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Course Structure and Syllabus SITE-23

Information 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

COMMUNICATIVE ENGLISH			
Subject Code	23CMEGT 1010/2010	IA Marks	30
Number of Lecture Hours/ Week	02	Exam Marks	70
Total Number of Lecture Hours	32	Exams Hours	03
Credits -02			
<p>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</p> <p>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.</p>			
Unit I			
<p>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.</p>		07 hours	
Unit II			
<p>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</p>		06 hours	
Unit III Lesson: BIOGRAPHY: Elon Musk			

<p>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</p> <p>Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.</p> <p>Writing: Summarizing, Note-making, paraphrasing</p> <p>Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations</p> <p>Vocabulary: Compound words, Collocations</p>	07 hours
Unit IV	
<p>Lesson: INSPIRATION: The Toys of Peace by Saki</p> <p>Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.</p> <p>Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.</p> <p>Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.</p> <p>Writing: Letter Writing: Official Letters, Resumes</p> <p>Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice</p> <p>Vocabulary: Words often confused, Jargons</p>	07 hours
Unit V	
<p>Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)</p> <p>Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.</p> <p>Speaking: Formal oral presentations on topics from academic contexts</p> <p>Reading: Reading comprehension.</p> <p>Writing: Writing structured essays on specific topics.</p> <p>Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)</p> <p>Vocabulary: Technical Jargons</p>	06 Hours
<p>Textbooks:</p> <ol style="list-style-type: none"> 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) 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 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:			
<ul style="list-style-type: none"> 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, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 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, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition.
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:			
<ul style="list-style-type: none"> To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by 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			
<p>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.</p> <p>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).</p> <p>Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol’s Prism -Half wave and Quarter wave plates.</p>			Hours – 12
Unit -2 Crystallography and X-ray diffraction			
<p>Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC.</p> <p>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.</p>			Hours – 8
Unit – 3 Dielectric and Magnetic Materials			
<p>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.</p> <p>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 for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.</p>			Hours –10

Unit – 4 Quantum Mechanics and Free electron Theory	
<p>Quantum Mechanics: Dual nature of matter – Heisenberg’s Uncertainty Principle – Significance and properties of wave function – Schrodinger’s time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.</p> <p>Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy</p>	Hours – 10
Unit – 5 Semiconductors	
<p>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 effect and its applications.</p>	Hours – 8
<p>COURSE OUTCOMES:</p> <p>On completion of the course student will able to</p> <p>CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.</p> <p>CO2: Familiarize with the basics of crystals and their structures.</p> <p>CO3: Summarize various magnetic and dielectric properties to design engineering materials.</p> <p>CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials.</p> <p>CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids.</p> <p>CO6: Identify the type of semiconductor using Hall effect.</p>	
<p>QUESTION PAPER PATTERN:</p> <p>i) There shall be 6 questions and all questions are compulsory.</p> <p>ii) Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.</p> <p>iii) There shall be 2 short answer questions from each unit.</p> <p>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.</p> <p>iv) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.</p>	
<p>TEXT BOOKS:</p> <p>1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S. Chand Publications, 11th Edition 2019.</p> <p>2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)</p>	
<p>REFERENCE BOOKS:</p> <p>1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.</p> <p>2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.</p> <p>3. Engineering Physics” - Sanjay D. Jain, D. Sahasrabudhe and Girish, University</p>	

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			
<ol style="list-style-type: none"> 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 O ₂ 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), applications Super conductors: Introduction - Types, properties and applications. Super capacitors: 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-3 Electrochemistry and Applications			
Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry - potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations). Electro chemical 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			

<p>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).</p>	Hours –10
Unit – 5 Instrumental Methods and Applications	
<p>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.</p>	Hours –10
<p>COURSE OUTCOMES: On completion of the course student will be able to</p> <ol style="list-style-type: none"> 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. 	
<p>QUESTION PAPER PATTERN: SECTION A:</p> <ol style="list-style-type: none"> 1. This section contains ten questions carrying 2 marks each. 2. Two questions from each unit should present. <p>SECTION B:</p> <ol style="list-style-type: none"> 6. This section will have 5 questions with internal choice. 7. Each full question carries 10 marks. <p>Each full question may have sub question covering all topics under a unit.</p>	
<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 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. 	
<p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 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:			
<ol style="list-style-type: none"> 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.			10
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.			7
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).			8
Course outcomes:			
On completion of the course, the student should be able to:			
<ol style="list-style-type: none"> 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 			

<p>measures related to Transportation.</p> <p>4. Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.</p> <p>5. Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.</p>	
<p>Text Books:</p> <p>1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.</p> <p>2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.</p> <p>3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.</p>	
<p>References:</p> <p>1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.</p> <p>2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016</p> <p>3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.</p> <p>4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.</p> <p>5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.</p>	
BASIC MECHANICAL ENGINEERING	
<p>Course Objectives:</p> <p>The students after completing the course are expected to</p> <ol style="list-style-type: none"> 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	
<p>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.</p> <p>Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics,\ Composites, Smart materials.</p>	10
Unit-II	
<p>Manufacturing Processes: Principles of Casting, Forming, and joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.</p> <p>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.</p>	8
Unit-III	

<p>Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants.</p> <p>Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.</p> <p>Introduction to Robotics - Joints & links, configurations, and applications of robotics.</p>	7
<p>Course outcomes:</p> <p>On completion of the course, the student should be able to</p> <ol style="list-style-type: none"> 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. 	
<p>Text Books:</p> <ol style="list-style-type: none"> 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. 	
<p>References:</p> <ol style="list-style-type: none"> 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 	

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:	
<ol style="list-style-type: none"> 1. Describe fundamental laws, operating principles of motors/generators, MC/MI instruments. (L2) 2. Demonstrate the working of electrical machines, measuring instruments and power generation stations. (L2) 3. Apply mathematical tools and fundamental concepts to derive various equations related to electrical circuits and machines. (L3) 4. Calculate electrical load and electricity bill of residential and commercial buildings. (L4) 	
Textbooks:	
<ol style="list-style-type: none"> 1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition. 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, Third Edition. 	
Reference Books:	
<ol style="list-style-type: none"> 1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw 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 University Press, 2017. 4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition. 	
PART B: BASIC ELECTRONICS ENGINEERING	
Course Objectives: To teach the fundamentals of semiconductor devices and its applications, principles of digital 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 INSTRUMENTATION 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	Hours

codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, 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).	– 8
Textbooks: <ol style="list-style-type: none"> 1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021. 2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009 	
Reference Books: <ol style="list-style-type: none"> 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			
<p>Course Objectives:</p> <ol style="list-style-type: none"> To introduce students to the fundamentals of computer programming. To provide hands-on experience with coding and debugging. To foster logical thinking and problem-solving skills using programming. To familiarize students with programming concepts such as data types, control structures, functions, and arrays. To encourage collaborative learning and teamwork in coding projects. <p>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.</p>			
Unit -1			Hours
<p>Introduction to Programming and Problem Solving</p> <p>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.</p> <p>Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.</p>			08
Unit -2			
<p>Control Structures Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.</p>			10
Unit – 3			
<p>Arrays and Strings</p> <p>Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.</p>			10
Unit – 4			
<p>Pointers & User Defined Data types</p> <p>Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.</p>			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
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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:			
<ul style="list-style-type: none"> • 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 -2 Linear 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.			10 Hr
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.			10 Hr
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.			10 Hr
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)			10 Hr
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. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and 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., 2015th Edition (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 Langmuir), 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	
<ol style="list-style-type: none"> 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. 	
TEXT BOOKS:	
<ol style="list-style-type: none"> 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. Peter Atkins, Juliode Paula and James Keeler, Atkins’ Physical Chemistry, 10/e, Oxford University Press, 2010. 	
ReferenceBooks:	
<ol style="list-style-type: none"> 3. H.F.W.Taylor, Cement Chemistry, 2/e, Thomas Telford Publications,1997. 4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth - Heineman, 1992. 5. 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:			
<ol style="list-style-type: none"> 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, Involute, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.			10
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.			10
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.			10
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.			10

Unit-5	
<p>Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.</p> <p>Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (<i>Not for end examination</i>).</p>	10
<p>Course outcomes:</p> <ol style="list-style-type: none"> 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. 	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016. 	
<p>References:</p> <ol style="list-style-type: none"> 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. 	

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:			
<ol style="list-style-type: none"> 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’s laws of dry friction, coefficient of friction, Cone of Static friction.			10
Unit-2 Equilibrium of Systems of Forces			
: Free Body Diagrams, Lami’s Theorem, 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			10
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.			10
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.			10
Unit-5 Rigid body Motion			
Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.			10
Course Outcomes:			
On Completion of the course, the student should be able to			
<ol style="list-style-type: none"> 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

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			
<p>Course Objectives:</p> <ul style="list-style-type: none"> • 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. <p>Course Outcomes: At the end of the course, Student will be able to</p> <p>CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.</p> <p>CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.</p> <p>CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.</p> <p>CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues, and apply them appropriately to solve data management challenges.</p> <p>CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.</p> <p>CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.</p>			
Unit -1			Hours
<p>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</p>			08
Unit -2			
<p>Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.</p>			10
Unit – 3			
<p>Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc</p>			10
Unit – 4			
<p>Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.</p>			10

Deque: 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 and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and 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, representation of 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 and bandwidth; 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:			
<ol style="list-style-type: none"> 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 			
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			10

parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also. 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	
<ol style="list-style-type: none"> 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:	
<ol style="list-style-type: none"> 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	
<ol style="list-style-type: none"> 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. 	

COMMUNICATIVE 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/UCNfm92h83W2i2ijc			

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			
<ol style="list-style-type: none"> 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 using diffraction 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's Method. 11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect. 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 Torsional pendulum. 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)			
<ol style="list-style-type: none"> 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			
<ol style="list-style-type: none"> 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			
<p>Course Objectives:</p> <ul style="list-style-type: none"> • 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 Operating Systems 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. <p>Course Outcomes:</p> <p>CO1: Perform Hardware troubleshooting.</p> <p>CO2: Understand Hardware components and inter dependencies.</p> <p>CO3: Safeguard computer systems from viruses/worms.</p> <p>CO4: Document/ Presentation preparation.</p> <p>CO5: Perform calculations using spreadsheets</p>			
<p>PC Hardware & Software Installation</p> <p>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.</p> <p>Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.</p> <p>Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.</p> <p>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 both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva</p> <p>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</p> <p>Internet & World Wide Web</p> <p>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. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet</p>			

connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy 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 how to 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 customize their 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 LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX 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 LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX 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 LaTeX and 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, slide slotter, 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 model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

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

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way 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 to see 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, Pearson Education, 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 Anfinson and Ken Quamme. – 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			
<p>Course Objectives: The course aims to give students hands – on experience and train them on the concepts of the C- programming language.</p> <p>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.</p>			
<p>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()</p> <p>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</p> <p>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</p>			

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 on 1D 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 of electrical machines and energy calculations.			
List of Experiments (Any six experiments must be conducted)			
<ol style="list-style-type: none"> 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 completion of this course, the student will be able to:			
<ol style="list-style-type: none"> 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)			
<ol style="list-style-type: none"> 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 gates using ICs. 8. Verification of truth tables of S-R-,J-K & D flip flops using respective ICs . 			
COURSE OUTCOMES: At the end of the course, the student will be able to			
<ol style="list-style-type: none"> 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			
<ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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:			
<ol style="list-style-type: none"> 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			
<p>List of Experiments (Any 10 experiments must be conducted)</p> <ol style="list-style-type: none"> 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 Na₂CO₃ 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. <p style="text-align: center;">Demonstration Experiments</p> <ol style="list-style-type: none"> 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			
<p>Course Objectives: The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.</p> <p>Course Outcomes: At the end of the course, Student will be able to</p> <p>CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.</p> <p>CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.</p> <p>CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.</p> <p>CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues and apply them appropriately to solve data management challenges.</p> <p>CO5: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.</p>			
<p>List of Experiments:</p> <p>Exercise 1: Array Manipulation</p> <ol style="list-style-type: none"> 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 <p>Exercise 2: Linked List Implementation</p> <ol style="list-style-type: none"> 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. <p>Exercise 3: Linked List Applications</p> <ol style="list-style-type: none"> 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. <p>Exercise 4: Double Linked List Implementation</p> <ol style="list-style-type: none"> i) Implement a doubly linked list and perform various operations to understand its properties and applications. ii) Implement a circular linked list and perform insertion, deletion, and traversal. <p>Exercise 5: Stack Operations</p> <ol style="list-style-type: none"> 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 Peter Sanders
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 David Ranum
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			
<ol style="list-style-type: none"> 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.			
<ol style="list-style-type: none"> 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			
<ol style="list-style-type: none"> 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. 			
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			
References:			
<ol style="list-style-type: none"> 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	23EEEEEL2090	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 usage of different circuits with different conditions.			
List of Experiments (Any ten experiments must be conducted)			
<ol style="list-style-type: none"> 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:			
<ol style="list-style-type: none"> 1. Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams. 2. Apply various theorems to compare practical results obtained with theoretical calculations. 3. Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil. 4. Analyse different circuit characteristics with the help of fundamental laws and various configurations. 5. Create locus diagrams of RL, RC series circuits and examine series and parallel resonance. 			

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)			
<ol style="list-style-type: none"> 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:			
<ol style="list-style-type: none"> 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:			
<ol style="list-style-type: none"> 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:			
<ol style="list-style-type: none"> 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 and physical 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.			Hours – 10
Activities:			
i) Organizing health awareness programmes in community			
ii) Preparation of health profile			
iii) Preparation of chart for balance diet for all age groups			
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.			Hours – 8
Activities:			
Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar			
Unit – 3			
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.			Hours – 10
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 and running.			

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 Surviving Anywhere 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.			Hours – 10
Activities: i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc. iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc. iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.			
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 Population Education.
- 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*, Directorate General 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 Environmental Engineering 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 viva voce on the subject.

Course Structure for
B. Tech (Information Technology) III Semester (II Year)

S. No.	Category	Code	Title	L	T	P	Credits
1	BS&H	23ITMAT3010	Discrete Mathematics & Graph Theory	3	0	0	3
2	BS&H	23CMMST3020	Universal human values – understanding harmony and Ethical human conduct	2	1	0	3
3	Engineering Science	23ITITT3030	Digital Logic & Computer Organization	3	0	0	3
4	Professional Core	23ITITT3040	Advanced Data Structures & Algorithm Analysis	3	0	0	3
5	Professional Core	23ITITT3050	Object Oriented Programming Through Java	3	0	0	3
6	Professional Core	23ITITL3060	Advanced Data Structures and Algorithm Analysis Lab	0	0	3	1.5
7	Professional Core	23ITITL3070	Object Oriented Programming Through Java Lab	0	0	3	1.5
8	Skill Enhancement Course	23ITITS3080	Python Programming	0	1	2	2
9	Audit Course	23CMCEN3090	Environmental Science	2	0	0	-
Total				16	2	8	20

IV Semester (II Year)

S. No.	Category	Code	Title	L	T	P	Credits
1	Management Course- I	23ITMST4010	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science/ Basic Science	23ITMAT4020	Probability & Statistics	3	0	0	3
3	Professional Core	23ITITT4030	Operating Systems	3	0	0	3
4	Professional Core	23ITITT4040	Database Management Systems	3	0	0	3
5	Professional Core	23ITITT4050	Software Engineering	2	1	0	3
6	Professional Core	23ITITL4060	Operating Systems Lab	0	0	3	1.5
7	Professional Core	23ITITL4070	Database Management Systems Lab	0	0	3	1.5
8	Skill Enhancement Course	23ITITS4080	Python with Django	0	1	2	2
9	BS&H	23ITITT4090	Design Thinking & Innovation	1	0	2	2
Total				14	2	10	21
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							

DISCRETE MATHEMATICS AND GRAPH THEORY SEMESTER III			
Subject Code	23ITMAT3010	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:			
1. To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.			
2. To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.			
Unit -1			Hours
Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.			10
Unit -2			
Set Theory: Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties			8
Unit -3			
Combinatorics and Recurrence Relations: Basis of Counting, Permutations, Permutations with repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems. Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations			10
Unit-4			
Graph Theory: Basic Concepts, Graph Theory and its Applications, Subgraphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs,			10
Unit – 5			
Multi Graphs: Multigraphs, Bipartite and Planar Graphs, Euler’s Theorem, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Prim’s and Kruskal’s Algorithms,			10

BFS and DFS Spanning Trees.	
Total	48
<p>Course Outcomes: At the end of the course students will be able to</p> <ol style="list-style-type: none"> 1. Build skills in solving mathematical problems (L3) 2. Comprehend mathematical principles and logic (L4) 3. Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software (L6) 4. Manipulate and analyze data numerically and/or graphically using appropriate Software (L3) 5. How to communicate effectively mathematical ideas/results verbally or in writing (L1) 	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill. 2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill. 3. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill. 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel and T. P. Baker, 2nd Edition, Prentice Hall of India. 2. Discrete Mathematical Structures, Bernard Kolman, Robert C. Busby and Sharon Cutler Ross, PHI. 3. Discrete Mathematics, S. K. Chakraborty and B.K. Sarkar, Oxford, 2011. 4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill 	

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT (Common to All) SEMESTER III			
Subject Code	23ITMST3020	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			
<ol style="list-style-type: none"> 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. 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. 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 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			10

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 <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 3. The Story of Stuff (Book). 4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi 5. Small is Beautiful - E. F Schumacher. 6. Slow is Beautiful - Cecile Andrews 7. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj – Pandit Sunderlal 9. Rediscovering India - by Dharampal 10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi 11. India Wins Freedom - Maulana Abdul Kalam Azad 12. Vivekananda - Romain Rolland (English) 	

13. Gandhi - Romain Rolland (English)**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.

DIGITAL LOGIC & COMPUTER ORGANIZATION			
SEMESTER III			
Subject Code	23ITITT3030	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:			
The main objectives of the course is to			
1.provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals			
2.Describe memory hierarchy concepts			
3.Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices.			
Unit -1			Hours
Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes			10
Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.			
Unit -2			
Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters			10
Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture.			
Unit -3			
Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations			10
Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control.			
Unit – 4			
The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.			10
Unit – 5			
Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.			8
Total			48
Text Books:			
1.Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6 th edition, McGraw Hill			
2.Digital Design, 6 th Edition, M. Morris Mano, Pearson Education.			
3.Computer Organization and Architecture, William Stallings, 11 th Edition, Pearson.			

Reference Books:

- 1.Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
- 2.Computer Organization and Design, David A. Paterson, John L.Hennessy,Elsevier
- 3.Fundamentals of Logic Design, Roth, 5thEdition, Thomson

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS			
SEMESTER III			
Subject Code	23ITITT3040	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:			
The main objectives of the course is to			
1. provide knowledge on advance data structures frequently used in Computer Sciencedomain			
2. Develop skills in algorithm design techniques popularly used			
3. Understand the use of various data structures in the algorithm design			
Unit -1			Hours
Introduction to Algorithm Analysis, Space and Time Complexity analysis, AsymptoticNotations. AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, Deletion operations and Applications			10
Unit -2			
Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications			10
Unit -3			
Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen’s matrixmultiplication. Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths			10
Unit – 4			
Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem			8
Unit – 5			
Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem. NP-Hard and NP-Complete Problems: Basic concepts, non-deterministic algorithms, NP-Hard and NP-Complete classes, Cook’s theorem			10
Total			48
Textbooks:			
1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2 nd Edition Universities Press			
2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2 nd Edition University Press			
Reference Books:			
1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia			
2. An introduction to Data Structures with Applications, Trembley & Sorenson, McGrawHill			
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.			

4.Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 1995
Algorithms + Data Structures & Programs, N.Wirth, PHI
5.Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.
Data structures in Java: Thomas Standish, Pearson Education Asia

Online Learning Resources:

https://www.tutorialspoint.com/advanced_data_structures/index.asp

<http://peterindia.net/Algorithms.html>

Abdul Bari, [Introduction to Algorithms \(youtube.com\)](#)

OBJECT ORIENTED PROGRAMMING THROUGH JAVA			
SEMESTER III			
Subject Code	23ITITT3050	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:			
The learning objectives of this course are to:			
1. identify Java language components and how they work together in applications			
2. Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.			
3. learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications			
4. understand how to design applications with threads in Java			
5. understand how to use Java APIs for program development			
Unit -1			Hours
Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style. Data Types, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators , Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators. Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator ?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement			10
Unit -2			
Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this. Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static			10
Unit -3			
Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three- dimensional Arrays, Arrays as Vectors. Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control			10

and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations .	
Unit – 4	
Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three- dimensional Arrays, Arrays as Vectors. Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.	10
Unit – 5	
String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer. Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread- Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads. Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3).	8
Total	48
Text Books: 1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford. 2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023. 3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4 th Edition, Pearson.	
References Books: 1. The complete Reference Java, 11 th edition, Herbert Schildt, TMH 2. Introduction to Java programming, 7 th Edition, Y Daniel Liang, Pearson	
Online Resources: 1) https://nptel.ac.in/courses/106/105/106105191/ 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview .	

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB			
SEMESTER III			
Subject Code	23ITITL3060	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03
Credits – 1.5			
Experiments covering the Topics			Hours
1. Operations on AVL trees, B-Trees, Heap Trees 2. Graph Traversals 3. Sorting techniques 4. Minimum cost spanning trees 5. Shortest path algorithms 6. 0/1 Knapsack Problem 7. Travelling Salesperson problem 8. Optimal Binary Search Trees 9. N-Queens Problem 10. Job Sequencing			36
Sample Programs: 1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order. 2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations. 3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap. 4. Implement BFT and DFT for given graph, when graph is represented by a) Adjacency Matrix b) Adjacency Lists 5. Write a program for finding the biconnected components in a given graph. 6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases). 7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists. 8. Implement Job Sequencing with deadlines using Greedy strategy. 9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming. 10. Implement N-Queens Problem Using Backtracking. 11. Use Backtracking strategy to solve 0/1 Knapsack problem. 12. Implement Travelling Sales Person problem using Branch and Bound approach.			

Reference Books: 1.Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh,2 nd Edition, Universities Press 2.Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran,2 nd Edition, University Press 3.Data Structures and program design in C, Robert Kruse, Pearson Education Asia 4.An introduction to Data Structures with applications, Trembley& Sorenson, McGrawHill	
Online Learning Resources: 1. http://cse01-iiith.vlabs.ac.in/ 2. http://peterindia.net/Algorithms.html	

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB			
SEMESTER III			
Subject Code	23ITITL3070	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03
Credits – 1.5			
Course Objectives: The aim of this course is to 1.Practice object oriented programming in the Java programming language 2.Implement Classes, Objects, Methods, Inheritance, Exception, RuntimePolymorphism, User defined Exception handling mechanism 3.Illustrate inheritance, Exception handling mechanism, JDBC connectivity 4.Construct Threads, Event Handling, implement packages, Java FX GUI			Hours
Experiments covering the Topics: 1.Object Oriented Programming fundamentals- data types, control structures 2.Classes, methods, objects, Inheritance, polymorphism, 3.Exception handling, Threads, Packages, Interfaces 4.Files, I/O streams, Java FX GUI Sample Experiments: Exercise – 1: a)Write a JAVA program to display default value of all primitive data type of JAVA b)Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. c)Calculate thediscriminate D and basing on value of D, describe the nature of root. Exercise - 2 a)Write a JAVA program to search for an element in a given list of elements using binarysearch mechanism. b)Write a JAVA program to sort for an element in a given list of elements using bubble sort c)Write a JAVA program using String Buffer to delete, remove character. Exercise - 3 a)Write a JAVA program to implement class mechanism. Create a class, methods and invokethem inside main method. b)Write a JAVA program to implement method overloading. c)Write a JAVA program to implement constructor. d)Write a JAVA program to implement constructor overloading. Exercise - 4 a)Write a JAVA program to implement Single Inheritance b)Write a JAVA program to implement multi-level Inheritance c)Write a JAVA program for abstract class to find areas of different shapes Exercise - 5 a)Write a JAVA program give example for “super” keyword. b)Write a JAVA program to implement Interface. What kind of Inheritance can be achieved? c)Write a JAVA program that implements Runtime polymorphism			36

Exercise - 6

- a) Write a JAVA program that describes exception handling mechanism
- b) Write a JAVA program illustrating Multiple catch clauses
- c) Write a JAVA program for creation of Java Built-in Exceptions
- d) Write a JAVA program for creation of User Defined Exception

Exercise - 7

- a) Write a JAVA program that creates threads by extending Thread class. First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds, (Repeat the same by implementing Runnable)
- b) Write a program illustrating is Alive and join ()
- c) Write a Program illustrating Daemon Threads.
- d) Write a JAVA program Producer Consumer Problem

Exercise – 8

- a) Write a JAVA program that import and use the user defined packages
- b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
- c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

PYTHON PROGRAMMING (SKILL ENHANCEMENT COURSE)			
SEMESTER III			
Subject Code	23ITITS3080	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			
Course Objectives: The main objectives of the course are to 1. Introduce core programming concepts of Python programming language. 2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries 3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these			Hours
UNIT-I: History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook. Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language. Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement. Sample Experiments: 1. Write a program to find the largest element among three Numbers. 2. Write a Program to display all prime numbers within an interval 3. Write a program to swap two numbers without using a temporary variable. 4. Demonstrate the following Operators in Python with suitable examples. Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators 5. Write a program to add and multiply complex numbers 6. Write a program to print multiplication table of a given number.			36
UNIT-II: Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement. Sample Experiments: 1. Write a program to define a function with multiple return values. 2. Write a program to define a function using default arguments.			

<p>3. Write a program to find the length of the string without using any library functions.</p> <p>4. Write a program to check if the substring is present in a given string or not.</p> <p>5. Write a program to perform the given operations on a list: Addition ii. Insertion iii. slicing</p> <p>7. Write a program to perform any 5 built-in functions by taking any list.</p>	
<p>UNIT-III: Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement. Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozen set.</p> <p>Sample Experiments:</p> <ol style="list-style-type: none"> 1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples. 2. Write a program to count the number of vowels in a string (No control flow allowed). 3. Write a program to check if a given key exists in a dictionary or not. 4. Write a program to add a new key-value pair to an existing dictionary. 5. Write a program to sum all the items in a given dictionary. 	
<p>UNIT-IV: Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules. Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism Sample Experiments:</p> <ol style="list-style-type: none"> 1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered. 2. Python program to print each line of a file in reverse order. 3. Python program to compute the number of characters, words and lines in a file. 4. Write a program to create, display, append, insert and reverse the order of the items in the array. 5. Write a program to add, transpose and multiply two matrices. 6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square. 	
<p>UNIT-V: Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas. Sample Experiments:</p>	

<ol style="list-style-type: none"> 1. Python program to check whether a JSON string contains complex object or not. 2. Python Program to demonstrate NumPy arrays creation using array () function. 3. Python program to demonstrate use of ndim, shape, size, dtype. 4. Python program to demonstrate basic slicing, integer and Boolean indexing. 5. Python program to find min, max, sum, cumulative sum of array 6. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows: <ol style="list-style-type: none"> a)Apply head () function to the pandas data frame b)Perform various data selection operations on Data Frame 7.Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press. 2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson,2024 3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson. 	
<p>Online Learning Resources/Virtual Labs:</p> <ol style="list-style-type: none"> 1.https://www.coursera.org/learn/python-for-applied-data-science-ai 2.https://www.coursera.org/learn/python?specialization=python#syllabus 	

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	
<p>Course Objectives: This course will enable students to</p> <ol style="list-style-type: none"> 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
<p>Multidisciplinary Nature of Environmental Studies:– Definition, Scope and Importance– Need for Public Awareness.</p> <p>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</p>			6
Unit -2			
<p>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:</p> <ol style="list-style-type: none"> a. Forest ecosystem. b. Grass land ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) <p>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</p>			8

nation–Hot-sports of biodiversity–Threats to biodiversity: habitat loss, poaching of wild life, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	
Unit -3	
<p>Environmental Pollution: Definition, Cause, effects and control measures of:</p> <ol style="list-style-type: none"> Air Pollution. Water pollution Soil pollution Noise pollution Thermal pollution Nuclear hazards <p>Solid Waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution – Pollution case studies</p>	6
Unit – 4	
<p>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.</p>	6
Unit – 5	
<p>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.</p> <p>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.</p>	6
Total	32
<p>Course outcomes: Upon successful completion of the course student will be able to</p> <ol style="list-style-type: none"> Grasp multi-disciplinary nature of environmental studies and various renewable and non-renewable resources. Understand flow and bio-geo- chemical cycles and ecological pyramids. Understand various causes of pollution and solid waste management and related preventive measures. Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation. Illustrate the causes of population explosion, value education and welfare programmes. 	

6. Illustrate the causes of population explosion, value education and welfare programmes.

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	23ITMST4010	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			
<ul style="list-style-type: none"> • 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 –			8

Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)	
Total	32
<p>Course outcomes: On completion of the course students will be able to</p> <ol style="list-style-type: none"> 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) 	
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Varshney & Maheswari: Managerial Economics, Sultan Chand. 2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH. 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Ahuja HI 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. 	

PROBABILITY AND STATISTICS			
SEMESTER IV			
Subject Code	23ITMAT4020	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:			
1.To familiarize the students with the foundations of probability and statistical methods			
2.To impart probability concepts and statistical methods in various applicationsEngineering			
Unit -1			Hours
Descriptive statistics and methods for data science:			
Data science – Statistics Introduction – Population vs Sample –Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability – Skewness – Kurtosis.			10
Unit -2			
Correlation and Regression:			
Correlation – Correlation coefficient – Rank correlation. Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and properties – Curvilinear Regression: Parabola – Exponential – Power curves.			10
Unit -3			
Probability and Distributions:			
Probability– Conditional probability and Baye’s theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.			10
Unit – 4			
Sampling Theory:			
Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) – Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof) – Estimation using t, and F-distributions. χ^2			8
Unit – 5			
Tests of Hypothesis:			
Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Test of significance for large samples and Small Samples: Single and difference means – Single and two proportions – Student’s t- test, F-test, χ^2 -test.			10
Total			48

Course outcomes:

Upon successful completion of this course, the student should be able to

1. Classify the concepts of data science and its importance (L2)
2. Interpret the association of characteristics and through correlation and regression tools (L4)
3. Apply discrete and continuous probability distributions (L3)
4. Design the components of a classical hypothesis test (L6)
5. Infer the statistical inferential methods based on small and large sampling tests (L4)

Text Books:

1. **Miller and Freund's**, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. **S. C. Gupta and V.K. Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. **Shron L. Myers, Keying Ye, Ronald E Walpole**, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
2. **Jay I. Devore**, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V. Hogg**, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

OPERATING SYSTEMS SEMESTER IV			
Subject Code	23ITITT4030	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	
<p>Course Objectives: The main objective of the course is to make student</p> <ol style="list-style-type: none"> 1. Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection 2. Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. 3. Illustrate different conditions for deadlock and their possible solutions. 			
Unit -1			Hours
<p>Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems</p> <p>System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging</p>			10
Unit -2			
<p>Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.</p> <p>Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.</p> <p>CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiprocessor scheduling.</p>			10
Unit -3			
<p>Synchronization Tools: The Critical Section Problem, Peterson’s Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.</p> <p>Deadlocks: System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.</p>			10
Unit – 4			
<p>Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.</p> <p>Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Paged replacement, Allocation of frames, Thrashing</p> <p>Storage Management: Overview of Mass Storage Structure, HDD Scheduling.</p>			8
Unit – 5			
<p>File system: File System Interface: File concept, Access methods, Directory Structure; Filesystem Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.</p> <p>Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.</p>			10

Total	48
Text Books: 1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10 th Edition, Wiley, 2018. 2. Modern Operating Systems, Tanenbaum A S, 4 th Edition, Pearson, 2016	
Reference Books: 1. Operating Systems -Internals and Design Principles, Stallings W, 9 th edition, Pearson, 2018 2. Operating Systems: A Concept Based Approach, D.M Dhamdhare, 3 rd Edition, McGraw-Hill, 2013.	
Online Learning Resources: 1. https://nptel.ac.in/courses/106/106/106106144/ 2. http://peterindia.net/OperatingSystems.html	

DATABASE MANAGEMENT SYSTEMS			
SEMESTER IV			
Subject Code	23ITITT4040	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:			
The main objectives of the course is to			
1.Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra			
2.Introduce the concepts of basic SQL as a universal Database language			
3.Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization			
4.Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques			
Unit -1			Hours
Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schemaarchitecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database. Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.			10
Unit -2			
Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).			8
Unit -3			
SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatableand non-updatable), relational set operations			10
Unit – 4			
Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form (BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).			10
Unit – 5			
Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock-based, timestamp-based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.			10

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing:	
Total	48
Text Books: 1.Database Management Systems, 3 rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4) 2.Database System Concepts, 5 th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)	
Reference Books: 1.Introduction to Database Systems, 8 th edition, C J Date, Pearson. 2.Database Management System, 6 th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson 3.Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.	
Web-Resources: 1) https://nptel.ac.in/courses/106/105/106105175/ 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview	

SOFTWARE ENGINEERING			
SEMESTER IV			
Subject Code	23ITITT4050	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	
<p>Course Objectives: The objectives of this course are to introduce</p> <ul style="list-style-type: none"> •Software life cycle models, Software requirements and SRS document. •Project Planning, quality control and ensuring good quality software. •Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures 			
Unit -1			
<p>Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering. Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.</p>			10
Unit -2			
<p>Requirements Analysis and Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL. Software Design: Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. approaches to software design. Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)</p>			10
Unit -3			
<p>Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review. User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology</p>			8
Unit – 4			

<p>Coding And Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.</p> <p>Software Reliability And Quality Management: Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000.SEI Capability maturity model. Few other important quality standards, and Six Sigma.</p>	10
Unit – 5	
<p>Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.</p> <p>Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.</p> <p>Software Reuse: reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.</p> <p>Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.</p>	10
Total	48
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI. 2. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition. 	
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Software Engineering, Ian Sommerville, 10th Edition, Pearson. 2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press. 	
<p>e-Resources:</p> <ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/106/105/106105182/ 2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview 3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview 	

OPERATING SYSTEMS LAB			
SEMESTER IV			
Subject Code	23ITITL4060	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03
Credits – 1.5			
Course Objectives:			
The main objectives of the course are to			
<ul style="list-style-type: none"> •Provide insights into system calls, file systems, semaphores, •Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation •Implement Bankers Algorithms to Avoid the Dead Lock 			
Experiments covering the Topics:			
<ul style="list-style-type: none"> •UNIX fundamentals, commands & system calls •CPU Scheduling algorithms, thread processing •IPC, semaphores, monitors, deadlocks •Page replacement algorithms, file allocation strategies 			
Memory allocation strategies			
Sample Experiments:			Hours
<ol style="list-style-type: none"> 1.Practicing of Basic UNIX Commands. 2. Write programs using the following UNIX operating system calls fork, exec, getpid, exit, wait, close, stat, opendir and readdir 3. Simulate UNIX commands like cp, ls, grep, etc., 4. Simulate the following CPU scheduling algorithms a)FCFS b) SJF c) Priority d) Round Robin 5. Control the number of ports opened by the operating system with a)Semaphore b) Monitors. 6. Write a program to illustrate concurrent execution of threads using pthreads library. 7. Write a program to solve producer-consumer problem using Semaphores. 8. Implement the following memory allocation methods for fixed partition a)First fit b) Worst fit c) Best fit 9. Simulate the following page replacement algorithms a)FIFO b) LRU c) LFU 10. Simulate Paging Technique of memory management. 11. Implement Banker's Algorithm for Dead Lock avoidance and prevention 12. Simulate the following file allocation strategies a)Sequential b) Indexed c) Linked 13. Download and install nachos operating system and experiment with it. 			36
Reference Books:			
<ol style="list-style-type: none"> 1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018. 2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016 Operating Systems - Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018 3. Operating Systems: A Concept Based Approach, D.M Dhamdhare, 3rd Edition, McGraw- Hill, 2013. 			

Online Learning Resources:

1. <https://www.cse.iitb.ac.in/~mythili/os/>
2. <http://peterindia.net/OperatingSystems.html>
www.cs.washington.edu/~tom/nachos

DATABASE MANAGEMENT SYSTEMS LAB			
SEMESTER IV			
Subject Code	23ITITL4070	Internal Marks	30
Number of Practical Hours/Week	03	External Marks	70
Total Number of Hours	36	Exam Hours	03
Credits – 1.5			
Course Objectives:			
This Course will enable students to			
<ul style="list-style-type: none"> •Populate and query a database using SQL DDL/DML Commands •Declare and enforce integrity constraints on a database •Writing Queries using advanced concepts of SQL •Programming PL/SQL including procedures, functions, cursors and triggers 			
Experiments covering the topics:			
<ul style="list-style-type: none"> •DDL, DML, DCL commands •Queries, nested queries, built-in functions, •PL/SQL programming- control structures •Procedures, Functions, Cursors, Triggers, •Database connectivity- ODBC/JDBC 			
Sample experiments:			Hours
<ol style="list-style-type: none"> 1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command. 2. Queries (along with sub-queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class. 3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views. 4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date) 5. i) Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found) ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block. 6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions. 7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR 8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES. 9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions. 10. Develop programs using features parameters in a CURSOR, FOR UPDATE 			36

<p>CURSOR, WHERE CURRENT of clause and CURSOR variables.</p> <p>11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers</p> <p>12. Create a table and perform the search operation on table using indexing and non-indexing techniques.</p> <p>13. Write a Java program that connects to a database using JDBC</p> <p>14. Write a Java program to connect to a database using JDBC and insert values into it</p> <p>15. Write a Java program to connect to a database using JDBC and delete values from it</p>	
<p>Text Books/Suggested Reading:</p> <p>1. Oracle: The Complete Reference by Oracle Press</p> <p>2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007</p> <p>3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007</p>	

PYTHON WITH DJANGO (SKILL ENHANCEMENT COURSE)			
SEMESTER IV			
Subject Code	23ITITS4080	Internal Marks	30
Number of Tutorial Hours/Week	01	External Marks	70
Number of Practical Hours/Week	02		
Total Number of Hours	48	Exam Hours	03
Pre-requisite		Credits – 02	
<p>Course Objectives: The main objectives of the course are to</p> <ul style="list-style-type: none"> • Design and build static as well as dynamic web pages and interactive web-based applications • Web development using Django framework. • Analyse and create functional website in Django and deploy Django Web Application on Cloud 			
UNIT-I: Python libraries for web development:			
<p>Collections-Container datatypes, Tkinter-GUI applications, Requests-HTTP requests, BeautifulSoup4-web scraping, Scrapy, Zappa, Dash, CherryPy, Turbo Gears, Flask, Web2Py, Bottle, Falcon, Cubic Web, Quixote, Pyramid.</p> <p>Sample Experiments:</p> <ol style="list-style-type: none"> 1. Write a Python GUI program to import Tkinter package and create a window. Set its title and add a label to the window. 2. Write a Python program that designs a simple login form with labels and Entry widgets, arranging them in a grid using the Grid geometry manager. 3. Write a program using BeautifulSoup4 library for web scraping for a given URL 4. Develop a sample Hello World page using Flask framework 5. Develop a sample web page using CherryPy / Web2Py / Bottle Framework 			10
UNIT-II: Introduction to Django Framework			
<p>Understanding Django environment, Features of Django and Django architecture, MVC and MTV, Urls and Views, Mapping the views to URLs, Django Template, Template inheritance Django Models, Creating model for site, Converting the model into a table, Fields in Models, Integrating Bootstrap into Django, Creating tables, Creating grids, Creating carousels.</p> <p>Sample Experiments:</p> <ol style="list-style-type: none"> 1. Create a Sample “Hello World” Application using Django 2. Create a Login and Registration Page using MVC architecture in Django Framework 3. Create a sample page in Django by integrating Bootstrap. 4. Create an application with Tables, grids in Django 5. Create a Django App with Carousels feature. 			10
UNIT-III : Integrating Accounts & Authentication on Django			
<p>Introduction to Django Authentication System, Security Problem &Solution with Django Creating Registration Form using Django, Adding Email Field in Forms, Configuring email settings, Sending emails with Django, Adding Grid Layout On Registration Page, Adding Page Restrictions, Login Functionality Test and Logout.</p> <p>Sample Experiments:</p> <ol style="list-style-type: none"> 1. Create a registration page using Authentication System 			10

2. Create an application in Django to send emails using email settings and Grid Layout 3. Create an application in Django using page restriction / authentication with Login and Logout Functionality 4. Create a sample form using Django Forms	
UNIT-IV: Connecting SQLite with Django	
Database Migrations, Fetch Data from Database, Displaying Data On Templates, Adding Condition On Data, Sending data from URL to view, Sending data from view to template, Saving objects into database, Sorting objects, Filtering objects, Deleting objects, Difference between session and cookie, Creating sessions and cookies in Django. Sample Experiments: 1. Create an app in Django which fetches data from database and show as list and also save objects in database 2. Create an app in Django for performing CRUD operations on records in a database 3. Create an app in Django which uses session management and cookies to store and manage user sessions.	10
UNIT-V: Deploying Django Web Application on Cloud	
Creating a functional website in Django, Four Important Pillars to Deploy, registering on Heroku and GitHub, Push project from Local System to GitHub, working with Django Heroku, Working with StaticRoot, Handling WSGI with gunicorn, setting up Database & adding users. Sample Experiments: 1. Create a website in Django with login, and registration page. 2. Register on GitHub, and Heroku and deploy the website on Heroku with all the functionalities developed. 3. Configure Django to handle static files.	8
Total	48
Text books: 1. Martin C.Brown, “Python: The Complete Reference Paper back”, 4th Edition 2018, McGraw Hill Education. 2. Reema Thareja, “Python Programming: Using Problem Solving Approach”, 3rd Edition 2017, Oxford. 3. Daniel Rubio, Apress, ”Beginning Django Web Application Development and Deployment with Python”, 2nd Edition 2017,Apress.	
Reference Books: 1. Tom Aratyn, “Building Django 2.0 Web Applications: Create enterprise-grade, scalable Python web applications easily with Django 2.0”,2ndEdition 2018, Packt Publishing. 2. Harry Percival, “Test-Driven Development with Python: Obey the Testing Goat: Using Django, Selenium and JavaScript”,2nd Edition 2019, Kindle Edition.	

DESIGN THINKING & INNOVATION			
SEMESTER IV			
Subject Code	23ITITT4090	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	
<p>Course Objectives: This course will enable students to</p> <ol style="list-style-type: none"> 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			
<p>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.</p>			10
Unit -2			
<p>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</p> <p>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.</p>			8
Unit -3			
<p>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.</p> <p>Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.</p>			10
Unit – 4			
<p>Product Design: Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.</p> <p>Activity: Importance of modeling, how to set specifications, Explaining their own product design.</p>			10
Unit – 5			
<p>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</p>			10

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.	
Total	48
Course outcomes: On completion of the course students will be able to	
<ol style="list-style-type: none"> 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:	
<ol style="list-style-type: none"> 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:	
<ol style="list-style-type: none"> 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:	
<ul style="list-style-type: none"> • 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 	