimum of Ten Experiments has to be performed)	**Hours**
1. Determination of Ft of a given transistor. 2. Voltage-Series Feedback Amplifier 3. Current-Shunt Feedback Amplifier 4. RC Phase Shift/Wien Bridge Oscillator 5. Hartley/Colpitt's Oscillator 6. Two Stage RC Coupled Amplifier 7. Darlington Pair Amplifier 8. Boots trapped Emitter Follower 9. Class A Series-fed Power Amplifier 10. Transformer-coupled Class A Power Amplifier 11. Class B Push-Pull Power Amplifier 12. Complementary Symmetry Class B Push-Pull Power Amplifier 13. Single Tuned Voltage Amplifier 14. Double Tuned Voltage Amplifier	**36**

Equipment required: Software:

i. Multisim/Equivalent Industrial Standard Licensed simulation software tool.

ii. Computer Systems with required specifications

Hardware Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

<table>
<tr><td colspan="4">SOFT SKILLS
(Common to ECE & ECT)
SEMESTER IV</td></tr>
<tr><td>Subject Code</td><td>23ECAHS4080</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Tutorial Hours/Week</td><td>01</td><td rowspan="2">External Marks</td><td rowspan="2">70</td></tr>
<tr><td>Number of Practical Hours/Week</td><td>02</td></tr>
<tr><td>Total Number of Hours</td><td>48</td><td>Exam Hours</td><td>03</td></tr>
<tr><td>Pre-requisite</td><td></td><td colspan="2">Credits – 02</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to
1. To prepare to face global competition for employment and excellence in profession.
2. To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.</td></tr>
<tr><td colspan="4">Unit -1</td></tr>
<tr><td colspan="3">INTRODUCTION: Introduction- Emergence of life skills, Definition & Meaning, Importance& need, reasons for skill gap, Analysis--Soft Skills vs Hard skills, Linkage between industry and soft skills, Challenges, Personality Developments. Soft Skills, Soft Skills vs English - Improving Techniques.</td><td>10</td></tr>
<tr><td colspan="3">Unit -2</td><td></td></tr>
<tr><td colspan="3">Intra-Personal: Definition-Meaning – Importance-SWOT analysis, Johari windows - Goal Setting- quotient skills - Emotional Intelligence- Attitudinal skills - Right thinking- Problem Solving-Time management, stress management.</td><td>8</td></tr>
<tr><td colspan="4">Unit -3</td></tr>
<tr><td colspan="3">Inter-Personal: Definition – Meaning – Importance-Communications skills-Team Work, managerial skills -Negotiation skills- Leadership skills, corporate etiquettes.</td><td>10</td></tr>
<tr><td colspan="4">Unit – 4</td></tr>
<tr><td colspan="3">Verbal Skills: Definition and Meaning-Listening skills, need- types, advantages, Importance-Improving Tips for Listening, Speaking, need- types, advantages, Importance- Improving Tips, Reading- Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips .</td><td>10</td></tr>
<tr><td colspan="4">Unit – 5</td></tr>
<tr><td colspan="3">Non Verbal Skills& Interview skills: Definition and Meaning – Importance-Facial Expressions- Eye Contact – Proxemics Haptics -Posture, cross cultural body language, body language in interview room, appearance and dress code – Kinetics- Para Language - tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills, interview methods and questions.</td><td>10</td></tr>
<tr><td colspan="3">Total</td><td>48</td></tr>
</table>

Course outcomes:

On completion of the course students will be able to

1. Assimilate and understood the meaning and importance of soft skills and learn how to develop them.
2. Understand the significance of soft skills in the working environment for professional excellence.
3. Prepare to undergo the placement process with confidence and clarity.
4. Ready to face any situation in life and equip themselves to handle them effectively.
5. Understand and learn the importance of etiquette in both professional and personal life

Text Books:

1. Sherfield, M. Robert at al, Cornerstone Developing Soft Skills, 4/e, Pearson Publication, New Delhi, 2014.
2. 2) Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited, 2016.

Reference Books:

1. Sambaiah.M. Technical English, Wiley publishers India. New Delhi. 2014.
2. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
3. Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
4. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
5. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014. 6. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc20_hs60/preview
- http://www.youtube.com/@softskillsdevelopment6210
- https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_ybOO1_q&si=Fs05Xh8ZrOPsR8F4
- https://www.coursera.org/learn/people-soft-skills-assessment?language=English
- https://www.edx.org/learn/soft-skills

DESIGN THINKING & INNOVATION (Common to ECE & ECT) SEMESTER IV			
Subject Code	23ECECR4090, 23ETETR4090	Internal Marks	30
Number of Lecture Hours/Week	01	External Marks	70
Number of Practical Hours/Week	02		
Total Number of Hours	48	Exam Hours	03
Pre-requisite		**Credits – 02**	

Course Objectives:

This course will enable students to

1. Bring awareness on innovative design and new product development.
2. Explain the basics of design thinking.
3. Familiarize the role of reverse engineering in product development.
4. Train how to identify the needs of society and convert into demand.
5. Introduce product planning and product development process.

Unit -1	
Introduction to Design Thinking: Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.	10
Unit -2	
Design Thinking Process: Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development **Activity**: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.	8
Unit -3	
Innovation: Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity. **Activity:** Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.	10
Unit – 4	
Product Design: Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies. **Activity:** Importance of modeling, how to set specifications, Explaining their own product design.	10
Unit – 5	

Design Thinking in Business Processes: Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes. **Activity:** How to market our own product, about maintenance, Reliability and plan for startup.	10
Total	**48**

Course outcomes:

On completion of the course students will be able to

1. Define the concepts related to design thinking.
2. Explain the fundamentals of Design Thinking and innovation.
3. Apply the design thinking techniques for solving problems in various sectors.
4. Analyse to work in a multidisciplinary environment.
5. Evaluate the value of creativity.

Text Books:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

Other Department Courses
(Mechanical Engineering)
III Semester

SITE23 Regulations

<table>
<tr><td colspan="4">EMBEDDED SYSTEMS & IoT
SEMESTER III</td></tr>
<tr><td>Subject Code</td><td>23MEECS3090</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Practical Hours/Week</td><td>02</td><td rowspan="2">External Marks</td><td rowspan="2">70</td></tr>
<tr><td>Number of Tutorial Hours/Week</td><td>01</td></tr>
<tr><td>Total Number of Hours</td><td>36</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 2</td></tr>
<tr><td colspan="4">Objectives:
• To comprehend Microcontroller-Transducers Interface techniques
• To establish Serial Communication link with Arduino
• To analyse basics of SPI interface.
• To interface Stepper Motor with Arduino
• To analyse Accelerometer interface techniques
• To introduce the Raspberry PI platform, that is widely used in IoT applications
• To introduce the implementation of distance sensor on IoT devices.</td></tr>
<tr><td colspan="3">List of Experiments: (Any 5 experiments from the following)</td><td>Hours</td></tr>
<tr><td colspan="3">1. Measure Analog signal from Temperature Sensor.
2. Generate PWM output.
3. Drive single character generation on Hyper Terminal.
4. Drive a given string on Hyper Terminal.
5. Full duplex Link establishment using Hyper terminal.
6. Drive a given value on a 8 bit DAC consisting of SPI.
7. Drive Stepper motor using Analog GPIOs.
8. Drive Accelerometer and Display the readings on Hyper Terminal.
COMPONENTS/ BOARDS: 1. Arduino Board 2. Arduino Software IDE.</td><td rowspan="3">36</td></tr>
<tr><td colspan="3">Text Books:
1. Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications, 2013.
2. Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited, 2013.
3. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013.
4. Embedded Systems-Lyla B.Das-Pearson Publications,2013.</td></tr>
<tr><td colspan="3">Internet of Things Experiments: (Any 5 experiments from the following)

1. Getting started with Raspberry Pi, Install Raspian on your SD card.
2. Python-based IDE (integrated development environments) for the Raspberry Pi andhow to trace and debug Python code on the device.
3. Using Raspberry pi a. Calculate the distance using distance sensor. b. Basic LED functionality.
4. Raspberry Pi interact with online services through the use of public APIs and SDKs.
5. Study and Install IDE of Arduino and different types of Arduino.</td></tr>
</table>

6. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi. 7. Calculate the distance using distance sensor Using Arduino. 8. Basic LED functionality Using Arduino. 9. Calculate temperature using temperature sensor Using Arduino. 10. Calculate the distance using distance sensor Using Node MCU. 11. Basic LED functionality Using Node MCU.	
Text Books: 1. Arsheep Bahga &Vijay Madisetti, Internet of Things - A Hands-on Approach, 1/e, Orient Blackswan Private Limited - New Delhi, 2015. 2. Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015. 3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,.	
Online Learning Sources: 1. https://onlinecourses.nptel.ac.in/noc21_cs17/preview 2. https://onlinecourses.nptel.ac.in/noc20_ee98/preview 3. https://archive.nptel.ac.in/courses/108/105/108105057/ 4. https://www.edx.org/learn/embedded-systems/the-university-of-texas-at-austinembedded-systems-shape-the-world microcontroller input output?index=product & objectID=course-785cf551-7f66-4350-b736-64a93427b4db & webview=false & campaign=Embedded+Systems+-+Shape+The+World%3A+Microcontroller+Input%2F Output & source=edX & product_category=course & placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fembedded-systems 5. https://www.edx.org/learn/iot-internet-of-things/universitat-politecnica-de-valenciaintroduction-to-the-internet-ofthings?index=product&queryID=e1322674dcb3d246be981d0669265399&position=4&linked_from=autocomplete&c=autocomplete 6. https://www.edx.org/learn/iot-internet-of-things/curtin-university-iot-sensors-anddevices?index=product&queryID=94ff5bcb80b8e4f427a0985bb2a5e07f&position=3&results_level=first-level-results&term=IOT&objectID=course-967eee29-87e8-4f2d-9257a1b38ec07e85&campaign=IoT+Sensors+and+Devices&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch 7. Virtual Labs - http://vlabs.iitkgp.ac.in/rtes/ 8. Virtual Labs - https://cse02-iiith.vlabs.ac.in/ 9. Virtual Labs - https://iotvirtuallab.github.io/vlab/Experiments/index.html	
Course Outcomes: **1.** Comprehend Microcontroller-Transducers Interface techniques. 2. Establish Serial Communication link with Arduino 3. Analyse basics of SPI interface. 4. Understand the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor. 5. Realize the revolution of internet in mobile devices, cloud and sensor networks	