SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CSE with Specialization in Cloud Computing

CSE WITH SPECIALIZATION IN CLOUD COMPUTING

R23 Regulation

B. TECH.
COURSE STRUCTURE
AND
SYLLABUS
I, II, III YEARS

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INSTITUTE VISION

To emerge as one of the premier institutions through excellence in education and research, producing globally competent and ethically strong professionals and entrepreneurs.

INSTITUTE MISSION

M1: Imparting high-quality technical and management education through the state-of-the- art resources.

M2: Creating an eco-system to conduct independent and collaborative research for the betterment of the society

M3: Promoting entrepreneurial skills and inculcating ethics for the socio-economic development of the nation.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT VISION

To impart quality education and research in Computer Science and Engineering for producing technically competent and ethically strong IT professionals with contemporary knowledge

DEPARTMENT MISSION

M1: Achieving academic excellence in computer science through effective pedagogy, modern curriculum and state-of-art computing facilities.

M2: Encouraging innovative research in Computer Science and Engineering by collaborating with Industry and Premier Institutions to serve the nation.

M3: Empowering the students by inculcating professional behavior, strong ethical values and leadership abilities

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To provide software solutions for arising problems in diverse areas with strong knowledge in innovative technologies of computer science.

PEO2: To serve as globally competent computer professionals and entrepreneurs or in pursuit of higher education and research, developing innovative solutions in multidisciplinary domains.

PEO3: To attain the professional etiquette, soft skills, leadership, teamwork, ethical values in computer science with a commitment for lifelong learning to serve for the society and environment.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Analysis & Design:

Ability to design, develop and deploy customized applications in all applicable domains using various algorithms and programming languages.

PSO2: Computational Logic:

Ability to visualize and configure computational need in terms of hardware and software to provide solutions for various complex applications.

PSO3: Software Development:

Ability to apply standard procedures, tools and strategies for software development.

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CSE WITH SPECIALIZATION IN CLOUD COMPUTING

INDUCTION PROGRAMME

S.No.	Subject	L	T	P	C
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	0	0	6	0
2	Career Counseling	2	0	2	0
3	Orientation to all branches -- career options, tools, etc.	3	0	0	0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	2	0	3	0
5	Proficiency Modules & Productivity Tools	2	1	2	0
6	Assessment on basic aptitude and mathematical skills	2	0	3	0
7	Remedial Training in Foundation Courses	2	1	2	0
8	Human Values & Professional Ethics	3	0	0	0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	2	1	2	0
10	Concepts of Programming	2	0	2	0

I B. Tech. – I Semester (CCC)

S.No.	Course Code	Subject	L	T	P	C
1	23HS0810	Communicative English	2	0	0	2
2	23HS0801	Chemistry	3	0	0	3
3	23HS0830	Linear Algebra & Calculus	3	0	0	3
4	23CE0101	Basic Civil & Mechanical Engineering	3	0	0	3
5	23CS0501	Introduction to Programming	3	0	0	3
6	23HS0811	Communicative English Lab	0	0	2	1
7	23HS0802	Chemistry Lab	0	0	2	1
8	23ME0301	Engineering Workshop	0	0	3	1.5
9	23CS0502	Computer Programming Lab	0	0	3	1.5
10	23HS0813	Health and wellness, Yoga and Sports	-	-	1	0.5
Contact Periods / Week			**14**	**-**	**11**	**19.5**
			Total/Week 25			

I B. Tech. – II Semester (CCC)

S.No.	Course Code	Subject	L	T	P	C
1	23HS0840	Engineering Physics	3	0	0	3
2	23HS0831	Differential Equations & Vector Calculus	3	0	0	3
3	23EE0201	Basic Electrical and Electronics Engineering	3	0	0	3
4	23ME0302	Engineering Graphics	1	0	4	3
5	23CS0503	IT Workshop	0	0	2	1
6	23CS0504	Data Structures	3	0	0	3
7	23HS0841	Engineering Physics Lab	0	0	2	1
8	23EE0202	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	23CS0505	Data Structures Lab	0	0	3	1.5
10	23HS0812	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Contact Periods / Week			**13**	**-**	**15**	**20.5**
			Total/Week 28			

II B. Tech. – I Semester (CCC)

S.No.	Course Code	Subject	L	T	P	C
1	23HS0836	Discrete Mathematics & Graph Theory	3	0	0	3
2	23HS0814	Universal Human Values– Understanding Harmony& Human Ethical Conduct	2	1	0	3
3	23CS0506	Digital Logic &Computer Organization	3	0	0	3
4	23CS0507	Advanced Data Structures & Algorithm Analysis	3	0	0	3
5	23CS0508	Object Oriented Programming Through Java	3	0	0	3
6	23CS0509	Advanced Data Structures and Algorithm Analysis Lab	0	0	3	1.5
7	23CS0510	Object Oriented Programming Through Java Lab	0	0	3	1.5
Skill Enhancement Course						
8	23CS0549	Python Programming	0	1	2	2
Non-Credit Course						
9	23HS0805	Environmental Science	2	0	0	0
Contact Periods / Week			16	2	8	20
			Total/Week 28			

II B. Tech. – II Semester (CCC)

S.No.	Course Code	Subject	L	T	P	C
1	23HS0848	Managerial Economics and Financial Analysis	2	0	0	2
2	23HS0838	Probability & Statistics	3	0	0	3
3	23CS0511	Operating Systems	3	0	0	3
4	23CS0512	Database Management Systems	3	0	0	3
5	23CS1201	Introduction to Cloud Computing	2	1	0	3
6	23CS1202	Cloud Computing Lab	0	0	3	1.5
7	23CS0515	Database Management Systems Lab	0	0	3	1.5
8	23CS0550	**Skill Enhancement Course:** Full Stack Development –I	0	0	2	2
9	23HS0815	Design Thinking &Innovation	1	0	2	2
Contact Periods / Week			14	1	10	21
			Total/Week 28			

III B. Tech. – I Semester (CCC)

S.No.	Course Code	Subject	L	T	P	C
1	23CS1203	Virtualization Techniques	3	0	0	3
2	23CS0517	Computer Networks & Internet Protocols	3	0	0	3
3	23CS0513	Software Engineering	3	0	0	3
4	23CS0519	Introduction to Quantum Technologies and Applications	3	0	0	3
Professional Elective course (PEC) –I						
5	23CS0532	Object Oriented Analysis and Design	3	0	0	3
	23CS1215	User Interface Technologies				
	23EC0414	Microprocessors and Microcontrollers				
	23CS0534	Data Warehousing & Data Mining				
Open Elective (OE) –I						
6	23CE0150	Green Buildings	3	0	0	3
	23CE0151	Construction Technology and Management				
	23EE0261	Electrical Safety Practices and Standards				
	23ME0356	Sustainable Energy Technologies				
	23EC0406	Electronic Circuits				
	23HS0855	Mathematics for Machine Learning and AI				
	23HS0842	Materials Characterization Techniques				
	23HS0806	Chemistry of Energy Systems				
	23HS0821	English for Competitive Examinations				
	23HS0822	Entrepreneurship and New Venture Creation				
7	23CS1204	Virtualization Techniques Lab	0	0	3	1.5
8	23CS0521	Computer Networks & Internet Protocols Lab	0	0	3	1.5
9	23CS0551	**Skill Enhancement Course**: Full Stack Development- II	0	1	2	2
10	23EC0417	Tinkering Lab	0	0	2	1
11	23CS1205	Evaluation of Community Service Internship	0	0	0	2
		Total	**18**	**1**	**10**	**26**

III B. Tech. – II Semester (CCC)

S.No.	Course Code	Subject	L	T	P	C
1	23CS1206	Fog Computing	3	0	0	3
2	23CS1207	Cryptography & Data Security	3	0	0	3
3	23CS1208	Big Data	3	0	0	3
Professional Elective course (PEC) –II						
4	23CS0535	Software Testing Methodologies	3	0	0	3
	23CS0536	Cyber Security				
	23CS1216	Cloud Architecture and Services				
	23EC0451	Embedded Systems Design				
Professional Elective course (PEC) –III						
5	23CS0538	Software Project Management	3	0	0	3
	23CS0539	Mobile Adhoc Networks				
	23CS0540	Natural Language Processing				
	23CS0541	Distributed Operating System				
Open Elective (OE) –II						
6	23CE0152	Disaster Management	3	0	0	3
	23CE0153	Sustainability in Engineering Practices				
	23EE0262	Renewable Energy Sources				
	23ME0349	Automation and Robotics				
	23EC0441	Digital Electronics				
	23HS0853	Optimization Techniques in Engineering				
	23HS0858	Mathematical Foundation Of Quantum Technologies				
	23HS0843	Physics of Electronic Materials And Devices				
	23HS0807	Chemistry of Polymers And Applications				
	23HS0823	Academic Writing and Public Speaking				
7	23CS1209	Fog Computing Lab	0	0	3	1.5
8	23CS1210	Cryptography & Data Security Lab	0	0	3	1.5
9	23HS0818	**Skill Enhancement course:** Soft Skills	0	1	2	2
10	23HS0816	**Non-Credit Course**: Technical Paper Writing & IPR	2	0	0	-
		Total	20	1	8	23
Mandatory Industry Internship of 08 weeks duration during summer vacation						

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I B.Tech – I Sem.

L	T	P	C
2	-	-	2

(23HS0810) COMMUNICATIVE ENGLISH
(Common to all branches of Engineering)

COURSE OBJECTIVES
The objectives of this course

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES (COs)
After the completion of the course student should be able to
1. *Understand the context, topic, and pieces of specific information from social or Transactional dialogues.*
2. *Apply grammatical structures to formulate sentences and correct word forms.*
3. *Analyze discourse markers to speak clearly on a specific topic in informal discussions.*
4. *Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.*
5. *Create a coherent paragraph, essay, and resume.*
6. *Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively.*

UNIT – I
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 ofinformation.
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.

UNIT – II
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.

UNIT – III

Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words,

Vocabulary: Collocations

UNIT – IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes.

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

UNIT – V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar andusage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

TEXTBOOKS

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, OrientBlack Swan, 2023 (Units 1,2 & 3).
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5).

REFERENCES

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 UniversityPress, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building aSuperior 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

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(23HS0801) CHEMISTRY
(Common to EEE, ECE, CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES

The objectives of this course
1. *To familiarize engineering chemistry and its applications*
2. *To train the students on the principles and applications of electrochemistry and polymers*
3. *To introduce instrumental methods, molecular machines and switches.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to
1. *Acquire the knowledge on the behaviour and interactions between matter and energy at both the atomic and molecular levels.*
2. *Analyze and demonstrate the applications of modern engineering materials in real world.*
3. *Impart the knowledge on the essential aspects of electrochemical cells, emf and applications of emf measurements*
4. *Gain the knowledge about construction and applications of batteries and sensors,*
5. *Impart knowledge on the essential aspects of Principles and comprehend idea about the synthesis and engineering applications of polymers.*
6. *Analyse the molecular transitions of Electromagnetic radiation (EMR) with matter in various spectroscopic techniques.*

UNIT – I
Structure and Bonding Models:
Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT- II
Modern Engineering Materials
Semiconductors – Introduction, basic concept, application.
Super Conductors - Introduction basic concept, applications.
Super Capacitors - Introduction, Basic Concept, Classification – Applications.
Nano Materials - Introduction, classification, properties and applications of Fullerenes, Carbon nano tubes and Graphines nanoparticles.

UNIT- III
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).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells – lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT - IV
Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

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), Polyl Lactic Acid (PLA).

UNIT - V
Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. High pressure Liquid Chromatography (HPLC) Classification, Principle, Instrumentation and Applications.

TEXTBOOKS
1. Jain and Jain, *Engineering Chemistry*, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, *Atkins' Physical Chemistry*, 10/e,Oxford University Press, 2010.

REFERENCES
1. Skoog and West, *Principles of Instrumental Analysis*, 6/e, Thomson, 2007.
2. J.D. Lee, *Concise Inorganic Chemistry*, 5th Edition, Wiley Publications, Feb.2008
3. Fred W. Billmayer Jr, *Textbook of Polymer Science*, 3rd Edition

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(23HS0830) LINEAR ALGEBRA & CALCULUS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

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.

COURSE OUTCOMES (COs)

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

1. *Develop and use of matrix algebra techniques that are needed by engineers for practical applications.*
2. *Identify different matrix techniques to find the inverse and powers of the matrix.*
3. *Understanding the concepts of continuity and differentiability of functions defined on intervals*
4. *Estimate the series expansions of algebraic and transcendental functions.*
5. *Analyze the functions of several variables which is useful in optimization.*
6. *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.*

UNIT I
Matrices
Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT II
Eigenvalues, Eigenvectors and Orthogonal Transformation
Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III
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.

UNIT IV

Partial differentiation and Applications (Multi variable calculus)

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V

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).

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.

REFERENCES:

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, Alpha ScienceInternational 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)

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(23CE0101) BASIC CIVIL & MECHANICAL ENGINEERING
(Common to all branches of Engineering)

PART A: BASIC CIVIL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

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.*

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.*
2. *Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.*
3. *Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation and understand the process of water storage and its supply to the public.*

UNIT I
Basics of Civil Engineering: Role of Civil Engineers in Society - Various Disciplines of Civil Engineering - Structural Engineering - Geo-technical Engineering - Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering - Scope of each discipline - Building Construction and Planning - Construction Materials - Cement - Aggregate - Bricks - Cement concrete - Steel. Introduction to Prefabricated construction Techniques

UNIT II
Surveying: Objectives of Surveying - Horizontal Measurements - Angular Measurements - Introduction to Bearings - Levelling instruments used for levelling - Simple problems on levelling and bearings - Contour mapping.

UNIT III

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).

TEXT BOOKS
1. M.S.Palanisamy, *Basic Civil Engineering,* Tata McGraw Hill publications (India) Pvt. Ltd. Fourth Edition, 2011.
2. S.S. Bhavikatti, *Introduction to Civil Engineering,* New Age International Publishers, First Edition, 2022.
3. Satheesh Gopi, *Basic Civil Engineering*, Pearson Publications, First Edition, 2009

REFERENCES
1. S.K. Duggal, *Surveying, Vol- I and Vol-II,* Tata McGraw Hill Publishers, Fifth Edition, 2019
2. Santosh Kumar Garg, *Hydrology and Water Resources Engineering,* Khanna Publishers, Delhi, 2016
3. Santosh Kumar Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, Delhi, 38th Edition, 2023
4. S.K.Khanna, C.E.G. Justo and Veeraraghavan*, Highway Engineering*, Nemchand and Brothers Publications, 10th Edition, 2019
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course
1. *Get familiarized with the scope and importance of Mechanical Engineering in differentsectors and industries.*
2. *Explain different engineering materials and different manufacturing processes.*
3. *Provide an overview of different thermal and mechanical transmission systems andintroduce basics of robotics and its applications.*

COURSE OUTCOMES

After the completion of the course, student should be able to
1. *Understand the role of mechanical engineering and materials in the manufacturing and automotive industries*
2. *Explain the basics of manufacturing processes and thermal engineering and its applications.*
3. *Describe the working of different power plants. Mechanical power transmission systems and the applications of robotics in industrial sector.*

UNIT I

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

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT II

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

TEXTBOOKS

1. V.Ganesan, *Internal Combustion Engines*, Tata McGraw Hill publications (India) Pvt. Ltd.
2. S.S. Rattan, *A Tear book of Theory of Machines* Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. Jonathan Wicker and Kemper Lewis, *An introduction to Mechanical Engineering,* Cengagelearning India Pvt. Ltd.

REFERENCE BOOKS

1. Appuu Kuttan KK, *Robotics*, I.K. International Publishing House Pvt. Ltd. Volume-I
2. L. Jyothish Kumar, Pulak M Pandey,*3D printing & Additive Manufacturing Technology*, Springer publications
3. Mahesh M Rathore, *Thermal Engineering*, Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, *Basic Civil and the Mechanical Engineering*, TataMcGraw Hill publications (India) Pvt. Ltd.

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I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(23CS0501) INTRODUCTION TO PROGRAMMING
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

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

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand basics of computers, the concept of algorithm and algorithmic thinking.*
2. *Analyse a problem and develop an algorithm using control structures & arrays*
3. *Analyse a problem and develop an algorithm to solve it using strings*
4. *Understand and implement the problems using pointers*
5. *Apply modular approach for solving the problem*
6. *Design and implement problem-solving using structures, unions and files.*

UNIT - I

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT - II

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, dowhile) Break and Continue.

UNIT - III

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT - IV

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT - V

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.

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS
1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language, 2nd edition, 2015*.
2. Pradip Dey Manas Ghosh‖ Programming in C ―First edition, Oxford University Press, 2018.

REFERENCES
1. Balagurusamy, E, *Computing fundamentals and C Programming*, McGraw-Hill Education, 2019.
2. Rema Theraja, *Programming in C*, Oxford, 2016, 2nd edition
3. Forouzan, Gilberg, Prasad, *C Programming, A Problem Solving Approach*, CENGAGE, 3rd edition

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(23HS0811) COMMUNICATIVE ENGLISH LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

 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 (COs)

After the completion of the course student should be able to

1. *Understand the different aspects of the English language proficiency with emphasis on LSRW skills.*
2. *Apply communication skills through various language learning activities.*
3. *Analyze the English speech sounds, stress, rhythm, intonation and syllable divisionfor better listening and speaking comprehension.*
4. *Evaluate and exhibit professionalism in participating in debates and group discussions.*
5. *Become active participants in the learning process and acquire proficiency in spoken English.*
6. *Speak with clarity and confidence thereby enhances employability skills.*

List of Topics:
1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Infotech
- Young India Films

REFERENCES:
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,

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(23HS0802) CHEMISTRY LAB
(Common to EEE, ECE, CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES

The objectives of this course
1. *Verify the fundamental concepts with experiments.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to
1. *Determine the cell constant and conductance of solutions.*
2. *Prepare advanced polymer Bakelite materials.*
3. *Measure the strength of an acid present in secondary batteries.*
4. *Analyse the IR spectra of some organic compounds.*
5. *Able to understand about the fundamental concepts of analytical instruments*
6. *Calculate strength of acid in Pb-Acid battery.*

LIST OF EXPERIMENTS
1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
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. Identification of simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

Note: Any Ten experiments may be conducted

REFERENCES
1. J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar *"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition"* Pearson Publications

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(23ME0301) ENGINEERING WORKSHOP
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to
1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on different types of fittings.*
4. *Provides hands-on training in the trades of House-Wiring .*
5. *Overview of metal cutting processes, foundry, Welding and plumbing, is provided through live demonstrations.*
6. *Acquire practical skills by performing the experiments in different shops of workshop.*

COURSE OUTCOMES

On successful completion of the course, the students will be able to
1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understands about Fitting and their types.*
4. *Explain the method of preparation of various House-Wiring .*
5. *Apply basic techniques in foundry, Welding and plumbing.*
6. *Estimate the amount of material required for various models.*

SYLLABUS

1. **Demonstration**: Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and

   make following joints.

   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working,

   Developments of following sheet metal job from GI sheets.

   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.

   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.

   a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor

   f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of   Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:
1. Felix W, *Basic Workshop Technology: Manufacturing Process*, Independently Published, 2019.
2. Bruce J. Black, *Workshop Processes, Practices and Materials*; Routledge publishers, 5th Edn. 2015.
3. B.S. Raghuwanshi, *A Course in Workshop Technology Vol I. & II*, Dhanpath Rai & Co., 2015 & 2017.

REFERENCES:
1. S. K. Hajra Choudhury & Others, *Elements of Workshop Technology, Vol. I* , Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. H. S. Bawa, Workshop Practice, Tata-McGraw Hill, 2004.
3. Soni P.M. & Upadhyay P.A., *Wiring Estimating, Costing and Contracting*; Atul Prakashan, 2021-22.

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(23CS0502) COMPUTER PROGRAMMING LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES

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

COURSE OUTCOMES (COs)
1. *Read, understand, and trace the execution of programs written in C language.*
2. *Select the right control structure for solving the problem.*
3. *Develop C programs which utilize memory efficiently using programming constructs like pointers.*
4. *Develop Debug and Execute programs to demonstrate the applications of arrays in C.*
5. *Develop Debug and Execute programs to demonstrate the applications of functions in C.*
6. *Implement the C programs using File handling Concepts.*

UNIT I
WEEK 1 - Objective: Getting familiar with the programming environment on the computer and writing the first program.
Suggested Experiments/Activities:
Tutorial 1: Problem-solving using Computers.
Lab1: Familiarization with programming environment
   i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
   ii) Exposure to Turbo C, gcc
   iii) Writing simple programs using printf(), scanf()

WEEK 2 - Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.
Suggested Experiments /Activities:
Tutorial 2: Problem-solving using Algorithms and Flow charts.
Lab 1: Converting algorithms/flow charts into C Source code. Developing the algorithms/flowcharts for the following sample programs
   i) Sum and average of 3 numbers
   ii) Conversion of Fahrenheit to Celsius and vice versa
   iii) Simple interest calculation

WEEK 3 - Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

- **i)** Finding the square root of a given number
- **ii)** Finding compound interest
- **iii)** Area of a triangle using heron's formulae
- **iv)** Distance travelled by an object

UNIT II

WEEK 4 - Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity:

Lab 4: 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, nullelse, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for ―if construct‖.

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

- **i)** Write a C program to find the max and min of four numbers using if-else.
- **ii)** Write a C program to generate electricity bill.
- **iii)** Find the roots of the quadratic equation.
- **iv)** Write a C program to simulate a calculator using switch case.
- **v)** Write a C program to find the given year is a leap year or not.

WEEK 6 - Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

- **i)** Find the factorial of given number using any loop.
- **ii)** Find the given number is a prime or not.
- **iii)** Compute sine and cos series
- **iv)** Checking a number palindrome
- **v)** Construct a pyramid of numbers.

UNIT III

WEEK 7 - Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

    i) Find the min and max of a 1-D integer array.

    ii) Perform linear search on1D array.

    iii) The reverse of a 1D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

WEEK 8 - Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D 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 dereferences.

    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.

WEEK 14 - 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

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, PrenticeHall of India
2. Forouzan, Gilberg, Prasad, *C Programming, A Problem-Solving Approach,* CENGAGE

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(23HS0813) HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to all branches of Engineering)

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 (COs)

After the completion of the course student should be able to
  1. Understand the importance of yoga and sports for Physical fitness and sound health
  2. Demonstrate an understanding of health-related fitness components.
  3. Compare and contrast various activities that help enhance their health.
  4. Assess current personal fitness levels.
  5. Develop Positive Personality.
  6. Apply various activities for holistic development.

UNIT I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index(BMI) of all age groups.

Activities:
  i) Organizing health awareness programmes in community
  ii) Preparation of health profile
  iii) Preparation of chart for balance diet for all age groups

UNIT II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asiangames and Commonwealthgames.

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 SurvivingAnywhere*, Third Edition, William Morrow Paperbacks, 2014
5. *The Sports Rules Book/ Human Kinetics with Thomas Hanlon.* - 3rd ed. Human Kinetics, 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, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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(23HS0840) ENGINEERING PHYSICS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

> *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.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Analyze the intensity variation of light due to polarization, interference and diffraction.*
2. *Familiarize with the basics of crystals and their structures.*
3. *Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.*
4. *Summarize various types of polarization of dielectrics and classify the magnetic materials.*
5. *Explain the basic concepts of Quantum Mechanics and the band theory of solids.*
6. *Identify the type of semiconductor using Hall effect.*

UNIT – I   Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT II   Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

UNIT III Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability,

Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT IV   Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependentwave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits anddemerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT V   Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effectand its applications

TEXTBOOKS

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

REFERENCES

1. B.K. Pandey and S. Chaturvedi, *Engineering Physics,* Cengage Learning 2021.
2. Shatendra Sharma, Jyotsna Sharma, *Engineering Physics,* Pearson Education, 2018.
3. M.R. Srinivasan, *Engineering Physics,* New Age international publishers (2009).

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html

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(23HS0831) DIFFERENTIAL EQUATIONS & VECTOR CALCULUS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course
1. *To enlighten the learners in the concept of differential equations and multivariable calculus.*
2. *To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to
1. *Solve the differential equations related to various engineering fields.*
2. *Create basic application problems described by second order linear differential equations with constant coefficients.*
3. *Understand basic properties of standard partial differential equations.*
4. *Identify solution methods for partial differential equations that model physical processes.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Estimate the work done against a field, circulation and flux using vector calculus.*

UNIT I
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.

UNIT II
Linear differential equations of higher order (Constant Coefficients)
Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III
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. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV

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.

UNIT V

Vector integration

LWithoutegral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

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

REFERENCES:
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 andBartlett, 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 ScienceInternational Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017.

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(23EE0201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *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.*
2. *This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.*

COURSE OUTCOMES (COs)

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

1. *Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.*
2. *Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations*
3. *Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.*
4. *Demonstrate the characteristics by analyzing the behaviour of electronic devices.*
5. *Develop applications using electronic devices.*
6. *Understand the number systems, codes, Boolean algebra, logic gates, and functioning of logic circuits.*

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I 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).

UNIT II 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.
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UNIT III 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.

TEXTBOOKS:
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

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

WEB RESOURCES:
1. https://nptel.ac.in/courses/108105053.
2. https://nptel.ac.in/courses/108108076.

PART B: BASIC ELECTRONICS ENGINEERING

UNIT I 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.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic 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 Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

TEXTBOOKS:

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.

REFERENCES:

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.

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(23ME0302) ENGINEERING GRAPHICS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to
1. *Enable the students with various concepts like dimensioning, conventions and standards relate to Engineering Drawing*
2. *Impart knowledge on the projection of points, lines and plane surfaces.*
3. *Improve the visualization skills for better understanding of projection of solids.*
4. *Develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.*
5. *Make the students understand the viewing perception of a solid object in Isometric and Perspective projections.*

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to
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. *Elucidate the basic principles of sections of solids and true shapes*
5. *Explain principles behind development of surfaces.*
6. *Prepare isometric and perspective sections of simple solids.*

UNIT I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.
Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III
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 planeand Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT IV
Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shapeof section, Sections of solids in simple position only.
Development of Surfaces: Methods of Development: Parallel line development and radial linedevelopment. Development of a cube, prism, cylinder, pyramid and cone.

UNIT V
Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformationsusing Auto CAD (*Not for end examination*).

TEXTBOOK:
1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

REFERENCES:
1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

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(23CS0503) IT WORKSHOP
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

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

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Perform Hardware troubleshooting.*
2. *Understand Hardware components and inter dependencies.*
3. *Safeguard computer systems from viruses/worms.*
4. *Document/ Presentation preparation.*
5. *Perform calculations using spread sheets.*
6. *Understand and Analyse the concepts of Prompt Engineering, Language Translation and Creative Writing using AI Tools*

LIST OF EXPERIMENTS

PC Hardware & Software Installation

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

Task 2: Every student should disassemble and assemble the PC back to working condition. 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.

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.

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

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

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the 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 La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

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

REFERENCES

1. Vikas Gupta, *Comdex Information Technology course tool kit*, WILEY Dream tech, 2003.
2. Cheryl A Schmidt, *The Complete Computer upgrade and repair book*, WILEY Dream tech, 2013, 3rd edition

3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. Kate J. Chase, *PC Hardware - A Handbook*, PHI (Microsoft)
5. Leslie Lamport, *LaTeX Companion*, PHI/Pearson.
6. David Anfins on and Ken Quamme, *IT Essentials PC Hardware and Software Companion Guide*, – CISCO Press, Pearson Education, 3rd edition
7. Patrick Regan, *IT Essentials PC Hardware and Software Labs and Study Guide*, CISCO Press, Pearson Education, 3rd edition

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(23CS0504) DATA STRUCTURES
(Common to CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES

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

COURSE OUTCOMES (COs)

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

1. *Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.*
2. *Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.*
3. *Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.*
4. *Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.*
5. *Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.*
6. *Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.*

UNIT - I
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

UNIT - II
Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT III
Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT IV
Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.
Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT V
Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal, AVL Trees
Graphs: Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Applications of graphs.

TEXTBOOKS
1. Mark Allen Weiss, *Data Structures and algorithm analysis in C*, Pearson, 2nd Edition.
2. Reema Thareja ―Data Structures using C‖,Third Edition,Oxford University,2023

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

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(23HS0841) ENGINEERING PHYSICS LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

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.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Operate optical instruments like travelling microscope and spectrometer.*
2. *Estimate the wavelengths of different colours using diffraction grating.*
3. *Plot the intensity of the magnetic field of circular coil carrying current with distance.*
4. *Evaluate dielectric constant and magnetic susceptibility for dielectric and magneticmaterials respectively.*
5. *Calculate the band gap of a given semiconductor*
6. *Identify the type of semiconductor using Hall Effect.*

LIST OF EXPERIMENTS

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum usingdiffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee'sMethod.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using HallEffect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using 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.

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

REFERENCES

1.   S. Balasubramanian, M.N. Srinivasan, *A Textbook of Practical Physics,* S. Chand Publishers, 2017.

Web Resources

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

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(23EE0202) ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP
(Common to all branches of Engineering)

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

Course Outcomes:
1. *Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.* usage *of electronic measuring instruments.*
2. *Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.*
3. *Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.*
4. *Demonstrate knowledge of different electronic devices and measuring instruments.*
5. *Plot and discuss the characteristics and applications of various electron devices.*
6. *Verify the functions of logic gates and flip-flops.*

Activities:
1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.

   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:
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

Reference Books:
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

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

List of Experiments:
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.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

References:
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
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

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(23CS0505) DATA STRUCTURES LAB
(Common to CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)

COURSE OBJECTIVES

The objectives of this course

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

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.*
2. *Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.*
3. *Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.*
4. *Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.*
5. *Implement the concepts of Binary Search Trees in Linked List*
6. *Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.*

LIST OF EXPERIMENTS:
Exercise 1: Array Manipulation
   i) Write a program to reverse an array.
   ii) C Programs to implement the Searching Techniques – Linear & Binary Search
   iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation
   i) Implement a singly linked list and perform insertion and deletion operations.
   ii) Develop a program to reverse a linked list iteratively and recursively.
   iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications
   i) Create a program to detect and remove duplicates from a linked list.
   ii) Implement a linked list to represent polynomials and perform addition.
   iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation
   i)   Implement a doubly linked list and perform various operations to understand its properties and applications.
   ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations
   i)   Implement a stack using arrays and linked lists.
   ii) Write a program to evaluate a postfix expression using a stack.
   iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations
   i)   Implement a queue using arrays and linked lists.
   ii) Develop a program to simulate a simple printer queue system.
   iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications
   i)   Use a stack to evaluate an infix expression and convert it to postfix.
   ii) Create a program to determine whether a given string is a palindrome or not.
   iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree
   i)   Implementing a BST using Linked List.
   ii) Traversing of BST.

Exercise 9: Graph
   i)   Write a program for finding the Depth First Search of a graph.
   ii) Write a program for finding the Breadth First Search of a graph.

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

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

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(23HS0812) NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE
(Common to all branches of Engineering)

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 (COs)
After the completion of the course student should be able to

1. *Understand the importance of discipline, character and service motto.*
2. *Solve some societal issues by applying acquired knowledge, facts, and techniques.*
3. *Explore human relationships by analyzing social problems.*
4. *Determine to extend their help for the fellow beings and downtrodden people.*
5. *Develop leadership skills and civic responsibilities.*
6. *Focus on awareness programmes that build community service*

UNIT I
Orientation
General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance.

Activities:
   i) Conducting –ice breaking sessions-expectations from the course-knowing personaltalents and skills
   ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc.
   iii) Displaying success stories-motivational biopics- award winning movies on societalissues etc.
   iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II
Nature & 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.

UNIT III
Community   Service
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.

   ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,

   iii) Conducting consumer Awareness. Explaining various legal provisions etc.

   iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.

   v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:
   1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme*
   Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
   2. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
   3. Davis M. L. and Cornwell D. A., ―Introduction to Environmental Engineering‖, McGraw Hill, New York 4/e 2008
   4. Masters G. M., Joseph K. and Nagendran R. ―Introduction to 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, totalling to 90 marks.
   • A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

II B.Tech – I Sem.

(23HS0836) DISCRETE MATHEMATICS & GRAPH THEORY
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course
1. *To enable students to understand the fundamentals of set, relation and recurrence relation.*
2. *To enable students to understand the fundamental concepts of graph theory and its applications in computer science.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Apply mathematical logic to solve problems.*
2. *Understand the concepts and perform the operations related to sets, relations and functions. Gain the conceptual background needed and identify structures of algebraic nature.*
3. *Apply basic counting techniques to solve combinatorial problems.*
4. *Formulate problems and solve Binomial, Multinomial problems*
5. *Formulate problems and solve recurrence relations.*
6. *Apply Graph Theory in solving computer science problems*

UNIT - I
Mathematical Logic:

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

UNIT - II
Set theory:

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

UNIT III
Elementary Combinatorics:

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

UNIT IV

Recurrence Relations

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations.

UNIT V

Graphs

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.

TEXTBOOKS
1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science,Tata McGrawHill,2002.
2. Kenneth H.Rosen, Discrete Mathematics and its Applications with Combinatorics and GraphTheory,7thEdition,McGraw Hill Education(India)Private Limited.

REFERENCES
1. *JoeL.Mott, Abraham Kandel and The odoreP.Baker, Discrete Mathematics for Computer Scientists & Mathematicians,2nd Edition, Pearson Education.*
2. *Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science.*

ONLINE LEARNING RESOURCES:
1. *http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf*

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II B.Tech – I Sem.

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(23HS0814) UNIVERSAL HUMAN VALUES
UNDERSTANDING HARMONY& HUMAN ETHICAL CONDUCT
(Common to All Branches of Engineering)

COURSE OBJECTIVES

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

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
  1. *Define the terms like Natural Acceptance, Happiness and Prosperity*
  2. *Identify oneself, and one's surroundings (family, society nature)*
  3. *Apply what they have learnt to their own self in different day-to-day settings in real life*
  4. *Relate human values with human relationship and human society.*
  5. *Justify the need for universal human values and harmonious existence*
  6. *Develop as socially and ecologically responsible engineers*

Course Topics

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 - I
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

UNIT - II
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

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 III
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

UNIT IV
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

UNIT V

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

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

TEXTBOOKS

1. 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

2. 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

REFERENCES

1. *JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.*
2. *Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.*
3. *The Story of Stuff (Book).*
4. *The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi*
5. *Small is Beautiful - E. F Schumacher.*
6. *Slow is Beautiful - Cecile Andrews*
7. *Economy of Permanence - J C Kumarappa*
8. *Bharat Mein Angreji Raj – PanditSunderlal*
9. *Rediscovering India - by Dharampal*
10. *Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi*
11. *India Wins Freedom - Maulana Abdul Kalam Azad*
12. *Vivekananda - Romain Rolland (English)*
13. *Gandhi - Romain Rolland (English)*

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions. While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up ‖ordinary‖ situations rather than‖ extra-ordinary‖ situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher

preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

ONLINE LEARNING RESOURCES:

1. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf*

2. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf*

3. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf*

4. *https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf*

5. *https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf*

6. *https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-*

7. *S2A%20Und%20Nature-Existence.pdf*

8. *https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202023-25%20Ethics%20v1.pdf*

9. *https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385*

10. *https://onlinecourses.swayam2.ac.in/aic22_ge23/preview*

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
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II B.Tech – I Sem.

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(23CS0506) DIGITAL LOGIC & COMPUTER ORGANIZATION
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
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*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Differentiate between combinational and sequential circuits based on their characteristics and functionalities.*
2. *Demonstrate an understanding of computer functional units.*
3. *Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems.*
4. *Demonstrate Hardwired Control and Multi programmed Control Units*
5. *Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability.*
6. *Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques.*

UNIT - I
Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

UNIT - II
Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

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 III

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

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT IV

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

UNIT V

Input/ Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

TEXTBOOKS

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.

REFERENCES

1. *Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.*
2. *Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson*
3. *Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier*
4. *Fundamentals of Logic Design, Roth, 5thEdition, Thomson*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/106/103/106103068/*

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II B.Tech – I Sem.

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(23CS0507) ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
1. *provide knowledge on advance data structures frequently used in Computer Science domain*
2. *Develop skills in algorithm design techniques popularly used*
3. *Understand the use of various data structures in the algorithm design*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Illustrate the working of the advanced tree data structures and their applications.*
2. *Understand the Graph data structure, traversals and apply them in various contexts.*
3. *Use various data structures in the design of algorithms.*
4. *Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.*
5. *Recommend appropriate data structures based on the problem being solved.*
6. *Analyze algorithms with respect to space and time complexities.*

UNIT - I
Introduction: Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.

AVL Trees: Creation, Insertion, Deletion operations and Applications

B-Trees: Creation, Insertion, Deletion operations and Applications

UNIT - II
Heap Trees (Priority Queues): Min and Max Heaps, Operations and Applications

Graphs: Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications

Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

UNIT III
Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths

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

UNIT IV

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

UNIT V

NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem

NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)

NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

TEXTBOOKS
1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2ndEdition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, 2nd Edition University Press

REFERENCES
1. *Data Structures and program design in C, Robert Kruse, Pearson Education Asia*
2. *An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill*
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*
5. *Algorithms + Data Structures & Programs:, N.Wirth, PHI*
6. *Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.*
7. *Data structures in Java:, Thomas Standish, Pearson Education Asia*

ONLINE LEARNING RESOURCES:
1. *https://www.tutorialspoint.com/advanced_data_structures/index.asp*
2. *http://peterindia.net/Algorithms.html*
3. *https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O*

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II B.Tech – I Sem.

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(23CS0508) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
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*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Analyze problems, design solutions using OOP principles, and implement them efficiently in Java.*
2. *Design and implement classes to model real-world entities, with a focus on attributes, behaviours, and relationships between objects*
3. *Implement classes, constructors and methods*
4. *Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch.*
5. *Apply Competence in handling exceptions and errors to write robust and fault-tolerant code.*
6. *Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical users interface (GUI) programming using JavaFX.*

UNIT - I

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.

UNIT - II

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.

UNIT III

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.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java.

UNIT V

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 Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

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

TEXTBOOKS
1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3. JAVA for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

REFERENCES
1. *The complete Reference Java, 11thedition, Herbert Schildt,TMH*
2. *Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson*

ONLINE LEARNING RESOURCES:
1. *https://nptel.ac.in/courses/106/105/106105191/*
2. *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618 816347_shared/overview*

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(23CS0509) ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
1. *acquire practical skills in constructing and managing Data structures*
2. *apply the popular algorithm design methods in problem-solving scenarios*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Design and develop programs to solve real world problems with the popular algorithm design methods.*
2. *Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs.*
3. *Relate the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms.*
4. *Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications.*
5. *Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems.*
6. *Compare the performance of different of algorithm design strategies*

Experiments covering the Topics:

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Finding Biconnected components in a graph
- Shortest path algorithms using greedy Method
- 0/1 Knapsack Problem using Dynamic Programming and Backtracking
- Travelling Salesperson problem using Branch and Bound
- N-Queens Problem using Backtracking
- Job Sequencing using Branch and Bound

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.

REFERENCES

1. *Fundamentals of Data Structures in C++, Horowitz Ellis, SahniSartaj, Mehta, Dinesh, 2ndEdition, Universities Press*

2. *Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, anguthevar Rajasekaran, 2ndEdition, 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, McGraw Hill*

ONLINE LEARNING RESOURCES:

1. *http://cse01-iiith.vlabs.ac.in/*
2. *http://peterindia.net/Algorithms.html*

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(23CS0510) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
1. *Practice object-oriented programming in the Java programming language*
2. *Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism*
3. *Illustrate inheritance, Exception handling mechanism, JDBC connectivity*
4. *Construct Threads, Event Handling, implement packages, Java FX GUI*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling.*
2. *Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively.*
3. *Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes.*
4. *Identify and fix defects and common security issues in code.*

5. *Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges.*
6. *Proficiently construct graphical user interface (GUI) applications using JavaFX*

Experiments covering the Topics:
- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

Sample Programs:

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 $ax2+bx=0$. Calculate the discriminate 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 binary search 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 invoke them inside main method.

b) Write a JAVA program 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

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

REFERENCES

1. *P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.*

2. *P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007*

3. *Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.*

4. *Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.*

ONLINE LEARNING RESOURCES:

1. *https://java-iitd.vlabs.ac.in/*
2. *http://peterindia.net/JavaFiles.html*

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(23CS0549) PYTHON PROGRAMMING
(Common to All Branches of Engineering)

COURSE OBJECTIVES
The objectives of this course
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*

COURSE OUTCOMES (COs)
At the end of the course, Student will be able to
1. *Showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions.*
2. *Apply Python programming concepts to solve a variety of computational problems*
3. *Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs*
4. *Acquire the skills in different operators and statements in python*
5. *Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas*
6. *Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries*

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.

i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operatorsviii) Identity Operators

5. Write a program to add and multiply complex numbers

6. Write a program to print multiplication table of a given number.

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:

7. Write a program to define a function with multiple return values.

8. Write a program to define a function using default arguments.

9. Write a program to find the length of the string without using any library functions.

10. Write a program to check if the substring is present in a given string or not.

11. Write a program to perform the given operations on a list:

i.   addition   ii. Insertion   iii. slicing

12. Write a program to perform any 5 built-in functions by taking any list.

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, Frozenset.

Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.

14. Write a program to count the number of vowels in a string (No control flow allowed).

15. Write a program to check if a given key exists in a dictionary or not.

16. Write a program to add a new key-value pair to an existing dictionary.

17. Write a program to sum all the items in a given dictionary.

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:

18. 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.

19. Python program to print each line of a file in reverse order.

20. Python program to compute the number of characters, words and lines in a file.

21. Write a program to create, display, append, insert and reverse the order of the items in the array.

22. Write a program to add, transpose and multiply two matrices.

23. 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.

UNIT V
Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.

25. Python Program to demonstrate NumPy arrays creation using array () function.

26. Python program to demonstrate use of ndim, shape, size, dtype.

27. Python program to demonstrate basic slicing, integer and Boolean indexing.

28. Python program to find min, max, sum, cumulative sum of array

29. 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:

a)   Apply head () function to the pandas data frame

b)   Perform various data selection operations on Data Frame

30. 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

REFERENCES
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.

ONLINE LEARNING RESOURCES:
1. *https://www.coursera.org/learn/python-for-applied-data-science-ai*
2. *https://www.coursera.org/learn/python?specialization=python#syllabus*

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(23HS0805) ENVIRONMENTAL SCIENCE
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course
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.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *To make the students to get awareness about the environment.*
2. *To understand the importance of protecting natural ecosystems for future.*
3. *To understand the various types of pollutions and its causes.*
4. *To understand the various engineering techniques to protect the environment.*
5. *To make awareness about social issues and laws of environmental protection.*
6. *To understand the concept of sustainable development and role of engineering Technology in environment and human health.*

UNIT - I

Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources.

UNIT - II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.

b. Grassland ecosystem

c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction, Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to **biodiversity**: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – 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, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – 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.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

TEXTBOOKS

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, ―Environmental Studies‖, Pearson education
3. S. Azeem Unnisa, ―Environmental Studies‖ Academic Publishing Company
4. K. Raghavan Nambiar, ―Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus‖, Scitech Publications (India), Pvt. Ltd.

REFERENCES

1. *Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.*
2. *M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.*
3. *J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.*
4. *J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited*
5. *G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House*
6. *Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited*

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(23HS0848) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

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

COURSE OUTCOMES (COs)

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

1. *Understand the nature of managerial economics and the role of it in business firms.(L1, L2)*
2. *Identify the determinants of demand and apply cost analysis under different market conditions.(L2,L3)*
3. *Integrate the concepts of price and output decisions of business firms.(L6)*
4. *Appreciate the importance of market structures and implement appropriate price and output decisions.(L2)*
5. *Assess the financial statements of a firm and the financial performance of the firm through the financial statements.(l5)*
6. *Measure operating, investing and financial performance of a firm.(L5)*

UNIT - I

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.

UNIT - II

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).

UNIT III

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

UNIT IV

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

UNIT V

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

TEXTBOOKS

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

REFERENCES

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

Online Learning Resources:

- https://www.slideshare.net/123ps/managerial-economics-ppt
- https://www.slideshare.net/rossanz/production-and-cost-45827016
- https://www.slideshare.net/darkyla/business-organizations-19917607
- https://www.slideshare.net/balarajbl/market-and-classification-of-market
- https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
- https://www.slideshare.net/ashu1983/financial-accounting

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(23HS0838) PROBABILITY & STATISTICS
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course
1. *To familiarize the students with the foundations of probability and statistical methods.*
2. *To help the students in getting a thorough understanding of fundamentals of probability and usage of statistical techniques like testing of hypothesis.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Acquire knowledge in finding the analysis of categorically and various statistical elementary tools*
2. *Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.*
3. *Apply binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies*
4. *Interpret the properties of normal distributions and its applications.*
5. *Analyze to test various hypotheses included in theory and types of errors for large samples.*
6. *Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real life problems*

UNIT - I
Descriptive statistics

Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.

UNIT - II
Probability

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT III
Probability distributions

Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshevs inequality). Approximation of the binomial distribution to normal distribution.

UNIT IV

Estimation and Testing of hypothesis, large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT V

Small sample tests

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

TEXTBOOKS
1. Miller and Freunds, 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.

REFERENCES
1. *S. Ross, a First Course in Probability, Pearson Education India, 2002.*
2. *W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.*
3. *B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.*

ONLINE LEARNING RESOURCES:
1. *https://onlinecourses.nptel.ac.in/noc21_ma74/preview*
2. *https://onlinecourses.nptel.ac.in/noc22_mg31/preview*

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(23CS0511) OPERATING SYSTEMS
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
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.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication.*
2. *Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection.*
3. *Analyze the requirement for process synchronization and deadlocks handled by operating system.*
4. *Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.*
5. *Illustrate different conditions for deadlock and their possible solutions.*
6. *Analyze the memory management and its allocation policies.*

UNIT - I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems

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

UNIT - II

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.

Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT III
Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.
Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT IV
Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.
Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing
Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

UNIT V
File System: File System Interface: File concept, Access methods, Directory Structure; File **system 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.
Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

TEXTBOOKS
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

REFERENCES
1. *Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018*
2. *Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013*

ONLINE LEARNING RESOURCES:
1. *https://nptel.ac.in/courses/106/106/106106144/*
2. *http://peterindia.net/OperatingSystems.html*

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR (AUTONOMOUS)

II B.Tech – II Sem.

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(23CS0512) DATABASE MANAGEMENT SYSTEMS
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
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*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Understand the basic concepts of database management systems*
2. *Analyze a given database application scenario to use ER model for conceptual design of the database*
3. *Develop relational algebra expressions to query and optimize the database using SQL*
4. *Utilize SQL proficiently to address diverse query challenges*
5. *Employ normalization methods to enhance database structure*
6. *Assess and implement transaction processing, concurrency control and database recovery protocols in databases.*

UNIT - I

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 schema architecture 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.

UNIT - II

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).

UNIT - III

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(updatable and non-updatable), relational set operations.

UNIT- IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependencyLossless 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).

UNIT - V

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing.

TEXTBOOKS

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

REFERENCES

3. *Data Structures and program design in C, Robert Kruse, Pearson Education Asia*
4. *An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill*
5. *The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.*
6. *Data Structures using C & C++: Langsam, Augenstein&Tanenbaum, Pearson, 1995*
7. *Algorithms + Data Structures & Programs:, N.Wirth, PHI*
8. *Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.*
9. *Data structures in Java:, Thomas Standish, Pearson Education Asia*
10. *Introduction to Database Systems, 8thedition, C J Date, Pearson.*
11. *Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson*

12. *Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022*

ONLINE LEARNING RESOURCES:
1. *https://nptel.ac.in/courses/106/105/106105175/*
2. *https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview*

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(23CS1201) INTRODUCTION TO CLOUD COMPUTING

COURSE OBJECTIVES
The objectives of this course:
1. This course provides an insight into what is cloud computing and the various services cloud is capable.
2. To provide skills and knowledge about operations and management in cloud technologies so as to implement large scale systems.
3. To provide skills to design suitable cloud infrastructure that meets the businessservices and customer needs.

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to
1. Understanding the systems, protocols and mechanisms to support cloud computing.
2. Illustrate different models and services in the cloud environment.
3. Differentiate the types of virtualization and their implementation in cloud
4. Discuss the phases in application migration to cloud
5. Summarize the different data handling approaches in cloud computing
6. Describe various practices in security applications for cloud computing.

UNIT –I
Introduction: Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers – Overview of Grid Architecture –service oriented architecture – Challenges in cloud computing - Exploring the Cloud Computing Stack - Fundamental Cloud Architectures

UNIT – II
Service Delivery and Deployment Models: Service Models (XaaS): Infrastructure as a Service (IaaS) - Platform as a Service (PaaS) - Software as a Service(SaaS) - Deployment Models: Types of cloud - Public cloud - Private cloud - Hybrid cloud – Pros and Cons of cloud computing - Service level agreements - Types of SLA – Lifecycle of SLA- SLA Management

UNIT –III
Virtualization as Foundation of Cloud: Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management - Virtualization for data center automation - Migrating Application to Cloud, Phases of Cloud Migration

UNIT –IV

Data in the cloud: Multi-entity support - Multi-schema approach - Multi-tenancy using cloud data stores - Relational databases - Cloud file systems: GFS and HDFS - BigTable, HBase - Cloud data stores: Datastore and SimpleDB

UNIT –V

Cloud Infrastructure Security: Authentication and Authorization methods -network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TEXT BOOKS
1. Rajkumar Buyya, James Broberg and AndzejM. Goseinski, *Cloud Computing:Principles and Paradigms,* 2011 , Wiley
2. Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, *Distributed and Cloud Computing*, 2012, Elsevier.
3. Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah,*Cloud Computing*
4. *lack Book Dreamtech* Publication, Kogent Learning Solutions

REFERENCES
1. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, *Cloud Computing : A Practical Approach*, Tata McGraw Hill, rp2011.
2. GautamShroff,*Enterprise Cloud Computing*, Cambridge, University Press, 2010.
3. John W.Rittinghouse, James F.Ransome,*Cloud Computing: Implementation, Management and Security,* CRC Press, rp2012.
4. George Reese, *Cloud Application Architectures: Building Applications rand Infrastructure in the Cloud*, O‟Reilly, SPD, rp2011.
5. Tim Mather, SubraKumaraswamy, ShahedLatif, *Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance*, O‟Reilly, SPD, rp2011.

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II B.Tech. – I Sem.

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(23CS1202) CLOUD COMPUTING LAB

COURSE OBJECTIVES
The Objectives of this Course:

1. *Be familiar with utilizing web services/Applications*
2. *Be exposed to tool kits for cloud environment.*
3. *Learn to run virtual machines of different configuration.*

COURSE OUTCOMES (COs)
On successful completion of the course students will be able to

1. *Understand the implementation of cloud computing environment.*
2. *Analyze the usage of Cloud computing environment in terms of application.*
3. *Design and Implement applications on the Cloud.*
4. *Use the cloud tool kits.*
5. *Develop and run cloud virtual environment.*

List of Experiments:

Programs on SaaS

1. Create an word document of your class time table and store locally and on the cloud with doc,and pdf format . (use www.zoho.com and docs.google.com)
2. Create a spread sheet which contains employee salary information and calculate gross and total sal using the formula
   DA=10% OF BASIC
   HRA=30% OF BASIC
   PF=10% OF BASIC IF BASIC<=3000
   12% OF BASIC IF BASIC>3000
   TAX=10% OF BASIC IF BASIC<=1500
   =11% OF BASIC IF BASIC>1500 AND BASIC<=2500
   =12% OF BASIC IF BASIC>2500
   (use www.zoho.com and docs.google.com)
   NET_SALARY=BASIC_SALARY+DA+HRA-PF-TAX
3. Prepare a ppt on cloud computing –introduction , models, services ,and architecture
   Ppt should contain explanations, images and at least 20 pages
   (use www.zoho.com and docs.google.com)
4. Create your resume in a neat format using google and zoho cloud

Programs on PaaS

1. Write a Google app engine program to generate n even numbers and deploy it to Google cloud
2. Google app engine program multiply two matrices
3. Google app engine program to validate user ; create a database login(username, password) in mysql and deploy to cloud
4. Write a Google app engine program to display nth largest no from the given list of numbers and deploy it into google cloud
5. Google app engine program to validate the user Use mysql to store user info and deploy on to the cloud
6. Implement Program 1-5 using AWS

Cloud Virtual Environment

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Find a procedure to tansfer the files from one virtual machine to another virtual machine.

    Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim

TEXT BOOKS
1. Kris Jamsa, MBA, PhD Cloud Computing with Cloud Labs SECOND EDITION
2. Kunal Meher Cloud Computing Lab Manual Kindle Edition

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(23CS0515) DATABASE MANAGEMENT SYSTEMS LAB
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
1. *Populate and query a database using SQL DDL/DML Commands*
2. *Declare and enforce integrity constraints on a database*
3. *Writing Queries using advanced concepts of SQL*
4. *Programming PL/SQL including procedures, functions, cursors and triggers*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment*
2. *Constructing and execute queries to manipulate and retrieve data from databases.*
3. *Develop application programs using PL/SQL.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality*
6. *Establish database connectivity through JDBC (Java Database Connectivity)*

Experiments covering the topics:
- 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:

1. Creation, altering and droping 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, NOTEXISTS, 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 CURSOR, WHERE CURRENT of clause and CURSOR variables.

11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

12. Create a table and perform the search operation on table using indexing and non-indexing techniques.

13. Write a Java program that connects to a database using JDBC

14. Write a Java program to connect to a database using JDBC and insert values into it

15. Write a Java program to connect to a database using JDBC and delete values from it

REFERENCES

1. *Oracle: The Complete Reference by Oracle Press*

2. *Nilesh Shah, "Database Systems Using Oracle", PHI, 2007*

3. *Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007*

4. *RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.*

5. *Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022*

ONLINE LEARNING RESOURCES:

1. *http://www.scoopworld.in*

2. *http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php*

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(23CS0550) FULL STACK DEVELOPMENT – 1
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course
  4. *Make use of HTML elements and their attributes for designing static web pages*
  5. *Build a web page by applying appropriate CSS styles to HTML elements*
  6. *Experiment with JavaScript to develop dynamic web pages and validate forms*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
  7. *Design Websites.*
  8. *Understand basic concepts of HTML and creation of static webpages*
  9. *Apply Styling to web pages.*
  10. *Make Web pages interactive.*
  11. *Design Forms for applications.*
  12. *Choose Control Structure based on the logic to be implemented.*

Experiments covering the Topics:

- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events

Sample Experiments:

1. Lists, Links and Images

a.   Write a HTML program, to explain the working of lists.

Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.

b.   Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.

c.   Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective

profiles.

d.   Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

2. HTML Tables, Forms and Frames

a.   Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)

b.   Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).

c.   Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).

d.   Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame □ image, second frame □ paragraph, third frame □ hyperlink. And also make sure of using ―no frame‖ attribute such that frames to be fixed).

3. HTML 5 and Cascading Style Sheets, Types of CSS

a.   Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, <span> tags.

b.   Write a HTML program, to embed audio and video into HTML web page.

c.   Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

4. Selector forms

a.   Write a program to apply different types of selector forms

i.   Simple selector (element, id, class, group, universal)

ii.   Combinator selector (descendant, child, adjacent sibling, general sibling)

iii.   Pseudo-class selector

iv.   Pseudo-element selector

v.   Attribute selector

5. CSS with Color, Background, Font, Text and CSS Box Model

a.   Write a program to demonstrate the various ways you can reference a color in CSS.

b.   Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.

c.   Write a program using the following terms related to CSS font and text:

i. font-size   ii. font-weight   iii. font-style

    iv. text-decoration   v. text-transformation   vi. text-alignment

d.   Write a program, to explain the importance of CSS Box model using

i.   Content   ii. Border   iii. Margin   iv. padding

6. Applying JavaScript - internal and external, I/O, Type Conversion

a.   Write a program to embed internal and external JavaScript in a web page.

b.   Write a program to explain the different ways for displaying output.

c.   Write a program to explain the different ways for taking input.

d.   Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

7. JavaScript Pre-defined and User-defined Objects

a.   Write a program using document object properties and methods.

b.   Write a program using window object properties and methods.

c.   Write a program using array object properties and methods.

d.   Write a program using math object properties and methods.

e.   Write a program using string object properties and methods.

f.   Write a program using regex object properties and methods.

g.   Write a program using date object properties and methods.

h.   Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

8. JavaScript Conditional Statements and Loops

a.   Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words ―LARGER NUMBER‖ in an information message dialog. If the numbers are equal, output HTML text as ―EQUAL NUMBERS‖.

b.   Write a program to display week days using switch case.

c.   Write a program to print 1 to 10 numbers using for, while and do-while loops.

d.   Write a program to print data in object using for-in, for-each and for-of loops

e.   Develop a program to determine whether a given number is an ‗ARMSTRONG NUMBER‘ or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,13 + 53+ 33 = 153]

f.   Write a program to display the denomination of the amount deposited in the bank in terms of 100‘s, 50‘s, 20‘s, 10‘s, 5‘s, 2‘s & 1‘s. (Eg: If deposited amount is Rs.163, the output should be 1-100‘s, 1-50‘s, 1- 10‘s, 1-2‘s & 1-1‘s)

9. JavaScript Functions and Events

a.   Design a appropriate function should be called to display

i.   Factorial of that number

ii.   Fibonacci series up to that number

iii. Prime numbers up to that number

iv. Is it palindrome or not

b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display

i. Factorial of that number

ii. Fibonacci series up to that number

iii. Prime numbers up to that number

iv. Is it palindrome or not

c. Write a program to validate the following fields in a registration page

i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)

ii. Mobile (only numbers and length 10 digits)

iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

TEXTBOOKS

1. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.

REFERENCES

1. *Programming the World Wide Web, 7thEdition, Robet W Sebesta, Pearson, 2013.*

2. *Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.*

ONLINE LEARNING RESOURCES:

1. *https://www.w3schools.com/html*

2. *https://www.w3schools.com/css*

3. *https://www.w3schools.com/js/*

4. *https://www.w3schools.com/nodejs*

5. *https://www.w3schools.com/typescript*

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(23HS0815) DESIGN THINKING FOR INNOVATION
(Common to All Engineering Branches)

COURSE OBJECTIVES

The objectives of this course
1. *Is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Define the concepts related to design thinking.*
2. *Explain the fundamentals of Design Thinking and innovation*
3. *Apply the design thinking techniques for solving problems in various sectors.*
4. *Analyze to work in a multidisciplinary environment*
5. *Evaluate the value of creativity*
6. *Formulate specific problem statements of real time issues*

UNIT - I
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.

UNIT - II
Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III
Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT IV

Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

TEXTBOOKS

1. Tim Brown,Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

REFERENCES

1. *David Lee, Design Thinking in the Classroom, Ulysses press*
2. *Shrutin N Shetty, Design the Future, Norton Press*
3. *William Lidwell,Universal Principles of Design- Kritinaholden, Jill Butter.*
4. *Chesbrough.H, The Era of Open Innovation – 2013*

ONLINE LEARNING RESOURCES:

1. *https://nptel.ac.in/courses/110/106/110106124/*
2. *https://nptel.ac.in/courses/109/104/109104109/*
3. *https://swayam.gov.in/nd1_noc19_mg60/preview*

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(23CS1203) VIRTUALIZATION TECHNIQUES

COURSE OBJECTIVES

The objectives of this course are to make the student:

1. *The goal of virtualization is usually one of the following: higher levels of performance, scalability, reliability/availability, agility,*
2. *To create a unified security and management domain.*
3. *This virtual view is constructed using excess processing power, memory, storage, or network bandwidth.*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. *Virtualization can increase IT agility, flexibility and scalability while creating significant cost savings.*
2. *Greater workload mobility, increased performance and availability of resources, automated operations*
3. *The benefits of virtualization that make IT simpler to manage and less costly to own and operate.*
4. *Mainly Virtualization means, running multiple operating systems on a single machine but sharing all the hardware resources.*
5. *Analyze various cloud programming models and apply them to solve problems on the cloud.*
6. *Apply the Virtualization techniques for real-world applications.*

UNIT I

Introduction to Virtualization: System Architectures – Virtual Machine Basics – Process Virtual Machines – System Virtual Machines – Taxonomy of Virtual Machines – Emulation: Basic Interpretation – Threaded Interpretation – Pre-Coded and Direct Interpretation.

UNIT II

Virtualization Infrastructure: Comprehensive Analysis -Resource Pool – Testing Environment– Server Virtualization– Virtual Workloads– Provision Virtual Machines– Desktop Virtualization – Application Virtualization - Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices.

UNIT III

Network Virtualization: Design of Scalable Enterprise Networks – Virtualizing the Campus – WAN Design – WAN Architecture – WAN virtualization – Virtual Enterprise
Transport Virtualization – VLANs and Scalability – Theory Network Device Virtualization Layer 2 – VLANs Layer 3 VRF Instances Layer 2

UNIT IV
Network Firewalls and Routing: VFIs Virtual Firewall Contexts Network Device Virtualization – Datapath Virtualization Layer 2: 802.1q – Trunking Generic Routing Encapsulation – IPSec L2TPv3 Label Switched Paths – Control-Plane Virtualization – Routing Protocols – VRF- Aware Routing – Multi-Topology Routing.

UNIT V
Applying Virtualization: Comparison of Virtualization Technologies: Guest OS, Host OS, Hypervisor, Emulation, Kernel Level – Shared Kernel – Enterprise Solutions: VMware Server, ESXi, Citrix Xen Server, Microsoft Virtual PC, Microsoft Hyper-V, Virtual Box – Server Virtualization: Configuring Server with Server Virtualization.

TEXT BOOKS
1. Chris Wolf, Erick M. Halter, *Virtualization: From the Desktop to the Enterprise*, A Press, 005.
2. James E. Smith, Ravi Nair, *Virtual Machines: Versatile Platforms for Systems and Processes*, Elsevier/Morgan Kaufmann, 2005.

REFERENCES
1. William von Hagen, *Professional Xen Virtualization*, Wrox Publications, January, 2008.
2. Kumar Reddy, Victor Moreno, *Network virtualization*, Cisco Press, July, 2006.
3. Amy Newman, Kenneth Hess, *Practical Virtualization Solutions: Virtualization from the Trenches*, Prentice Hall, October 2009.

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(23CS0517) COMPUTER NETWORKS & INTERNET PROTOCOLS
(Common to CSE, CAD, CCC)

COURSE OBJECTIVES:

The course is designed to

1. *Understand the basic concepts of Computer Networks.*
2. *Introduce the layered approach for design of computer networks*
3. *Expose the network protocols used in Internet environment*
4. *Explain the format of headers of IP, TCP and UDP*
5. *Familiarize with the applications of Internet*
6. *Elucidate the design issues for a computer network*

COURSE OUTCOMES(CO):

 After completion of the course students will be able to

1. *Identify the software and hardware components of a computer network*
2. *Design software for a computer network*
3. *Develop error, routing, and congestion control algorithms*
4. *Assess critically the existing routing protocols*
5. *Explain the functionality of each layer of a computer network*
6. *Choose the appropriate transport protocol based on the application requirements.*

UNIT I

Computer Networks and the Internet

What Is the Internet? Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks (Textbook 2), Reference Models, Multimedia Networks, Guided Transmission Media, Wireless Transmission (Textbook 1).

UNIT II

The Data Link Layer, Access Networks, and LANs

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding window protocol(Textbook 1) Introduction to the Link Layer, Error Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page (Packet) (Textbook 2)

UNIT III

The Network Layer:

Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1.

UNIT IV

The Transport Layer:

Connectionless Transport: UDP (Textbook 2), The Internet Transport Protocols: TCP, Congestion Control (Textbook 1)

UNIT V

The Application Layer:

Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications, Video Streaming and Content Distribution Networks (Textbook 2)

TEXT BOOKS

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Networks*, 5th Edition, Pearson.
2. James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2019

REFERENCES

1."Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill Publication.

2.Youlu Zheng, Shakil Akhtar, Networks for Computer Scientists and Engineers, Oxford Publishers,2016.

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(23CS0513) SOFTWARE ENGINEERING
(Common to All CSE & CSE Allied branches)

COURSE OBJECTIVES

The objectives of this course is to
1. *Software life cycle models, Software requirements and SRS document.*
2. *Project Planning, quality control and ensuring good quality software.*
3. *Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance*
2. *Analyze various software engineering models and apply methods for design and development of software projects.*
3. *Illustrate the design process and architectural design*
4. *Develop system designs using appropriate techniques.*
5. *Understand various testing techniques for a software project.*
6. *Apply standards, CASE tools and techniques for engineering software projects.*

UNIT - I
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.

UNIT - II
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.
Requirements Analysis And Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

UNIT III
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)

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.

UNIT IV

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.

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.

UNIT V

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.

Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

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.

TEXTBOOKS

1. Rajib Mall, *Fundamentals of Software Engineering*, 5th Edition, PHI.
2. Roger S. Pressman, *Software Engineering A Practitioner's Approach*, 9th Edition, Mc-Graw Hill International Edition.

REFERENCES

1. Ian Sommerville, *Software Engineering,* 10th Edition, Pearson.
2. Deepak Jain, *Software Engineering, Principles and Practices,* Oxford University Press.

ONLINE LEARNING RESOURCES

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_01338269041100390 4735_shared/overview

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(23CS0519) INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS
(Common to All Branches)

COURSE OBJECTIVES:
The objectives of this course are to make the student:
1. *Introduce fundamental quantum concepts like superposition and entanglement.*
2. *Understand theoretical structure of qubits and quantum information.*
3. *Explore conceptual challenges in building quantum computers.*
4. *Explain principles of quantum communication and computing.*
5. *Examine real-world applications and the future of quantum technologies.*

COURSE OUTCOMES (COs):
Upon successful completion of the course, students will be able to:
1. *Explain core quantum principles in a non-mathematical manner.*
2. *Compare classical and quantum information systems.*
3. *Identify theoretical issues in building quantum computers.*
4. *Discuss quantum communication and computing concepts.*
5. *Recognize applications, industry trends, and career paths in quantum technology.*
6. *Societal & ethical implications of quantum technologies.*

UNIT I

Introduction to Quantum Theory and Technologies: The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics – theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels, why quantum? Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China

UNIT II
Theoretical Structure of Quantum Information Systems
What is a qubit? Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (non-engineering view),Quantum coherence and decoherence – intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators – only interpreted in abstract, The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences, Philosophical implications: randomness, determinism, and observer role.

UNIT III

Building a Quantum Computer – Theoretical Challenges and Requirements: What is required to build a quantum computer (conceptual overview)?,Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers: Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual comparison),Superconducting circuits, Trapped ions, Photonics, Visions reality: what's working and what remains elusive, The role of quantum software in managing theoretical complexities

UNIT IV

Quantum Communication and Computing – Theoretical Perspective: Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD), Role of Entanglement in Communication, The Idea of the Quantum Internet – Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once), Classical vs Quantum Gates, Challenges: Decoherence and Error Correction, Real-World Importance and Future Potential

UNIT V

Applications, Use Cases, and the Quantum Future: Real-world application domains: Healthcare (drug discovery), Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, Psi Quantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, Emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape – India's opportunity in the global quantum race.

TEXTBOOKS:
1. Michael A. Nielsen, Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
3. Chris Bernhardt, *Quantum Computing for Everyone*, MIT Press, 2019.

REFERENCE BOOKS:
1. David McMahon, *Quantum Computing Explained*, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, *An Introduction to Quantum Computing*, Oxford University Press, 2007.
3. Scott Aaronson, *Quantum Computing Since Democritus*, Cambridge University Press, 2013.
4. **Alastair I.M. Rae**, *Quantum Physics: A Beginner's Guide*, Oneworld Publications, Revised Edition, 2005.
5. **Eleanor G. Rieffel, Wolfgang H. Polak**, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.

6. **Leonard Susskind, Art Friedman**, *Quantum Mechanics: The Theoretical Minimum*, Basic Books, 2014.

7. **Bruce Rosenblum, Fred Kuttner**, *Quantum Enigma: Physics Encounters Consciousness*, Oxford University Press, 2nd Edition, 2011.

8. **GiulianoBenenti, GiulioCasati, GiulianoStrini**, *Principles of Quantum Computation and Information, Volume I: Basic Concepts*, World Scientific Publishing, 2004.

9. **K.B. Whaley et al.**, *Quantum Technologies and Industrial Applications: European Roadmap and Strategy Document*, Quantum Flagship, European Commission, 2020.

10. **Department of Science & Technology (DST), Government of India**, *National Mission on Quantum Technologies & Applications – Official Reports and Whitepapers*, MeitY/DST Publications, 2020 onward.

Online Learning Resources:
1. IBM Quantum Experience and Qiskit Tutorials
2. Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley
3. edX – The Quantum Internet and Quantum Computers
4. YouTube – Quantum Computing for the Determined by Michael Nielsen
5. Qiskit Textbook – IBM Quantum

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(23CS0532) OBJECT ORIENTED ANALYSIS AND DESIGN
(Professional Elective course –I)
Common to CSE, CAD & CCC)

COURSE OBJECTIVES:
The objectives of this course are to
1. *Describe the activities in the different phases of the object-oriented development lifecycle.*
2. *Understand the concepts of object-oriented model with the E-R and EER models.*
3. *Model a real-world application by using UML diagram.*
4. *Design architectural modelling.*
5. *Describing an application of UML.*

COURSE OUTCOMES:
At the end of the course, student will be able to
1. *The importance of modelling in UML.*
2. *Compare and contrast the object-oriented model with the E-R and EER models.*
3. *Design use case diagram. Design an application using deployment diagram.*
4. *Apply UML diagrams to build library application.*
5. *Construct class, sequence, and activity diagrams to represent dynamic and static aspects of a system.*
6. *Design complete object-oriented software solutions using appropriate UML tools and design principles.*

UNIT I
Introduction to UML: Importance of modelling, principles of modelling, object-oriented modelling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II
Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.
Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

UNIT III
Basic Behavioral Modelling-I: Interactions, Interaction diagrams.
Basic Behavioral Modelling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT IV

Advanced Behavioral Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT V

Patterns and Frameworks, Artifact Diagrams. **Case Study**: The Unified Library application.

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson: *The Unified Modelling Language* User Guide, Pearson Education 2nd Edition.
2. *Object-Oriented Analysis and Design with the Unified Process* By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

REFERENCE BOOKS:

1. Meilir Page-Jones: *Fundamentals of Object-Oriented Design in UML,* Pearson Education.
2. Pascal Roques: *Modelling Software Systems Using UML2,* WILEY-Dreamtech India Pvt. Ltd.
3. Atul Kahate: *Object Oriented Analysis & Design*, The McGraw-Hill Companies.
4. Mark Priestley*: Practical Object-Oriented Design with UML*, TMH.
5. Appling UML and Patterns: *An introduction to Object – Oriented Analysis and Design and Unified Process,* Craig Larman, Pearson Education.

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(23CS1215) USER INTERFACE TECHNOLOGIES
(Professional Elective Course –I)

COURSE OBJECTIVES
The objectives of this course:
1. *Introduce the basic web concepts and Internet Protocols*
2. *Explain client-side scripting with JavaScript and DHTML*
3. *Introduce server-side programming with Java servlets, JSP and PHP*
4. *Implement web services through XML.*

COURSE OUTCOMES (COs)
Upon Completion of the course, the students will be able to
1. *Create dynamic and interactive web sites using HTML*
2. *Identify and implement client-side scripting using java script and DHTML*
3. *Design and develop CSS*
4. *Demonstrate understanding of what is XML and how to parse and use XML data*
5. *Implement server-side programming with Java Servlets, JSP and PHP*
6. *Prepare client presentation using AJAX*

UNIT I
HTML5: Introduction Features of HTML5 – Semantic Tags – New Input Elements and tags - Media tags (audio and video tags) – Designing Graphics using Canvas API - Drag and Drop features – Geolocation API

CSS3: Introduction – Features of CSS3 – Implementation of border radius, box shadow, image border, custom web font, backgrounds - Advanced text effects (shadow) - 2D and 3D Transformations.

UNIT II
Responsive Design: Introduction to RWD Techniques – Fluid Layout, Fluid Images and Media queries - Introduction to RWD Framework Twitter Bootstrap – Bootstrap Background and Features - Getting Started with Bootstrap - Demystifying Grids – Off Canvas - Bootstrap Components - JS Plugins – Customization

UNIT III

Client-Side Programming: The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

Server-Side Programming: Java Servlets- Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle- Parameter Data-Sessions-Cookies-URL Rewriting-Other Capabilities.

UNIT IV

Node JS (Server-Side JS Framework) Introduction – Architecture – Feature of Node JS Installation and Setup - Creating web servers with HTTP (Request & Response) – Event Handling - GET & POST implementation – Connect to SQL Database using Node JS – Implementation of CRUD Operations**.**

UNIT V

Angular JS: Introduction to Angular 4.0 - Needs & Evolution – Features – Setup and Configuration. jQuery Introduction -Selectors – jQuery HTML – Animations – Effects – Event Handling – DOM jQuery DOM Traversing, DOM Manipulation – AJAX: Introduction - Architecure of AJAX- jQuery AJAX

TEXT BOOKS
1. Jeffrey C. Jackson, *Web Technologies–A Computer Science Perspective*, Pearson Education, 2006
2. Jason Gilmore, *Beginning PHP and MySQL*, 3rd Edition, Apress Publications (Dream tech.).

REFERENCES

1. Lee Babin, Nathan A Good, Frank M.Kromann and Jon Stephens, *PHP5 Recipes A problem Solution Approach*, Apress publisher, 1st Edition 2005.
2. Deitel and Deitel and Nieto, Prentice Hall, *Internet and World Wide Web – How to Program*, 5th Edition, 2011.
3. Herbert Schildt, *Java-The Complete Reference*, Eighth Edition, Mc Graw Hill Professional, 2011.

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(23EC0414) MICROPROCESSORS AND MICROCONTROLLERS
(Professional Elective course –I)

COURSE OBJECTIVES

The objectives of this course
1. *To comprehend the architecture, operation, and configurations of the 8086 microprocessors.*
2. *To get familiar with 8086 programming concepts, instruction set, and assembly language development tools.*
3. *To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.*
4. *To learn the architecture, instruction set, and programming of the 8051 microcontrollers.*
5. *To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to
1. *Gain knowledge on the architecture, operation, and configurations of the 8086 microprocessors.*
2. *Get familiar with 8086 programming concepts, instruction set, and assembly language development tools.*
3. *Know the interfacing of 8086 with memory, peripherals, and controllers for various applications.*
4. *Learn the architecture, instruction set, and programming of the 8051 microcontrollers.*
5. *Understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.*
6. *Students will understand the specialized features of different microprocessors and how they impact performance and application.*

UNIT I
8086 Architecture: Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode, and maximum mode configuration.

UNIT II
8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT III

8086 Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT IV

Microcontroller - Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V

Interfacing Microcontroller - Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TEXTBOOKS:

1. Microprocessors and Interfacing – *Programming and Hardware by Douglas V Hall*, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition,1994.
2. K M Bhurchandi, A K Ray*, Advanced Microprocessors and Peripherals*, 3rd edition, McGraw Hill Education, 2017.
3. Raj Kamal, Microcontrollers: *Architecture, Programming, Interfacing and System Design,* 2nd edition, Pearson, 2012.

REFERENCES:

1. Ramesh S Gaonkar, *Microprocessor Architecture Programming and Applications with the 8085*, 6th edition, Penram International Publishing, 2013.
2. Kenneth J. Ayala*, The 8051 Microcontroller,* 3rd edition, Cengage Learning, 2004.

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(23CS0534) DATA WAREHOUSING & DATA MINING
(Professional Elective Course –I)

COURSE OBJECTIVE:

The objectives of this course

1. *Familiarize with mathematical foundations of data mining tools.*
2. *Introduce classical models and algorithms in data warehouses and data mining.*
3. *Investigate the kinds of patterns that can be discovered by association rule mining, classification and clustering.*
4. *Explore data mining techniques in various applications like social, scientific and environmental context.*

COURSE OUTCOMES:

Upon completion of the course, the students should be able to:

1. *Design a Data warehouse system and perform business analysis with OLAP tools.*
2. *Apply suitable pre-processing and visualization techniques for data analysis*
3. *Apply frequent pattern and association rule mining techniques for data analysis*
4. *Design appropriate classification and clustering techniques for data analysis*
5. *Infer knowledge from raw data*
6. *Evaluate the performance and effectiveness of data mining models and techniques.*

UNIT I

Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

UNIT II

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT III

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi-Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

UNIT IV:
Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines –– Lazy Learners – Model Evaluation and Selection- Techniques to improve Classification Accuracy. Clustering Techniques – Cluster Analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT V: WEKA TOOL
Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

TEXT BOOK:
1. Jiawei Han and Micheline Kamber, ―*Data Mining Concepts and Techniques*, Third Edition, Elsevier, 2012.
2. Alex Berson and Stephen J. Smith, *Data Warehousing, Data Mining & OLAP*, Tata McGraw-Hill, 35th Reprint, 2016

REFERENCES:
1. Alex Berson and Stephen J.Smith, ―*Data Warehousing, Data Mining & OLAP,* Tata McGraw – Hill Edition, 35th Reprint 2016.
2. K.P. Soman, Shyam Diwakar and V. Ajay, ―*Insight into Data Mining Theory and Practice, Eastern Economy Edition,* Prentice Hall of India, 2006.
3. Ian H.Witten and Eibe Frank, ―*Data Mining: Practical Machine Learning Tools and Techniques*, Elsevier, Second Edition.

ONLINE LEARNING RESOURCES:
1. https://nptel.ac.in/courses/111104104
2. https://nptel.ac.in/courses/106105174

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(23CE0150) GREEN BUILDINGS
(Open Elective - I)

COURSE OBJECTIVES:

The objectives of this course are to make the student:

1. *To understand the fundamental concepts of green buildings, their necessity, and sustainable features.*
2. *To analyze green building concepts, rating systems, and their benefits in India.*
3. *To apply green building design principles, energy efficiency measures, and renewable energy sources.*
4. *To evaluate air conditioning systems, HVAC designs, and energy modeling for sustainable buildings.*
5. *To assess material conservation strategies, waste management, and indoor environmental quality in green buildings.*

COURSE OUTCOMES (COs)

Upon successful completion of the course, students will be able to:

1. *Choose appropriate materials and techniques for achieving the goal of green buildings during their design.*
2. *Analyze market opportunities, resources, different practices of green buildings and its effects on environment*
3. *Evaluate energy efficiency in design of green buildings*
4. *Design effective and eco-friendly green buildings*
5. *Apply natural air conditioning and lighting techniques in design of green buildings*
6. *Conserve materials, water and maintain quality of environment in construction of green buildings*

UNIT – I

Introduction to Green Building: Necessity of Green Buildings, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable Features for Green Buildings.

UNIT – II

Green Building Concepts and Practices: Indian Green Building Council, Green Building Movement in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Buildings, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy-Saving Approaches in Buildings, LEED India Rating System, and Energy Efficiency

UNIT – III

Green Building Design: Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximizing System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Eco-Friendly Captive Power Generation for Factories, Building Requirements.

UNIT – IV

Air Conditioning: Introduction, CII Godrej Green Business Centre, Design Philosophy, Design Interventions, Energy Modeling, HVAC System Design, Chiller Selection, Pump Selection, Selection of Cooling towers, Selection of Air Handling Units, Pre-Cooling of Fresh Air, Interior Lighting Systems, Key Features of The Building, Eco-Friendly Captive Power Generation for Factories, Building Requirements.

UNIT – V

Material Conservation: Handling of Non-Process Waste, Waste Reduction During Construction, Materials with Recycled Content, Local Materials, Material Reuse, Certified Wood, Rapidly Renewable Building Materials and Furniture. Indoor Environment Quality and Occupational Health– Air Conditioning, Indoor Air Quality, Sick Building Syndrome, tobacco Smoke.

TEXT BOOKS:
1. Indian Society of Heating Refrigerating and Air conditioning Engineers, *Handbook on Green Practice,* 2025
2. Tom Woolley and Sam Kimings, *Green Building Hand Book*, 2009.

REFERENCE BOOKS:
1. Trish riley, *Complete Guide to Green Buildings*
2. Kent Peterson, *Standard for the design for High Performance Green Buildings,* 2009
3. *Energy Conservation Building Code –ECBC*, BEE published, 2020
4. Dr.G.Prabhakaran, *Green Buildings and Eco-Engineering,* Vinsa Publishing, 1st edition, 2025

ONLINE LEARNING RESOURCES:
https://archive.nptel.ac.in/courses/105/102/105102195/

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(23CE0151) CONSTRUCTION TECHNOLOGY AND MANAGEMENT
(OPEN ELECTIVE - I)

COURSE OBJECTIVES:
The objectives of this course are to make the student:
1. *To understand project management fundamentals, organizational structures, and leadership principles in construction.*
2. *To analyze manpower planning, equipment management, and cost estimation in civil engineering projects.*
3. *To apply planning, scheduling, and project management techniques such as CPM and PERT.*
4. *To evaluate various contract types, contract formation, and legal aspects in construction management.*
5. *To assess safety management practices, accident prevention strategies, and quality management systems in construction.*

COURSE OUTCOMES (COs):
Upon successful completion of the course, students will be able to:
1. *Realize objectives, functions, public relations and management structure in projects*
2. *Plan and care the human resource needed for the project and can fix the rent of the construction equipment and can perform benefit cost analysis.*
3. *Apply different techniques in scheduling of projects.*
4. *Formulate CPM/PERT networks to evaluate the project completion time and also monitor the project during its life cycle.*
5. *Draft a contract document by incorporating various clauses as per Indian Contract act.*
6. *Implement safety measures to reduce construction related accidents.*

UNIT – I
Introduction: Project forms, Management Objectives and Functions; Organizational Chart of AZ Construction Company; Manager's Duties and Responsibilities; Public Relations; **Leadership and Team** - Work; Ethics, Morale, Delegation and Accountability.

UNIT – II
Man and Machine: Man-Power Planning, Training, Recruitment, Motivation, Welfare Measures and Safety Laws; Machinery for Civil Engineering., Earth Movers and Hauling. Costs, Factors Affecting Purchase, Rent, and Lease of Equipment, and Cost Benefit Estimation.

UNIT – III

Planning, Scheduling and Project Management: Planning Stages, Construction Schedules and Project Specification, Monitoring and Evaluation; Bar-Chart, CPM, PERT, Network-formulation and Time Computation.

UNIT – IV

Contracts: Types of Contracts, formation of Contract – Contract Conditions – Contract for Labor, Material, Design, **Construction** – Drafting of Contract Documents Based On IBRD/ MORTH Standard Bidding Documents – Construction Contracts – Contract Problems – Arbitration and Legal Requirements Computer Applications in Construction Management: Software for Project Planning, Scheduling and Control.

UNIT – V

Safety Management – Implementation and Application of QMS in Safety Programs, ISO 9000 Series, Accident Theories, Cost of Accidents, Problem Areas in Construction Safety, Fall Protection, Incentives, Zero Accident Concepts, Planning for Safety, Occupational Health and Ergonomics.

TEXT BOOKS:
1. SK. Sears, GA. Sears and RH. Cloug, *Construction Project Management*, John Wiley and Sons, 6th Edition, 2016.
2. Saleh Mubarak, *Construction Project Scheduling and Control*, 4th Edition, 2019.

REFERENCE BOOKS:
1. Brien, J.O. and Plotnick, F.L., CPM *in Construction Management*, Mcgraw Hill, 2010.
2. Punmia, B.C., andKhandelwal, K.K., *Project Planning and control with PERT and CPM*, Laxmi Publications, 2002.
3. *Construction Methods and Management*: Pearson New International Edition 8th Edition Stephens Nunnally.
4. Rhoden, M and Cato B, *Construction Management and Organisational Behaviour*, Wiley-Blackwell, 2016.

ONLINE LEARNING RESOURCES:
1. https://archive.nptel.ac.in/courses/105/104/105104161/
2. https://archive.nptel.ac.in/courses/105/103/105103093/

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(23EE0261)ELECTRICAL SAFETY PRACTICES AND STANDARDS
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course are

1. To understand the basic principles of electrical safety, effects of electric shock, and hazards like arc and blast.

2. To learn about safety equipment, overvoltage protection, and fire prevention methods in electrical systems.

3. To gain knowledge of grounding practices, bonding methods, and maintaining safe distances in electrical environments.

4. To become familiar with electrical safety standards, regulations, and practical safety practices in various installations.

COURSE OUTCOMES

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

1. Understanding the Fundamentals of Electrical Safety

2. Identifying and Applying Safety Components

3. Analyzing Grounding Practices and Electrical Bonding

4. Applying Safety Practices in Electrical Installations and Environments

5. Identify various national and international standards and statutory requirements related to electrical safety.

6. Compare and interpret the applications of different electrical safety codes and regulations.

UNIT I

Introduction To Electrical Safety: Fundamentals of Electrical safety-Electric Shock- physiological effects of electric current - Safety requirements –Hazards of electricity- Arc - Blast- Causes for electrical failure.

UNIT II

Safety Components: Introduction to conductors and insulators- voltage classification -safety against over voltages- safety against static electricity-Electrical safety equipment's - Fire extinguishers for electrical safety.

UNIT III

Grounding: General requirements for grounding and bonding- Definitions- System grounding- Equipment grounding - The Earth - Earthing practices- Determining safe approach distance- Determining arc hazard category.

UNIT IV

Safety Practices: General first aid- Safety in handling hand held electrical appliances tools-Electrical safety in train stations-swimming pools, external lighting installations, medical locations-Case studies.

UNIT V

Standards For Electrical Safety: Electricity Acts- Rules & regulations- Electrical standards-NFPA 70 E-OSHA standards- IEEE standards-National Electrical Code 2005 – National Electric Safety code NESC- Statutory requirements from electrical inspectorate.

TEXT BOOKS:

1. Massimo A.G.Mitolo, ―*Electrical Safety of Low-Voltage Systems,* McGraw Hill, USA, 2009.
2. Mohamed El-Sharkawi, ―*Electric Safety - Practice and Standards,* CRC Press, USA, 2014

REFERENCES:

1. Kenneth G.Mastrullo, Ray A. Jones, ―*The Electrical Safety Program Book*, Jones and Bartlett Publishers, London, 2nd Edition, 2011.
2. Palmer Hickman, ―*Electrical Safety-Related Work Practices*, Jones & Bartlett Publishers, London, 2009.
3. Fordham Cooper, W., ―*Electrical Safety Engineering*, Butterworth and Company, London, 1986.
4. John Cadick, Mary Capelli-Schellpfeffer, Dennis K. Neitzel, ―*Electrical Safety Hand book*, McGraw-Hill, New York, USA, 4th edition, 2012.

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(23ME0356) SUSTAINABLE ENERGY TECHNOLOGIES
(Open Elective-I)

COURSE OBJECTIVES:
The objectives of the course are to
1. *To demonstrate the importance the impact of solar radiation, solar PV modules*
2. *To understand the principles of storage in PV systems*
3. *To discuss solar energy storage systems and their applications.*
4. *To get knowledge in wind energy and bio-mass*
5. *To gain insights in geothermal energy, ocean energy and fuel cells.*

COURSE OUTCOMES:
On successful completion of this course the student will be able to
1. *Illustrate the importance of solar radiation and solar PV modules.*
2. *Discuss the storage methods in PV systems*
3. *Explain the solar energy storage for different applications*
4. *Understand the principles of wind energy, and bio-mass energy.*
5. *Attain knowledge in geothermal energy, ocean energy and fuel cells.*
6. *Explain the principles of sustainability and the environmental, social, economic aspects of energy use.*

UNIT I
Solar Radiation: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

Solar PV Modules and PV Systems: PV Module Circuit Design, Module Structure, Packing Density, Interconnections, Mismatch and Temperature Effects, Electrical and Mechanical Insulation, Lifetime of PV Modules, Degradation and Failure, PV Module Parameters, Efficiency of PV Module, Solar PV Systems-Design of Off Grid Solar Power Plant. Installation and Maintenance.

UNIT II
Storage In PV Systems: Battery Operation, Types of Batteries, Battery Parameters, Application and Selection of Batteries for Solar PV System, Battery Maintenance and Measurements, Battery Installation for PV System.

UNIT III

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.

Solar Energy Storage and Applications: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT IV

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

UNIT V

Geothermal Energy: Origin, Applications, Types of Geothermal Resources, Relative Merits **Ocean Energy:** Ocean Thermal Energy; Open Cycle & Closed Cycle OTEC Plants, Environmental Impacts, Challenges.

Fuel Cells: Introduction, Applications, Classification, Different Types of Fuel Cells Such as Phosphoric Acid Fuel Cell, Alkaline Fuel Cell, PEM Fuel Cell, MC Fuel Cell.

TEXT BOOKS:
1. S. P. Sukhatme and J. K. Nayak, *Solar Energy,Principles of Thermal Collection and Storage*, Tata McGraw-Hill.
2. B. H. Khan, *Non-Conventional Energy Resources*, Tata McGraw-Hill, New Delhi, 2006

REFERENCES:
1. D. Yogi Goswami, Frank Kreith, and John F. Kreider, *Principles of Solar Engineering*, Taylor & Francis.
2. Ashok V. Desai, *Non-Conventional Energy*, New Age International (P) Ltd.
3. Ramesh and Kumar, *Renewable Energy Technologies*, Narosa Publishing House.
4. G. D. Roy, *Non-Conventional Energy Source*, Standard Publishers

Online Learning Resources:
1. https://nptel.ac.in/courses/112106318
2. https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=-mwIa2X-SuSiNy13
3. https://youtube.com/playlist?list=PLyqSpQzTE6M-djYukayF6QevPv7WE-

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(23EC0406) ELECTRONIC CIRCUITS
(Open Elective-I)

COURSE OBJECTIVES:
The objectives of the course are to
1. *To understand semiconductor diodes, their characteristics and applications.*
2. *To explore the operation, configurations, and biasing of BJTs.*
3. *To study the operation, analysis, and coupling techniques of BJT amplifiers.*
4. *To learn the operation, applications and uses of feedback amplifiers and oscillators.*
5. *To analyze the characteristics, configurations, and applications of operational amplifiers.*

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. *Explain the operation and characteristics of PN junction diodes and special-purpose diodes such as Zener, Tunnel, LED, Varactor, and Photodiode.*
2. *Analyze the behavior of rectifier circuits (half-wave, full-wave, and bridge) with and without filters, and describe clipping and clamping circuits.*
3. *Demonstrate the operation of Bipolar Junction Transistors in different configurations and evaluate suitable biasing techniques for amplifier stability.*
4. *Compare the performance of single and multistage amplifiers using different coupling methods and analyze the simplified hybrid model in CE, CB, and CC configurations.*
5. *Classify feedback amplifiers and oscillators, and construct basic RC and LC oscillator circuits to meet required oscillation conditions.*
6. *Apply operational amplifier concepts to design and implement analog signal processing applications such as summing amplifiers, integrators, differentiators, and comparators.*

UNIT I
Semiconductor Diode and Applications: Introduction, PN junction diode – structure, operation and VI characteristics, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Positive and Negative Clipping and Clamping circuits (Qualitative treatment only).
Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, LED, Varactor Diode, Photo Diode.

UNIT II
Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch and Amplifier, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.

UNIT III

Single stage amplifiers: Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model.
Multistage amplifiers: Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier; Multistage RC coupled BJT amplifier (Qualitative treatment only).

UNIT IV

Feedback amplifiers: Concepts of feedback, Classification of feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations (Qualitative treatment only).
Oscillators: Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators, Wien Bridge Oscillator.

UNIT V
Op-amp: Classification of IC'S, basic information of Op-amp, ideal and practical Op-amp, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.
Applications of op-amp: Summing, scaling and averaging amplifiers, Integrator, Differentiator, phase shift oscillator and comparator.

TEXT BOOKS:
1. J. Millman and Christos C. Halkias, *Electronic Devices and Circuits*, 3rd Edition, Tata McGraw-Hill, 2006.
2. David A. Bell, *Electronic Devices and Circuit Theory*, 5th Edition, Oxford University Press, 2008.

REFERENCE BOOKS:
1. R. L. Boylestad, Louis Nashelsky, and K. Lal Kishore, *Electronic Devices and Circuit Theory*, 12th Edition, Pearson, 2006.
2. N. Salivahanan and N. Suresh Kumar, *Electronic Devices and Circuits*, 3rd Edition, Tata McGraw-Hill, 2012.
3. S. Sedra and K. C. Smith, *Microelectronic Circuits*, 5th Edition, Oxford University Press.

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(23HS0855) Mathematics for Machine Learning and AI
(Open Elective-I)

COURSE OBJECTIVES:

The objectives of the course are to

1. *To provide a strong mathematical foundation for understanding and developing AI/ML algorithms.*
2. *To enhance the ability to apply linear algebra, probability, and calculus in AI/ML models.*
3. *To equip students with optimization techniques and graph-based methods used in AI applications.*
4. *To develop critical problem-solving skills for analysing mathematical formulations in AI/ML.*

COURSE OUTCOMES:

After successful completion of this course, the students should be able to

1. *Apply linear algebra concepts to ML techniques like PCA and regression.*
2. *Analyze probabilistic models and statistical methods for AI applications.*
3. *Implement optimization techniques for machine learning algorithms.*
4. *Apply the fundamental concepts of Gradient Descent in machine learning to choose the right optimization algorithm*
5. *Utilize vector calculus and transformations in AI-based models*
6. *Develop graph-based AI models using mathematical representations.*

UNIT I

Linear Algebra for Machine Learning: Review of Vector spaces, basis, linear independence, Vector and matrix norms, Matrix factorization techniques, Eigenvalues, eigenvectors, diagonalization, Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT II

Probability and Statistics for AI: Probability distributions: Gaussian, Binomial, Poisson. Bayes 'Theorem, Maximum Likelihood Estimation (MLE), and Maximum a Posteriori (MAP). Entropy and Kullback-Leibler (KL) Divergence in AI, Cross entropy loss, Markov chains.

UNIT III

Optimization Techniques for ML: Multivariable calculus: Gradients, Hessians, Jacobians. Constrained optimization: Lagrange multipliers and KKT conditions.Gradient Descent and its variants (Momentum, Adam) Newton's method, BFGS method.

UNIT IV

Vector Calculus & Transformations: Vector calculus: Gradient, divergence, curl. Fourier Transform & Laplace Transform in ML applications.

UNIT V

Graph Theory for AI: Graph representations: Adjacency matrices, Laplacian matrices. Bayesian Networks & Probabilistic Graphical Models. Introduction to Graph Neural Networks (GNNs).

TEXTBOOKS:
1. Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, *Mathematics for Machine Learning*, Cambridge University Press, 2020.
2. Christopher Bishop, *Pattern Recognition and Machine Learning*, Springer.

REFERENCE BOOKS:
1. Gilbert Strang, Linear Algebra and Its Applications, Cengage Learning, 2016.
2. Jonathan Gross, Jay Yellen, Graph Theory and Its Applications, CRC Press, 2018.

WEB REFERENCES:
1. MIT– Mathematics for Machine Learning https://ocw.mit.edu
2. Stanford CS229 – Machine Learning Course https://cs229.stanford.edu/
3. DeepAI – Mathematical Foundations for AI https://deepai.org

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(23HS0842) MATERIALS CHARACTERIZATION TECHNIQUES
(Open Elective-I)

COURSE OBJECTIVES:
The objectives of the course are to
1. *To provide exposure to different characterization techniques.*
2. *To explain the basic principles and analysis of different spectroscopic techniques.*
3. *To elucidate the working of Scanning electron microscope - Principle, limitations and applications.*
4. *To illustrate the working of the Transmission electron microscope (TEM) - SAED patterns and its applications.*
5. *To educate the uses of advanced electric and magnetic instruments for characterization.*

COURSE OUTCOMES
After successful completion of this course, the students should be able to
1. *Analyze the crystal structure and crystallite size by various methods*
2. *Analyze the morphology of the sample by using a Scanning Electron Microscope*
3. *Analyze the morphology and crystal structure of the sample by using transmission Electron Microscope.*
4. *Explain the difference between SEM and TEM*
5. *Explain the principle and experimental arrangement of various spectroscopic technique*
6. *Identify the construction and working principle of various Electrical & Magnetic Characterization technique*

UNIT I
Structure analysis by Powder X-Ray Diffraction: Introduction, Bragg's law of diffraction, Intensity of Diffracted beams, Factors affecting Diffraction, Intensities, Structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherer and Williamson-Hall (W-H) Methods, Small angle X-ray scattering (SAXS) (in brief).

UNIT II
Microscopy technique -1 –Scanning Electron Microscopy (SEM): Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

UNIT III
Microscopy Technique -2 - Transmission Electron Microscopy (TEM): Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and

image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantage and Limitations of Transmission Electron Microscopy

UNIT IV
Spectroscopy-techniques
Principle, Experimental arrangement, Analysis and advantages of the spectroscopic techniques– (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

UNIT V
Electrical &Magnetic Characterization techniques
Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID.

TEXTBOOKS:
1. Yang Leng, *Material Characterization: Introduction to Microscopic and Spectroscopic Methods*, John Wiley & Sons (Asia) Pvt. Ltd., 2013.
2. David Brandon and Wayne D. Kaplan, *Microstructural Characterization of Materials*, John Wiley & Sons Ltd., 2008

REFERENCE BOOKS:
1. Colin Neville Banwell and Elaine M. McCash, *Fundamentals of Molecular Spectroscopy*, 4th Edition, Tata McGraw-Hill, 2008.
2. Bernard Dennis Cullity and Stuart R. Stock, *Elements of X-Ray Diffraction*, Prentice Hall, 2001.
3. Khalid Sultan, *Practical Guide to Materials Characterization: Techniques and Applications*, Wiley, 2021.
4. Sam Zhang, Lin Li, and Ashok Kumar, *Materials Characterization Techniques*, CRC Press, 2008

NPTEL courses link:
1. https://nptel.ac.in/courses/115/103/115103030/
2. https://nptel.ac.in/content/syllabus_pdf/113106034.pdf
3. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm08/

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(23HS0806) CHEMISTRY OF ENERGY SYSTEMS
(Open Elective-I)

COURSE OBJECTIVES

The objectives of the course are to

1. *To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.*
2. *To understand the basic concepts of processing and limitations of fuel cells and their applications.*
3. *To impart knowledge to the students about fundamental concepts of photochemical cells, reactions and applications.*
4. *Necessity of harnessing alternate energy resources such as solar energy and its basic concepts.*
5. *To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method.*

COURSE OUTCOMES

After successful completion of this course, the students should be able to

1. *Understand the problems based on electrode potential and concept of batteries.*
2. *Apply fuel technology in various energy and engineering contexts.*
3. *Analyze the design and working mechanisms and applications of photo electrochemical cells.*
4. *Analyze the advantages of photoelectric catalytic process such as high efficiency, low*
5. *environmental impact and renewable energy applications.*
6. *Apply the electrochemical principles to photo voltaic cell, solar power and solar cells.*

UNIT I

Electrochemical Systems: Galvanic cell, Nernst equation, standard electrode potential, application of EMF, electrical double layer, polarization, Batteries- Introduction, Lead-acid, Nickel- cadmium, Lithium-ion batteries, and their applications**.**

UNIT II

Fuel Cells: Fuel cell- Introduction, Basic design of fuel cell, working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency and applications.

UNIT III

Photo and Photo electrochemical Conversions: Photochemical cells Introduction and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions and their applications.

UNIT IV

Solar Energy: Introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar cells and applications.

UNIT V

Hydrogen Storage: Hydrogen storage and delivery: State-of-the art, Established technologies, Chemical and Physical methods of hydrogen storage, Compressed gas storage, Liquid hydrogen storage, Other storage methods, Hydrogen storage in metal hydrides, metal organic frameworks (MOF), Metal oxide porous structures, hydrogel, and Organic hydrogen carriers.

TEXT BOOKS

1. Ira N. Levine, *Physical Chemistry*.
2. B. S. Bahl, Arun Bahl, and G. D. Tuli, *Essentials of Physical Chemistry*.
3. Peter Atkins and Tina Overton, *Inorganic Chemistry* (also known as *Shriver and Atkins' Inorganic Chemistry*), Oxford University Press

REFERENCE BOOKS:

1. *Fuel Cell Hand Book* 7th Edition, by US Department of Energy (EG&G technical services And corporation)
2. *Hand book of solar energy and applications* by ArvindTiwari and Shyam.
3. *Solar energy fundamental, technology and systems* by Klaus Jagar et.al.
4. *Hydrogen storage* by Levine Klebonoff

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(23HS0821) ENGLISH FOR COMPETITIVE EXAMINATIONS
(Open Elective-I)

COURSE OBJECTIVES:

The objectives of the course are to

1. *To enable the students to learn about the structure of competitive English*
2. *To understand the grammatical aspects and identify the errors*
3. *To enhance verbal ability and identify the errors*
4. *To improve word power to answer competitive challenges*
5. *To make them ready to crack competitive exams*

COURSE OUTCOMES (CO):

By the end of the program students will be able to

1. *Identify the basics of English grammar and its importance*
2. *Explain the use of grammatical structures in sentences*
3. *Demonstrate the ability to use various concepts in grammar and vocabulary and their applications in everyday use and in competitive exams*
4. *Analyze an unknown passage and reach conclusions about it.*
5. *Choose the appropriate form of verbs in framing sentences*
6. *Develop speed reading and comprehending ability thereby perform better in competitive exams*

UNIT I

Grammar-1: Nouns- classification -errors-Pronouns-types-errors-Adjectives-types-errors Articles-definite indefinite-Degree of Comparison-Adverbs-types- errors-Conjunctions-usage-repositions-usage Tag Questions, types- identifying errors-Practice.

UNIT II

Grammar-2 Verbs-tenses- structure-usages- negatives- positives- time adverbs-Sequence of tenses--If Clause- Voice-active voice and passive voice- reported Speech-Agreement- subject and verb-Modals-Spotting Errors-Practices.

UNIT III

Verbal Ability: Sentence completion-Verbal analogies-Word Groups-Instructions-Critical reasoning-Verbal deduction- Select appropriate pair-Reading Comprehension-Paragraph-Jumbles-Selecting the proper statement by reading a given paragraph.

UNIT IV

Reading Comprehension and Vocabulary Competitive Vocabulary: Word Building – Memory Techniques-Synonyms, Antonyms, Affixes-Prefix &Suffix-One-word substitutes-Compound Words-Phrasal Verbs-Idioms and Phrases-Homophones- Linking Words-Modifiers-Intensifiers - Mastering Competitive Vocabulary- Cracking the unknowing passage-speed reading techniques- Skimming & Scanning-types of answering–Elimination methods

UNIT- V

Writing For Competitive Examinations: Punctuation- Spelling rules- Word Order-Sub Skills of Writing-Paragraph meaning-salient features-types - Note-making, Note-taking, summarizing-precise writing-Paraphrasing-Expansion of proverbs- Essay writing-types.

TEXTBOOKS
1. *Wren & Martin, English for Competitive Examinations*, S.Chand & Co, 2021
2. *Objective English for Competitive Examination*, Tata McGraw Hill, New Delhi, 2014.

REFERENCE BOOKS
1. Prasad, H. M. (2014). *Objective English for Competitive Examination*. New Delhi: Tata McGraw Hill.
2. Solomon, P. S. (2016). *English for Success in Competitive Exams*. Oxford University Press.
3. Verma, S. (n.d.). *Word Power Made Handy*. New Delhi: S. Chand Publications.
4. Neira, A. D., & Co. (2008). *Creative Writing: A Beginner's Manual*. Pearson Education India.
5. Jain, A. (2013). *Vocabulary Learning Techniques* (Vols. I & II). RR Global Publishers.
6. Swan, M. (2006). *Practical English Usage*. Oxford University Press.

ONLINE RESOURCES
1. https://www.grammar.cl/english/parts-of-speech.htm
2. https://academicguides.waldenu.edu/writingcenter/grammar/partsofspeech
3. https://learnenglish.britishcouncil.org/grammar/english-grammar-reference/active-passive-voice
4. https://languagetool.org/insights/post/verb-tenses/
5. https://www.britishcouncil.in/blog/best-free-english-learning-resources-british-council

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(23HS0822) ENTREPRENEURSHIP AND NEW VENTURE CREATION
(Open Elective-I)

COURSE OBJECTIVES:
The objectives of this course are
1. *To foster an entrepreneurial mind-set for venture creation and intrapreneurial leadership.*
2. *To encourage creativity and innovation*
3. *To enable them to learn pitching and presentation skills*
4. *To make the students understand MVP development and validation techniques to determine Product-Market fit and Initiate Solution design, Prototype for Proof of Concept.*
5. *To enhance the ability of analyzing Customer and Market segmentation, estimate Market size, develop and validate Customer Personal*

COURSE OUTCOMES
At the end of the Unit, the learners will be able to
1. *Develop an entrepreneurial mindset and appreciate the concept of entrepreneurship*
2. *Comprehend the process of problem-opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution*
3. *Analyze and refine business models to ensure sustainability and profitability*
4. *Build Prototype for Proof of Concept and validate MVP of their practice venture idea*
5. *Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture*
6. *Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders*

UNIT I

Entrepreneurship Fundamentals and context: Meaning and concept, attributes and mindset of entrepreneurial and intrapreneurial leadership, role models in each and their role in economic development. An understanding of how to build entrepreneurial mindset, skill sets, attributes and networks while on campus. Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16industries to choose from), Venture Activity.

UNIT II

Problem & Customer Identification: Understanding and analyzing the macro-Problem and Industry perspective - technological, socioeconomic and urbanization trends and their implication on new opportunities - Identifying passion- identifying and defining problem using Design thinking principles - Analyzing problem and validating with the potential customer -

Understanding customer segmentation, creating, and validating customer personas. Core Teaching Tool: Several types of activities including Class, game, Gen AI, Get out of the Building 'and Venture Activity.

Unit III
Solution design, Prototyping & Opportunity Assessment and Sizing: Understanding Customer Jobs-to-be-done and crafting innovative solution design to map to customer 's needs and create a strong value proposition - Understanding prototyping and Minimum Viable product (MVP) - Developing a feasibility prototype with differentiating value, features, and benefits - Assess relative market position via competition analysis - Sizing the market and assess scope and potential scale of the opportunity. Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

UNIT IV
Business & Financial Model, Go-to-Market Plan: Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to Business models. Importance of Build - Measure – Lean approach.
Business planning: components of Business plan- Sales plan, People plan and financial plan.
Financial Planning: Types of costs, preparing a financial plan for profitability using financial template, understanding basics of Unit economics, and analyzing financial performance.

UNIT V
Scale Outlook and Venture Pitch readiness: Understand and identify potential and aspiration for scale vis-a-vis your venture idea. Persuasive Storytelling and its key components. Build an Investor ready pitch deck.

TEXT BOOKS

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha *Entrepreneurship*, McGrawHill, 11th Edition.(2020)
2. Ries, E. *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. Crown Business,(2011).
3. Osterwalder, A., & Pigneur, Y. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers.* John Wiley & Sons. (2010).

REFERENCES

1. Simon Sinek,*Start with Why,* Penguin Books limited. (2011)
2. Brown Tim,*Change by Design Revised & Updated: How Design Thinking*
3. *Transforms Organizations and Inspires Innovation,* Harper Business.(2019)
4. Namita Thapar (2022) The Dolphin and the Shark: Stories on Entrepreneurship, Penguin Books Limited.

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(23CS1204) VIRTUALIZATION TECHNIQUES LAB

COURSE OBJECTIVES
The objectives of this course:

1. *The objective of VM ware lab is to learn the cloud architecture and its efficiency, and tools to provide virtualization on cloud.*
2. *The lab enables the study and implementation of infrastructure as a service, storage as a service, and user management on cloud.*
3. *Cloud computing is a style of computing in which dynamically scalable and often*
4. *Virtualized resources are provided as a service over the Internet.*
5. *Learn to run virtual machines of different configuration.*

COURSE OUTCOMES (COs)
Through this course students, should be able to

1. *Define & implement Virtualization using different types of Hypervisors*
2. *Describe steps to perform on demand Application delivery using Ulteo.*
3. *Examine the installation and configuration of Open stack cloud*
4. *Analyze and understand the functioning of different components involved in Amazon Web services cloud platform.*
5. *Describe the functioning of Platform as a Service*
6. *Design & Synthesize Storage as a service using own Cloud.*

LIST OF EXPERIMENTS

1. Install Oracle Virtual box and create two VMs on your laptop.
2. Install Turbo C in guest OS and execute C program.
3. Develop a Hello World application using Google App Engine
4. Develop a Guestbook Application using Google App Engine
5. Develop a Windows Azure Hello World application using.
6. Create a word document of your class time table and store locally and on the cloud with doc, and pdf format. (use www.zoho.com and docs.google.com).
7. Create a spread sheet which contains employee salary information and calculate gross and total salary using the formula.
8. Program to create one Grid resource with three machines.
9. Develop a new Web Service for Calculator.
10. Create your resume in a neat format using google and Zoho cloud.

TEXT BOOKS

1. Phil Scott, *Cloud Management and Automation Certification*: VMware 2V0-731
2. Tony Robinson , *Building Virtual Machine Labs A Hands-On Guide* , Volume I - Black and White Print)

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(23CS0521) COMPUTER NETWORKS & INTERNET PROTOCOLS LAB
(Common to CSE, CCC)

COURSE OBJECTIVES
The course is designed to
1. *To understand the working principle of various communication protocols.*
2. *To understand the network simulator environment and*
3. *To visualize a network topology observe its performance*
4. *To analyze the traffic flow and the contents of protocol frames.*
5. *Familiarize with the applications of Internet.*

COURSE OUTCOMES:
After completion of the course, students will be able to
1. *Design scripts for Wired network simulation*
2. *Design scripts of static and mobile wireless networks simulation*
3. *Analyze the data traffic using tools*
4. *Design JAVA programs for client-server communication*
5. *Construct a wired and wireless network using the real hardware*
6. *Implement basic network security mechanisms and simulate secure data transmission scenarios.*

LIST OF EXPERIMENTS:
1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
3. Implement Dijkastra's algorithm to compute the shortest path through a network
4. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
5. Implement distance vector routing algorithm for obtaining routing tables at each node.
6. Implement data encryption and data decryption
7. Write a program for congestion control using Leaky bucket algorithm.
8. Write a program for frame sorting technique used in buffers.
9. Programs using Wireshark

   i. Packet Capture Using Wire shark
   ii.   Starting Wire shark
   iii.   Viewing Captured Traffic
   iv.   Analysis and Statistics & Filters.

10. How to run Nmap scan
11. Operating System Detection using Nmap
12. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate& Throughput.
    vi. Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to transmission of Packets

TEXTBOOKS
1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 6th Edition, PEARSON.
2. James F.Kurose, Keith W. Ross, Computer Networking: A Top-Down 6th edition, Pearson, 2019. 2. Computer Networks: A Systems Approach-Bruce Davie, VMware-Larry Peterson, Princeton University-2019.

REFERENCES BOOKS:
1. Shivendra S. Panwar, Shiwen Mao, Jeong-Dong Ryoo, and Yihan Li, *TCP/IP Essentials: A Lab-Based Approach*, Cambridge University Press, 2004.
2. Cisco Networking Academy, *CCNA1 and CCNA2 Companion Guide*, 3rd Edition, Cisco Networking Academy Program, 2003.
3. Elliotte Rusty Harold, *Java Network Programming*, 3rd Edition, O'Reilly Media, 2011.

ONLINE LEARNING RESOURCES/VIRTUAL LABS:
1. https://www.netacad.com/courses/packet-tracer-
2. https://www.wireshark.org/docs/wsug_html_chunked/
3. https://nptel.ac.in/courses/106105183/25
4. http://www.nptelvideos.in/2012/11/computer-networks.html
5. https://nptel.ac.in/courses/106105183/3
6. http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php

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(23CS0551) FULL STACK DEVELOPMENT- II
(Skill Enhancement Course)

COURSE OBJECTIVES:

The main objectives of the course are to

1. *Make use of Modern- day JavaScript with ES6 standards for designing Dynamic web pages*
2. *Building robust & responsive User Interfaces using popular JavaScript library _**React.js**'. Building robust backend APIs using _**Express. js**'*
3. *Establishing the connection between frontend (React) User interfaces and backend APIs (Express) with Data Bases(My SQL)*
4. *Familiarize students with GitHub for remote repository hosting and collaborative development*

COURSE OUT COMES:

After completion of the course, students will be able to

1. *Building fast and interactive UIs*
2. *Applying Declarative approach for developing web apps*
3. *Understanding ES6 features to embrace modern JavaScript*
4. *Building reliable APIs with Express. Js*
5. *Integrate front-end and back-end components to create full-stack web applications.*
6. *Deploy full-stack applications with database integration and version control tools*

EXPERIMENTS COVERING THE TOPICS:

1. Introduction to DOM (Document Object Model), Ecma Script (ES6) standards and features like Arrow functions, spread operator, Rest operator, Type coercion, Type hoisting, String literals, Array and Object Destructuring.
2. Basics of React. js like React Components, JSX, Conditional rendering Differences between Real DOM and Virtual DOM.
3. Important React.js concepts like React hooks, Props, React forms, Fetch API, Iterative rendering using JavaScript map () function.
4. JavaScript runtime environment node. js and its uses, Express. js and Routing, Micro-Services architecture and MVC architecture, database connectivity using (My SQL)
5. Introduction to My SQL, setting up MySQL and configuring, Databases, My SQL queries, subqueries, creating My SQL driver for database connectivity to Express. js server.

SAMPLE EXPERIMENTS:

1.   **Introduction to Modern JavaScript and DOM**
   a.   Write a JavaScript program to link JavaScript file with the HTML page
   b.   Write a JavaScript program to select the elements in HTML page using selectors
   c.   Write a JavaScript program to implement the event listeners
   d.   Write a JavaScript program to handle the click events for the HTML button elements
   e.   Write a JavaScript program to With three types of functions
      i.   Function declaration
      ii.   Function definition
      iii. Arrow functions

2.   **Basics of React. js**
   a.   Write a React program to implement a counter button using react class components
   b.   Write a React program to implement a counter button using react functional components
   c.   Write a React program to handle the button click events in functional component
   d.   Write a React program to conditionally render a component in the browser
   e.   Write a React program to display text using String literals

3.   **Important concepts of React. js**
   a.   Write a React program to implement a counter button using React use State hook
   b.   Write a React program to fetch the data from an API using React use Effect hook
   c.   Write a React program with two react components sharing data using Props.
   d.   Write a React program to implement the forms in react
   e.   Write a React program to implement the iterative rendering using map() function.

4.   **Introduction to Node. js and Express. js**
   a.   Write a program to implement the _hello world 'm e s s a g e in the route through the browser using Express
   b.   Write a program to develop a small website with multiple routes using Express. js
   c.   Write a program to print the _hello world 'in the browser console using Express. js
   d.   Write a program to implement the CRUD operations using Express. js
   e.   Write a program to establish the connection between API and Database using Express – My SQL driver

5.   **Introduction to My SQL**
   a.   Write a program to create a Database and table inside that database using My SQL Command line client
   b.   Write a My SQL queries to create table, and insert the data, update the data in the table
   c.   Write a My SQL queries to implement the subqueries in the My SQL command line client
   d.   Write a My SQL program to create the script files in the My SQL workbench
   e.   Write a My SQL program to create a database directory in Project and

initialize a database. sql file to integrate the database into API

TEXTBOOKS:
1. Jon Duckett, *Web Design with HTML, CSS, JavaScript and jQuery*, Wiley.
   Nicholas C. Zakas, *Professional JavaScript for Web Developers*, Wiley.
2. John Dean, *Web Programming with HTML5, CSS, and JavaScript*, Jones & Bartlett Learning, 2019.
3. Vasan Subramanian, *Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node*, 2nd Edition, Apress (O'Reilly).
4. Robin Nixon, *Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites*, O'Reilly.
5. Azat Mardan, *Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB*, 2015*DB*.2015

REFERENCE BOOKS:
1. *Eric Bush, Full-Stack JavaScript Development.*
2. *Robert W. Sebesta, Programming the World Wide Web, 7th Edition, Pearson, 2013.*
3. *Tomasz Dyl, Kamil Przeorski, and Maciej Czarnecki, Mastering Full Stack React Web Development, 2017*

ONLINE LEARNING RESOURCES:
1. https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-js-bootstrap-php-4/
2. https://www.w3schools.com/html
3. https://www.w3schools.com/css
4. https://www.w3schools.com/js/

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(23EC0417) TINKERING LAB

COURSE OBJECTIVES:

The objectives of the course are to

1. *Encourage Innovation and Creativity*
2. *Provide Hands-on Learning and Impart Skill Development*
3. *Foster Collaboration and Teamwork*
4. *Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship*
5. *Impart Problem-Solving mind-set*

COURSE OUTCOMES:

The students will be able to experiment, innovate, and solve real-world challenges.

1. *Enhanced STEM Engagement and Understanding*
2. *Development of Problem-Solving and Critical Thinking Skills*
3. *Cultivating Creativity and Innovation*
   Building Essential Soft Skills
4. *The entrepreneurial mindset fostered in ATLs can prepare students for future opportunities in innovation and technology.*
5. *By engaging with cutting-edge technologies, students are better equipped for the demands of the modern workforce.*

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start- ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

1. Make your own parallel and series circuits using breadboard for any application of your choice.
2. Design and 3D print a Walking Robot
3. Design and 3D Print a Rocket.
4. Temperature & Humidity Monitoring System (DHT11 + LCD)
5. Water Level Detection and Alert System
6. Automatic Plant Watering System
7. Bluetooth-Based Door Lock System
8. Smart Dustbin Using Ultrasonic Sensor
9. Fire Detection and Alarm System
10. RFID-Based Attendance System
11. Voice-Controlled Devices via Google Assistant

12. Heart Rate Monitoring Using Pulse Sensor
13. Soil Moisture-Based Irrigation
14. Smart Helmet for Accident Detection
15. Milk Adulteration Detection System
16. Water Purification via Activated Carbon
17. Solar Dehydrator for Food Drying
18. Temperature-Controlled Chemical Reactor
19. Ethanol Mini-Plant Using Biomass
20. Smart Fluid Flow Control (Solenoid + pH Sensor)
21. Portable Water Quality Tester
22. AI Crop Disease Detection
23. AI-based Smart Irrigation
24. ECG Signal Acquisition and Plotting
25. AI-Powered Traffic Flow Prediction
26. Smart Grid Simulation with Load Monitoring
27. Smart Campus Indoor Navigator
28. Weather Station Prototype
29. Firefighting Robot with Sensor Guidance
30. Facial Recognition Dustbin
31. Barcode-Based Lab Inventory System
32. Growth Chamber for Plants
33. Biomedical Waste Alert System
34. Soil Classification with AI
35. Smart Railway Gate
36. Smart Bin Locator via GPS and Load Sensors
37. Algae-Based Water Purifier
38. Contactless Attendance via Face Recognition

Note: The students can also design and implement their own ideas, apart from the list of experiments mentioned above.

 Note: A minimum of 8 to 10 experiments must be completed by the students. Students need to refer to the following links:

1. https://aim.gov.in/pdf/equipment-manual-pdf.pdf
2. https://atl.aim.gov.in/ATL-Equipment-Manual/
3. https://aim.gov.in/pdf/Level-1.pdf
4. https://aim.gov.in/pdf/Level-2.pdf
5. https://aim.gov.in/pdf/Level-3.pdf

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(23CS1205) EVALUATION OF COMMUNITY SERVICE INTERNSHIP

Mandatory Community Service Project / Internship of 08 weeks duration during summer vacation

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(23CS1206) FOG COMPUTING

COURSE OBJECTIVES

The objectives of this course

1. *To introduce the fundamental concepts, characteristics, and architecture of Fog Computing and its relationship with IoT and Cloud Computing.*
2. *To explore fog computing components, services, and real-world application scenarios including resource estimation and modeling challenges.*
3. *To analyze data management strategies in fog environments including privacy, storage, preprocessing, and real-time analytics.*
4. *To understand fog-based solutions for smart environments through predictive analytics and case studies in e-health and transportation systems.*

COURSE OUTCOMES (COs)

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

1. *Describe the characteristics, components, and architecture of Fog Computing and differentiate it from Cloud Computing.*
2. *Evaluate the role of Fog Computing in IoT-based applications and identify resource estimation challenges.*
3. *Analyze fog data management techniques including preprocessing, storage, and privacy.*
4. *Apply predictive analytics tools like iFogSim and FogTorchΠ for application deployment in fog environments.*
5. *Develop fog computing-based architectures for real-world scenarios such as e-health and intelligent transportation.*
6. *Critically assess system implementation case studies to understand the practical aspects and benefits of fog computing.*

UNIT I

Introduction To Fog Computing Fog Computing-Definition-Characteristics- Application Scenarios- Issues -Fog Computing and Internet of Things–Fog Computing Components - Fog Computing and Cloud Computing- Simple Case Studies (STLS and Wind Farm) -High-Level and Software Architecture

UNIT II

Fog Computing & IoT Resource Estimation: Introduction – Background and Motivation of Fog Computing – Fog Computing Basics – Fog Computing Services - Fog Resource estimation and its challenges

UNIT III

Data Management in Fog Computing: Introduction - Fog Data Management - Data Characteristics - Data preprocessing and Analytics - Data privacy - Data storage and placement - Case Study: E-Health

UNIT IV

Predictive Analysis to Support Fog Application Deployment: Introduction - Smart building (Motivation example) - FogTorchΠ - Fog Application deployment support - Comparing iFogSim and FogTorchΠ

UNIT V

Fog For Health Monitoring & Smart Transport : Introduction - An Architecture of a Health Monitoring IoT-Based System with Fog Computing - Fog Computing Services in Smart E-Health Gateways - System Implementation - Case Studies: Human Fall Detection - Introduction (Smart Transportation Applications) - Data-Driven Intelligent Transportation Systems - Mission-Critical Computing Requirements of Smart Transportation Applications - Fog Computing for Smart Transportation Applications - Case Study: Intelligent Traffic Lights Management (ITLM) System.

TEXT BOOKS:

1. *Fog and Edge Computing: Principles and Paradigms*, First Edition(2019) Rajkumar Buyya, Satish Narayana Srirama, wiley publication
2. *Fog Computing: Theory and Practice by Assad Abbas*, Samee U. Khan, Albert Y. Zomaya

REFERENCES:

1. Amir Vahid Dastjerdi and Rajkumar Buyya, ―*Fog Computing: Helping the Internet of Things Realize its Potential,* University of Melbourne.
2. *Sensors, Cloud, and Fog: The Enabling Technologies for the Internet of Things* Paperback by SudipMisra , Subhadeep Sarkar , Subarna Chatterjee.

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(23CS1207) CRYPTOGRAPHY & DATA SECURITY

COURSE OBJECTIVES

The objective of the course is to

1. *Emphasizes on how to apply and implement cryptography techniques.*
2. *Learn the fundamental of conventional cryptographic algorithms, including the mathematical foundations.*
3. *Introduce the concepts of Asymmetric key Ciphers, cryptographic algorithms and Data security Techniques.*
4. *Provides a broad view of security with digital signature of cryptography to data security.*
5. *Learning the principal of Key Management and Distribution and IP Security.*
6. *Understand various applications of cryptography and security issues practically.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Understand secure cryptography have been designed.*
2. *Understand the issues involved in using asymmetric encryption to distribute Symmetric keys.*
3. *Understand how to perform basic attacks on cryptography.*
4. *Learn various authentication and digital signature techniques.*
5. *Combine security aspects of key management IP security.*
6. *Apply methods for authentication, access control, intrusion detection and prevention.*

UNIT-I

Introduction to security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms.

A model for Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, key range and key size, possible types of attacks.

UNIT-II

Conventional Encryption: Conventional encryption model - classical encryption techniques- Ceaser cipher - Affine cipher - substitution ciphers and transposition ciphers – cryptanalysis - stream and block ciphers- Block Cipher principles, DES, triple DES,

UNIT-III
Asymmetric key Ciphers: RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, DSA algorithm, X448 key exchange, AES, Blowfish, IDEA, Random bit generation and stream ciphering.

UNIT-IV
Introduction to Data Security: Attacks, Vulnerability, Security Goals, Data Integrity: HashFunction, Two Simple Hashing function, Elliptic Curve Cryptography.
IDS Security: Non-malicious Program errors – Buffer overflow, Time-of-check to Time-of-use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks.

UNIT-V
IP Security: Architecture - Authentication header - Encapsulating security payloads - combiningSecurity associations.
Digital Signatures: Digital Signatures - authentication protocols – Over view digital signaturestandards (DSS) - proof of digital signature algorithm, SHA algorithm.

TEXT BOOKS
1. William Stallings, *Cryptography and Network Security –Principles and Practice*, Pearson Education, 6th Edition, 2014.
2. Wade Trappe, Lawrence C Washington, *Introduction to Cryptography with coding theory*, Pearson, 2005.

REFERENCES
1. W. Mao, *Modern Cryptography – Theory and Practice*, Pearson Education
2. Mark Stamp ,*Information Security, Principles, and Practice*, Wiley India.
3. Forouzan Mukhopadhyay ,*Cryptography and Network Security* , Mc Graw Hill, 3rd Edition.
4. Hans Delfs & Helmut Knebl , *Introduction to Cryptography: Principles and Applications*, Second Edition.

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(23CS1208) BIG DATA

COURSE OBJECTIVES

The objectives of this course:

1. *Understand the Big Data Platform and its Use cases*
2. *Provide an over view of Apache Hadoop*
3. *Provide HDFS Concepts and Interfacing with HDFS*
4. *Understand Map Reduce Jobs*
5. *Provide hands on Hodoop EcoSystem*

COURSE OUTCOMES (COs)

On successful completion of course, the students can able to:

1. *Understanding the concepts of BigData and Hadoop along with their applications*
2. *Describe the access and process of data on Distributed File System*
3. *Illustrate the Map-reduce programming in Hadoop framework*
4. *Develop BigData Solutions using Hadoop Eco System*
5. *Analyze the Big Data using HIVE and Hbase to efficiently store and process Big Data to generate analytics*
6. *Understand the usage of BigSQL*

UNIT-I

Introduction To Big Data And Hadoop: Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with Unix tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Bigdata Strategy, Introduction to Infosphere Big Insights and Big Sheets.

UNIT-II

HDFS (Hadoop Distributed File System): The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avroand File-Based Data structures.

UNIT – III

Map Reduce: Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, MapReduce Features.

UNIT-IV

Hadoop Eco System: Pig- Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, PigLatin, User Defined Functions, Data Processing operators.

UNITV

HIVE: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, Hive QL, Tables, Querying Data and User Defined Functions.
Hbase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.

TEXTBOOKS

1. Tom White, *Hadoop: The Definitive Guide,* Third Editon, O'reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, *BigData Analytics,* Wiley 2015.

REFERENCES

1. Michael Berthold, David J. Hand, *Intelligent Data Analysis,* Springer, 2007.
2. Jay Liebowitz, *BigData and Business Analytics* Auerbach Publications, CRC press (2013)
3. Anand Rajaraman and Jefrey David Ulman,*Mining of Massive Datasets,* Cambridge University Press, 2012.
4. Bill Franks, *Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics,* John Wiley& sons, 2012.
5. Michael Mineli, Michele Chambers, Ambiga Dhiraj,*BigData, BigAnalytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses,* Wiley Publications, 2013.
6. Arvind Sathi, *BigData Analytics: Disruptive Technologies for Changing the Game,* MC Press,2012
7. Paul Zikopoulos, Dirk DeRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corigan, *Harness the Power of Big Data The IBM Big Data Platform,* Tata McGraw Hill Publications, 2012.

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(23CS0535) SOFTWARE TESTING METHODOLOGIES
(Professional Elective Course - II)

(Common to CSE, CAD & CCC)

COURSE OBJECTIVES:

The objectives of this course:

1. *To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.*
2. *To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.*
3. *It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.*
4. *It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.*
5. *To learn the domain testing, path testing and logic-based testing to explore the testing process easier.*

COURSE OUTCOMES:

On successful completion of course, the students can able to:

1. *Know the basic concepts of software testing and its essentials.*
2. *Able to identify the various bugs and correcting them after knowing the consequences of the bug.*
3. *Apply control flow-based structural models to design and perform software testing effectively.*
4. *Apply automated testing tools and techniques to evaluate software quality and reliability in real-time scenarios.*
5. *Use of program's control flow as a structural model is the corner stone of testing.*
6. *Performing functional testing using control flow and transaction flow graphs.*

UNIT-I
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs, Flow graphs and Path testing - Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II
Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.
Dataflow testing: Basics of Dataflow Testing, Strategies In Dataflow Testing, Application Of Dataflow Testing.

UNIT-III
Domain Testing: Domains And Paths, Nice & Ugly Domains, Domain Testing, Domains
and Interfaces Testing, Domain and Interface Testing, Domains, and Testability.

UNIT-IV
Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction
Procedure, Applications, Regular Expressions & Flow Anomaly Detection.
Logic Based Testing: over view, decision tables, path expressions, KV charts, specifications.

UNIT-V
State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs,
State Testing, Testability Tips**.**
Graph Matrices and Application: Motivational Overview, Matrix of Graph, Relations,
Power of a Matrix, Node Reduction Algorithm, Building Tools

TEXT BOOKS
1. Boris Beizer, *Software Testing Techniques*, 2nd Edition, Dreamtech Press.
2. Dr. K.V.K.K. Prasad, *Software Testing Tools*, Dreamtech Press.

REFERENCES BOOKS:
1. Brian Marick, *The Craft of Software Testing*, Pearson Education.
2. *Software Testing Techniques*, SPD (O'Reilly).
3. Edward Kit, *Software Testing in the Real World*, Pearson Education.
4. William E. Perry, *Effective Methods of Software Testing*, John Wiley & Sons.
5. Glenford J. Myers, *The Art of Software Testing*, John Wiley & Sons.

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(23CS0536) CYBER SECURITY
(Professional Elective Course – II)

(Common to CSE & CCC)

COURSE OBJECTIVES:
The main objectives of this course are:
1. *Introduce the fundamental Information security concepts & Threats.*
2. *Illustrate the security standards and policies to be maintained by the organizations.*
3. *Describe various Security Performance Metrics & Configuration reviews.*
4. *Discuss the different log management and backup procedures.*

COURSE OUTCOMES:
After completion of the course, students will be able to
1. *Classify the cybercrimes and understand the Indian ITA 2000*
2. *Analyze the vulnerabilities in any computing system and find the solutions*
3. *Predict the security threats of the future*
4. *Investigate the protection mechanisms*
5. *Design security solutions for organizations*
6. *Develop and implement incident response strategies to mitigate cyber-attacks*

UNIT I
Introduction to Cybercrime: Introduction, Cybercrime, and Information Security, who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II
Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber Cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing

UNIT III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones
Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security: Organizational Implications: Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOKS:

1. Nina Godbole and Sunil Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India.
2. William Stallings, *Effective Cybersecurity: A Guide to Using Best Practices and Standards*, Pearson Education, 2018.

REFERENCE BOOKS:

1. James Graham, Richard Howard, and Ryan Otson, *Cyber Security Essentials*, CRC Press.
2. Chwan-Hwa (John) Wu and J. David Irwin, *Introduction to Cyber Security*, CRC Press, Taylor & Francis Group

ONLINE LEARNING RESOURCES:

1. http://nptel.ac.in/courses/106105031/40
2. http://nptel.ac.in/courses/106105031/39

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(23CS1216) CLOUD ARCHITECTURE AND SERVICES
(Professional Elective Course – II)

COURSE OBJECTIVES
This course is designed to:
1. *Define cloud services and models*
2. *Demonstrate design the architecture for new cloud application.*
3. *Explain how to re-architect the existing application for the cloud*
4. *To introduce the various levels of services that can be achieved by cloud.*
5. *To describe the security aspects in cloud.*

COURSE OUTCOMES (COs)
On successful completion of the course, students will be able to:
1. *Understand the concepts of cloud computing fundamentals and its related techniques.*
2. *Ability to design applications for Cloud environment and Virtualization Data centre Environments.*
3. *Analyze the components of cloud computing showing how business agility in an organization can be considered in Storage Network Design.*
4. *Evaluate the deployment of web services and the consistency of services deployed from a cloud architecture.*
5. *Compare and contrast the economic benefits delivered by various cloud models based on application requirements, economic constraints and business requirements.*
6. *Analyze case studies to derive the best practice model to apply when developing and deploying cloud-based applications*

UNIT - I
Cloud Computing Fundamentals: Cloud Computing definition, Cloud types; IaaS, PaaS, SaaS, Benefits and challenges of cloud computing, public vs Private Clouds.
Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security, and disaster recovery.

UNIT - II
Virtualized Data Center Architecture: Cloud Infrastructures; Public, Private, Hybrid. VDC Environments, Concept, Planning and design, Business continuity and Disaster recovery principles. Managing VDC and cloud environments and infrastructures.

UNIT - III
Storage Network Design: Architecture of storage, analysis and planning, Storage network design considerations -NAS and FC SANs, Hybrid storage networking technologies (iSCSI, FCIP, FCoE), Design for storage virtualization in cloud computing, Host system design considerations.

UNIT - IV
Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Identity and Access Management Services, Open Source Private Cloud Software, Apache Hadoop, Hadoop MapReduce Job Execution.

UNIT - V
Applications and Issues in Cloud
Cloud Security: Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity Access Management, Data Security.
Cloud for Industry, Healthcare &Education: Cloud Computing for Healthcare, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud computing for Education.

TEXTBOOKS
1. Arshadeep Bhaga, Vijay Madisetti, *Cloud Computing A Handson Approach*, Universities Press, 2018
2. Raj Kumar Buyya, James Broberg, Andrzej Goscinski ,*Cloud Computing Principles and Paradigms*, Wiley, 2016

REFERENCES
1. Toby Velte, Anthony Velte, Robert Elsenpeter, *Cloud Computing*, *A Practical Approach,* McGraw-Hill Osborne Media; 1 edition, 2009.
2. Dimitris N. Chorafas, *Cloud Computing Strategies*, CRC Press; 1 edition,2010.
3. John W. Rittinghouse and Ames F. Ransome, *Cloud Computing Implementation , Management and security*, CRC press & Francis Group, Boca Raton London New York. 2010.

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(23EC0451) EMBEDDED SYSTEMS DESIGN
(Professional Elective Course – II)

COURSE OBJECTIVES:

This course is designed to:

1. *To understand the history, classification, and design process of embedded systems.*
2. *To explore the core components of embedded systems, including processors, memory, and I/O components.*
3. *To introduce onboard and external communication interfaces used in embedded systems.*
4. *To explain different firmware design approaches and programming techniques for embedded systems.*
5. *To provide an understanding of real-time operating systems and task management in embedded systems.*

COURSE OUTCOMES:

After completing the course, the student will be able to,

1. *Classify embedded systems based on their purpose, generation, and complexity.*
2. *Identify and select appropriate hardware components for an embedded system design.*
3. *Differentiate and implement various communication protocols like I2C, SPI, and CAN.*
4. *Develop firmware using assembly and high-level programming languages.*
5. *Analyze and apply RTOS-based task scheduling and synchronization techniques.*
6. *Integrate hardware and software components to build and test real-time embedded applications.*

UNIT I

I n t r o d u c t i o n to Embedded Systems: History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, The embedded system design process-requirements, specification, architecture design, designing hardware and software, components, system integration, Applications of embedded systems, and characteristics of embedded systems.

UNIT II

Typical Embedded System : Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment LED, relay, piezo buzzer, push button switch, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer.

UNIT III

Communication Interface: Onboard communication interfaces-I2C, SPI, CAN, parallel interface; External communication interfaces-RS232 and RS485, USB, infrared, Bluetooth, Wi-Fi, ZigBe, GPRS, GSM.

UNIT IV

Embedded Firmware Design and Development: Embedded firmware design approaches-super loop-based approach, operating system-based approach; embedded firmware development languages-assembly language-based development, high level language-based development.

UNIT V

RTOS based Embedded System Design: Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-pre-emptive and pre-emptive scheduling; task communication- shared memory, message passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization Issues, Task Synchronization Techniques

TEXT BOOKS:

1. Shibu K.V., *Introduction to Embedded Systems*, McGraw Hill Education.
2. Wayne Wolf, *Computers as Components*, 2nd Edition, Morgan Kaufmann

REFERENCES:

1. Frank Vahid, Tony Givargis, *Embedded System Design*, John Wiley.
2. Lyla B. Das, *Embedded Systems: An Integrated Approach*, Pearson Education, 2012.
3. Raj Kamal, *Embedded Systems*, Tata McGraw-Hill

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(23CS0538) SOFTWARE PROJECT MANAGEMENT
(Professional Elective Course – III)
(Common to CSE, CAD, CCC and CIC)

COURSE OBJECTIVE:
The objectives of this course

1. *Identify main elements of software project*
2. *Explain the purpose of a project's planning documents*
3. *Construct the scope statement and the work breakdown structure*
4. *Demonstrate RUP, Microsoft project 2007 & open- source software project management tools*

COURSE OUT COMES:
After completion of the course, students will be able to
1. *Describe the fundamentals of Project Management*
2. *Recognize and use Project Scheduling Techniques*
3. *Familiarize with Project Control Mechanisms*
4. *Understand Team Management*
5. *Recognize the importance of Project Documentation and Evaluation*
6. *Evaluate software project success factors and best practices through case studies.*

UNIT-I
Conventional Software Management: The waterfall model, Conventional Software Management Performance.
Evolution of Software Economics: Software Economics, Pragmatic Software Cost Estimation.
Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation through Software Environments, Achieving Required Quality, Peer Inspections.

UNIT-II
The Old Way and the New: The principles of Conventional Software Engineering, the Principles of Modern Software Management, Transitioning to Iterative process.
Lifecycle Phases: Engineering and Production Stages, Inception, Elaboration, Construction, Transition Phases.
Artifacts of the Process: The Artifact Sets, Management, Engineering, and programmatic Artifacts.

UNIT-III
Work Flows of the Process: Software Process Workflows, Iteration Workflows.
Checkpoints of the Process: Major and Minor Milestones, Periodic Status Assessments.

Iterative Process Planning: Work Breakdown Structures, Planning Guidelines, Cost and Schedule Estimating Process, Iteration Planning Process Pragmatic Planning.

UNIT-IV
Process Automation: Automation Building Blocks, Project Environment.
Project Control and Process Instrumentation: The Seven Core Metrics, Management Indicators, Quality Indicators.
Tailoring the Process: Process Discriminants. Managing people and organizing teams.

UNIT-V
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, Evolution of Organizations.
Future Software Project Management: Modern Project Profiles, Next Generation Software Economics, Modern Process Transitions
Case Study: The Command Center Processing and Display System-Replacement (CCPDS-R)

TEXT BOOKS:
1. Walker Royce, *Software Project Management*, Pearson Education, 2012.
2. Bob Hughes, Mike Cotterell, and Rajib Mall, *Software Project Management*, 6th Edition, McGraw Hill, 2017

REFERENCE BOOKS:
1. PankajJalote, ―*SoftwareProjectManagementinpractice*‖,5thEdition, PearsonEducation, 2017.
2. Murali K.Chemuturi,Thomas M.Cagley Jr.Mastering *Software Project anagement: Best Practices, Tools and Techniques*, J.Ross Publishing, 2010
3. SanjayMohapatra,―*SoftwareProjectManagement, Cengage Learning*,2011

ONLINE LEARNING RESOURCES:
1. http://nptel.ac.in/courses/106101061/29

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(23CS0539) MOBILE ADHOC NETWORKS
(Professional Elective course –III)
(Common to CSE,CCC,CIC)

COURSE OBJECTIVE:

The objectives of this course

1. *Knowledge of mobile ad hoc networks, design and implementation issues, and available solutions.*
2. *Knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.*
3. *Knowledge of clustering mechanisms and the different schemes that have been employed, e.g., hierarchical, flat, and leaderless.*
4. *Knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards.*

COURSE OUTCOMES:

After completion of the course, students will be able to

1. *Describe the unique issues in ad-hoc/sensor networks.*
2. *Describe current technology trends for the implementation and deployment of wireless ad- hoc/sensor networks.*
3. *Discuss the challenges in designing MAC, routing and transport protocols for wireless ad- hoc/sensor networks.*
4. *Discuss the challenges in designing routing and transport protocols for wireless Adhoc/sensor networks.*
5. *Comprehend the various sensor network Platforms, tools and applications*
6. *Analyze the performance of ad-hoc and sensor network protocols using simulation tools.*

UNIT- I

Introduction to Ad Hoc Networks:

Characteristics of MANETs, Applications of MANETs and challenges of MANETs -Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, other routing algorithms.

UNIT -II

Data Transmission:

Broadcast storm problem, Broadcasting, Multicasting and Geocasting -TC Pover Ad Hoc: TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT- III

Basics of Wireless, Sensors and Applications: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT- IV

Data Retrieval in Sensor Networks: Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots-Security: Security in Ad　　Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

UNIT- V

Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges**, Node-Level Software Platforms -Operating System**: Tiny OS -Imperative Language: nesC, **Data flow style language:** Tiny GALS, Node Level Simulators, ns- 2 and its sensor network extension.

TEXT BOOKS:
1. Carlos Corderio and Dharma P. Aggarwal, *Ad Hoc and Sensor Networks,Theory and Applications*, World Scientific Publications, March 2006, ISBN: 981-256-681-3.

2. Feng Zhao and Leonidas Guibas, *Wireless Sensor Networks: An Information Processing Approach*, Elsevier Science (Morgan Kaufmann), ISBN: 978-1-55860-914-3

REFERENCE BOOKS:
1. C. Siva Ram Murthy and B. S. Manoj, *Ad Hoc Wireless Networks: Architectures and Protocols*, Pearson Education, 2008.
2. Charles E. Perkins, *Ad Hoc Networking*, Addison Wesley, 2001.
3. Mohammad Ilyas, *The Handbook of Ad Hoc Wireless Networks*, CRC Press, 2002.
4. Toh C. K., *Ad Hoc Mobile Wireless Networks: Protocols and Systems*, Prentice Hall PTR, 2002.
5. Raghavendra V. Kulkarni and Ganesh Kumar Venayagamoorthy, *Bio-Inspired Algorithms for Autonomous Mobile Ad Hoc Networks*, IEEE Press/Wiley, 2013

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(23CS0540) NATURAL LANGUAGE PROCESSING
(Professional Elective course –III)
(Common to CSE CIA,CCC,CIC)

COURSE OBJECTIVE
　　1. *Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)*
　　2. *Discuss approaches to syn tax and semantics in NLP.*
　　3. *Examine current methods for statistical approach esto machine translation.*
　　4. *Teach machine learning techniques used in NLP.*

COURSE OUT COMES:
After completion of the course, students will be able to
　　1. *Understand the various NLP Applications and Organization of Natural language, able to learn and implement realistic applications using Python.*
　　2. *Apply the various Parsing techniques, Bayes Rule, Shannongame, Entropy and Cross Entropy.*
　　3. *Understand the fundamentals of CFG and parsers and mechan is msin ATN's.*
　　4. *Apply Semantic Interpretation and Language Modelling.*
　　5. *Apply the concept of Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.*
　　6. *Use NLP tools and libraries to analyze and interpret natural language data in real-world scenarios.*

UNIT- I
Introduction to Natural language: The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Back ground: Anoutline of English Syn tax

UNIT- II
Grammars and Parsing: Grammars and Parsing – Top – Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphologica l Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannongame, Entropy and Cross Entropy.

UNIT- III
Grammars for Natural Language: Grammars for Natural Language, Movement Phenomenon in Language, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

UNIT-IV

Semantic Interpretation: Semantic & Logical form, Word senses & ambiguity, The basic logical form language, encoding ambiguity in the logical Form, Verbs & States in logical form, The Matic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modelling: Introduction, Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language Specific Modelling Problems, Multilingual and Cross- lingual Language Modelling

UNIT-V

Machine Translation: Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusarakaor Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval: Introduction, Document Pre-processing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization; Introduction, Approach esto Summarization, Evaluation, How to Build Summarizer, Competitions and Datasets.

TEXTBOOKS:
1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory To Practice- Daniel M.Bikel and ImedZitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi, Vineetchaitanya, Prentice –Hall of India.

REFERENCE BOOKS:
1. Charniack, Eugene, Statistical Language Learning, MITPress,1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall,2008.
3. Manning, Christopher and Hen rich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press,1999.

ONLINE LEARNING RESOURCES:
1. https://nptel.ac.in/courses/106/105/106105158/http://www.nptelvideos.in/2012/11 /natural-language- processing.html

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(23CS0541) DISTRIBUTED OPERATING SYSTEM
(Professional Elective course –III)
(Common to CSE, CCC)

COURSE OBJECTIVES

1. *To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open-source operating systems)*
2. *Hardware and software features that support these systems.*

COURSE OUTCOMES

1. *Understand the design approaches of advanced operating systems*
2. *Analyze the design issues of distributed operating systems.*
3. *Evaluate design issues of multi-processor operating systems.*
4. *Identify the requirements Distributed File System and Distributed Shared Memory.*
5. *Formulate the solutions to schedule the real time applications.*
6. *Apply fault tolerance and recovery techniques to ensure reliability in distributed systems.*

UNIT - I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. Theoretical Foundations: Inherent Limitations of a Distributed System, Lam port 's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT - II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token – Based Algorithms: Lamport's Algorithm, The Ricart-Agrawal's Algorithm, Maekawa's Algorithm, Token- Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heuristic Algorithm, Raymond's Heuristic Algorithm.

UNIT - III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT - IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi-Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling. Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

UNIT - V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOK:

1. Mukesh Singhal and Niranjan G. Shivaratri, Advanced Concepts in Operating Systems, Tata McGraw-Hill, 2001.
2. Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems, 2nd Edition, Pearson Prentice Hall, 2007

REFERENCE BOOK:

1. Pradeep K. Sinha, *Distributed Operating Systems: Concepts and Design*, PHI Learning, 2007.
2. George Coulouris, Jean Dollimore, Tim Kindberg, and Gordon Blair, *Distributed Systems: Concepts and Design*, 5th Edition, Pearson Education, 2012.
3. Tanenbaum A. S., *Modern Operating Systems*, 4th Edition, Pearson, 2016.
4. Ajay D. Kshemkalyani and Mukesh Singhal, *Distributed Computing: Principles, Algorithms, and Systems*, Cambridge University Press, 2008

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(23CE0152) DISASTER MANAGEMENT
(Open Elective course–II)

COURSE OBJECTIVES

The objectives of this course are to make the student:

1. *Understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.*
2. *Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.*
3. *Apply wind engineering principles and computational techniques in designing wind-resistant structures.*
4. *Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.*
5. *Assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.*

COURSE OUTCOMES:

After successful completion of this course, students will be able to:

1. *Examine types and patterns of natural disasters, interpret hazard maps, and evaluate disaster risk reduction and recovery measures.*
2. *Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.*
3. *Apply wind engineering principles in the design of wind–resistant structures.*
4. *Apply computational techniques for the analysis and design of wind–resistant structures.*
5. *Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.*
6. *Design disaster-resistant structures with innovative construction materials.*

UNIT-I

Introduction to Natural Disasters – Brief introduction to different types of natural disasters, occurrence of disasters in different climatic and geographical regions, hazard maps (earthquake and cyclone) of the world and India, regulations for disaster risk reduction, post-disaster recovery and rehabilitation (socioeconomic consequences).

UNIT-II

Cyclones and Their Impact – Climate change and its impact on tropical cyclones, nature of cyclonic wind, velocities and pressure, cyclone effects, storm surges, floods, and landslides. Behavior of structures in past cyclones and windstorms, case studies. Cyclonic retrofitting, strengthening of structures, and adaptive sustainable reconstruction. Life-line structures such as temporary cyclone shelters

UNIT-III

Wind Engineering and Structural Response: Basic wind engineering, aerodynamics of bluff bodies, vortex shedding, and associated unsteadiness along and across wind forces. *Lab:* Wind tunnel testing and its salient features. Introduction to Computational Fluid Dynamics (CFD). General planning and design considerations under windstorms and cyclones. Wind effects on buildings, towers, glass panels, etc., and wind-resistant features in design. Codal provisions, design wind speed, pressure coefficients. Coastal zoning regulations for construction and reconstruction in coastal areas. Innovative construction materials and techniques, traditional construction techniques in coastal areas

UNIT-IV

Seismology and Earthquake Effects: Causes of earthquakes, plate tectonics, faults, seismic waves; magnitude, intensity, epicenter, energy release, and ground motions. Earthquake effects on ground, soil rupture, liquefaction, and landslides. Performance of ground and buildings in past earthquakes – behavior of various types of buildings and structures, collapse patterns; behavior of non-structural elements such as services, fixtures, and mountings – case studies. Seismic retrofitting – weakness in existing buildings, aging, concepts in repair, restoration, and seismic strengthening

UNIT-V

Planning and Design Considerations for Seismic Safety : General planning and design considerations; building forms, horizontal and vertical eccentricities, mass and stiffness distribution, soft story effects, etc.; seismic effects related to building configuration. Plan and vertical irregularities, redundancy, and setbacks. Construction details – various types of foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, underground and overhead tanks, staircases, and isolation of structures. Innovative construction materials and techniques. Local practices – traditional regional responses. Computational investigation techniques.

TEXT BOOKS:
1.   David Alexander, *Natural Disasters*, 1st Edition, CRC Press, 2017.
2.   Edward A. Keller and Duane E. DeVecchio, *Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes*, 5th Edition, Routledge, 2019.

REFERENCE BOOKS:
1. Ben Wisner, J.C. Gaillard, and Ilan Kelman (Editors), *Handbook of Hazards and Disaster Risk Reduction and Management*, 2nd Edition, Routledge, 2012.
2. Damon P. Coppola, *Introduction to International Disaster Management*, 4th Edition, Butterworth-Heinemann, 2020.
3. Bimal Kanti Paul, *Environmental Hazards and Disasters: Contexts, Perspectives and Management*, 2nd Edition, Wiley-Blackwell, 2020.

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(23CE0153) SUSTAINABILITY IN ENGINEERING PRACTICES
(Open Elective course –II)

COURSE OBJECTIVES

The objectives of this course are to make the student:

1. *Understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials.*
2. *Analyze sustainable construction materials, their durability, and life cycle assessment.*
3. *Apply energy calculations in construction materials and assess their embodied energy.*
4. *Evaluate green building standards, energy codes, and performance ratings.*
5. *Assess the environmental effects of energy use, climate change, and global warming.*

COURSE OUTCOMES

After successful completion of this course, students will be able to:

1. *Recognize the rule of construction materials in contributing to CO_2 emissions from materials*
2. *Choose construction materials that are more sustainable.*
3. *Calculate the embodied energy of various construction materials and assess their contribution to overall building energy consumption.*
4. *Differentiate between embodied and operational energy in buildings and evaluate total life cycle energy use for sustainable construction.*
5. *Implement energy efficiency standards, and rating systems such as LEED, GRIHA, and ECBC, including the role of materials, insulation, and thermal performance in sustainable building design*
6. *Analyze the environmental impacts of non-renewable energy sources, including their role in global warming, greenhouse effects, acid rain, and regional climate changes.*

UNIT – I
Introduction: Introduction and Definition of Sustainability - Carbon Cycle - Role of Construction Material: Concrete and Steel, Etc. - CO_2 Contribution From Cement and Other Construction Materials.

UNIT – II
Materials Used in Sustainable Construction: Construction Materials and Indoor Air Quality - No/Low Cement Concrete - Recycled and Manufactured Aggregate - Role of QC and Durability - Life Cycle and Sustainability.

UNIT – III
Energy Calculations: Components of embodied energy – calculation of embodied energy for construction materials – energy concept and primary energy – embodied energy vis-à-vis operational energy in conditioned buildings – life cycle energy use.

UNIT – IV
Green Buildings
Control of Energy Use in Building - ECBC Code, Codes in Neighboring Tropical Countries -OTTV Concepts and Calculations – Features of LEED and TERI – GRIHA Ratings - Role of Insulation and Thermal Properties of Construction Materials - Influence of Moisture Content and Modeling - Performance Ratings of Green Buildings - Zero Energy Building

UNIT – V
Non-Renewable Sources of Energy and Environmental Impact – Energy norm, coal, oil, natural gas, nuclear energy, global temperature, greenhouse effects, global warming, acid rain: causes, effects and control methods, regional impacts of temperature.

TEXT BOOKS:

1. Charles J. Kibert, *Sustainable Construction: Green Building Design & Delivery*, 4th Edition, Wiley Publishers, 2016.
2. Steve Goodhew, *Sustainable Construction Process*, Wiley Blackwell, UK, 2016.

REFERENCE BOOK:

1. Craig A. Langston & Grace K.C. Ding, *Sustainable Practices in the Built Environment*, Butterworth-Heinemann Publishers, 2011.
2. William P. Spence, *Construction Materials, Methods & Techniques*, 3rd Edition, Yesdee Publication Pvt. Ltd, 2012.

ONLINE REFERENCE:

https://archive.nptel.ac.in/courses/105/105/105105157/

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III B.Tech – II Sem.

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(23EE0262) RENEWABLE ENERGY SOURCES
(Open Elective course–II)

COURSE OBJECTIVES

The objectives of this course are to make the student:

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of solar energy, its harnessing technologies & its applications.*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation.*
4. *Explain the concept of bio energy and its conversion devices.*
5. *Differentiate various renewable energies such as tidal energy, fuel cells.*

COURSE OUTCOMES

After successful completion of this course, students will be able to:

1. *State various sources of energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies.*

UNIT – I

Solar Energy: Solar radiation - beam and diffuse radiation, solar constant, Sun at Zenith, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. Flat plate collectors, concentrating collectors, storage of solar energy - thermal storage.

UNIT – II

PV Energy Systems: Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Solar PV modules from solar cells, mismatch in series and parallel connections design and structure of PV modules, Electrical characteristics of silicon PV cells and modules, Stand-alone PV system configuration, Grid connected PV systems

UNIT – III

Wind Energy: Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades; wind data and energy estimation and site selection considerations.

UNIT IV
Geothermal Energy: Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India

UNIT V
Miscellaneous Energy Technologies: Ocean Energy: Tidal Energy - Principle of working, Operation methods, advantages and limitations. Wave Energy - Principle of working, energy and power from waves, wave energy conversion devices, advantages and limitations. **Bio mass Energy**: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration. **Fuel cell**: Principle of working of various types of fuel cells and their working, performance and limitations.

TEXT BOOKS:
1. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.
2. Chetan Singh Solanki, "Solar Photovoltaics Fundamentals, Technologies and Applications", 2nd Edition, PHI Learning Private Limited, 2012.

REFERENCE BOOKS:
1. Stephen Peake, "*Renewable Energy Power for a Sustainable Future*", Oxford International Edition, 2018.
2. S. P. Sukhatme, "*Solar Energy*", 3rd Edition, Tata McGraw Hill Education Pvt. Ltd, 2008.
3. B H Khan, "*Non-Conventional Energy Resources*", 2nd Edition, Tata McGraw Hill Education Pvt Ltd, 2011.
4. S. Hasan Saeed and D.K. Sharma, "*Non-Conventional Energy Resources*", 3rd Edition, S.K. Kataria & Sons, 2012.
5. G. N. Tiwari and M.K. Ghosal, *"Renewable Energy Resource: Basic Principles and Applications*", Narosa Publishing House, 2004.

ONLINE REFERENCE:
1. https://nptel.ac.in/courses/103103206
2. https://nptel.ac.in/courses/108108078

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(23ME0349) AUTOMATION AND ROBOTICS
(Open Elective course –II)

COURSE OBJECTIVES
The objectives of this course are to make the student:
1. *Fundamentals of industrial automation, production types, automation strategies, and hardware elements used in modern manufacturing processes.*
2. *Understanding of automated manufacturing systems, and strategies for improving productivity and flexibility in industrial automation*
3. *Knowledge of industrial automation and robotics, sensors, and end-effector design for modern manufacturing environments.*
4. *Explain industrial automation and robotics, and trajectory planning for intelligent and efficient manufacturing applications.*
5. *Familiarity of industrial automation and robotics, and practical applications in manufacturing processes.*

COURSE OUTCOMES
After successful completion of this course, students will be able to:
1. *Understand and analyze the structure and functions of automated manufacturing systems, and evaluate hardware components for efficient production.*
2. *Analyze and design automated flow lines with or without buffer storage, perform quantitative evaluations, apply assembly line balancing techniques.*
3. *Classify robot configurations, select suitable actuators and sensors, analyze and apply automation and robotics principles to optimize production efficiency and flexibility.*
4. *Explain the various components of robots andits feedback syatemsandits corrective measures.*
5. *Apply kinematic and dynamic modeling using D-H notation and select appropriate hardware and control strategies for real-world industrial scenario to analyze and design automated and robotic systems.*
6. *Design, program, and implement robotic systems, understand and apply robotics technology to manufacturing tasks*

UNIT – I   Introduction to Automation
Types, Basic elements of an automated system, Manufacturing Industries, Types of production, Functions in manufacturing, Organization and information processing in manufacturing, Automation strategies and levels of automation, Hardware components for automation and process control, mechanical feeders, hoppers, orienteers, high speed automatic insertion devices

UNIT – II
Automated flow lines, Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, Quantitative analysis of flow lines. Assembly line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – III

Introduction to Industrial Robotics, Classification of Robot Configurations, functional line diagram, degrees of freedom. Components common types of arms, joints grippers, factors to be considered in the design of grippers. Robot actuators and Feedback components: Actuators, Pneumatic, Hydraulic actuators, Electric Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity & sensors, Tactile sensors, Proximity sensors.

UNIT – IV

Manipulator Kinematics, Homogenous transformations as applicable to rotation and transition - D-H notation, forward inverse kinematics Manipulator Dynamics: Differential transformations, Jacobians, Lagrange - Euler and Newton – Euler formations. Trajectory Planning: Trajectory Planning and avoidance of obstacles path planning, skew motion, joint integrated motion - straight line motion

UNIT – V

Robot Programming, Methods of programming - requirements and features of programming languages, software packages. Problems with programming languages.

Robot Application in manufacturing: Material Transfer - Material handling, loading and unloading - Process - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:
1. M.P. Groover, Automation , Production systems and CIM, Pearson Edu. 2008
2. M.P. Groover Industrial Robotics , TMH, 1986.

REFERENCE BOOK:
1. *Robotics , Fu K S, McGraw Hill, 4th edition, 2010.*
2. *An Introduction to Robot Technology, P. Coiffet and M. Chaironze, KogamPage Ltd. 1983 London.*
3. *Robotic Engineering , Richard D. Klafter, Prentice Hall*
4. *Robotics, Fundamental Concepts and analysis – Ashitave Ghosal ,Oxford Press, 1/e, 2006*
5. *Robotics and Control , Mittal R K &Nagrath I J , TMH.*

ONLINE REFERENCE :
1. *https://www.youtube.com/watch?v=yxZm9WQJUA0&list=PLRLB5WCqU54UJG45UnazSY mnmhl-gt76o*
2. *https://www.youtube.com/watch?v=6f3bvIhSWyM&list=PLRLB5WCqU54X5Vy4DwjfSODT 3ZJ gwEjyE*

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(23EC0441) DIGITAL ELECTRONICS
(Open Elective course –II)

COURSE OBJECTIVES
The objectives of this course are to make the student:
1. *To Learn Boolean algebra, logic simplification techniques, and combinational circuit design.*
2. *To analyze combinational circuits like adders, subtractors, and code converters.*
3. *To explore combinational logic circuits and their applications in digital design.*
4. *To understand sequential logic circuits, including latches, flip-flops, counters, and shift registers.*
5. *To gain knowledge about programmable logic devices and digital IC's.*

COURSE OUTCOMES
At the end of this course, the students will be able to
1. *Apply Boolean algebra and Karnaugh Maps to simplify and analyze logic expressions.*
2. *Design basic logic gates like AND, OR, NAND, NOR, XOR..*
3. *Analyze and design combinational circuits like adders, subtractors, and perform code conversions.*
4. *Design and implement logic functions using multiplexers, decoders, encoders, and comparators.*
5. *Understand sequentiall logic circuits, including latches, flipflops, counters, and shift registers.*
6. *Implement logic circuits using ROM, PLA, PAL, and standard digital ICs like 74-series.*

UNIT-I
Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex- NOR operations, Minimization of Switching Functions: Karnaugh map method, Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT-II
Introduction to Combinational Design 1: Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

UNIT-III
Combinational Logic Design 2: Decoders, Encoders, Priority Encoder, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers.

UNIT-IV

Sequential Logic Design: Latches, Flip-flops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, set up and hold times, Ripple counters, Shift registers.

UNIT-V

Programmable Logic Devices:ROM, Programmable Logic Devices (PLA and PAL).Digital IC's:Decoder (74x138), Priority Encoder (74x148), multiplexer (74x151) and de-multiplexer (74x155), comparator (74x85).

TEXT BOOKS:

1. M. Morris Mano and Michel D. Ciletti, Digital Design, 5th Edition, Pearson Education, 1999.
2. Zvi Kohavi and Nirah K. Jha, Switching Theory and Finite Automata Theory, 2nd Edition, Tata McGraw-Hill, 2005.

REFERENCE BOOKS:

1. Fundamentals of Logic Design, Charles H Roth,Jr., 5th Edition, Brooks/cole Cengage Learning, 2004.

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(23HS0853) OPTIMIZATION TECHNIQUES IN ENGINEERING
(Open Elective course –II)

COURSE OBJECTIVES:
The course objectives for Optimization Techniques typically include
1. *Understanding the concept of search space and optimality for engineering problems, learning computation techniques for optimizing single and multivariable functions, and formulating optimization problems mathematically.*
2. *Students will also learn to classify optimization problems and choose appropriate methods or solving them, along with understanding various classical and advanced optimization techniques.*

COURSE OUTCOMES:
After successful completion of this course, the students should be able to
1. *Understand the meaning, purpose, tools of Operations Research and linear programming in solving practical problems in industry.*
2. *Interpret the transportation models' solutions and infer solutions to the real-world problems.*
3. *Develop mathematical skills to analyze and solve nonlinear programming models arising from a wide range of applications.*
4. *Apply the concept of non-linear programming for solving the problems involving non-linear constraints and objectives.*
5. *Apply the concept of unconstrained geometric programming for solving the problems involving non-linear constraints and objectives.*
6. *Apply optimization techniques for effective decision-making in real-world problems.*

UNIT-1
Linear programming I: Introduction, Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two-phase Simplex Method, Big-M method.

UNIT – II
Linear programming II: Duality in Linear Programming Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method, Transportation Problem and assignment problem, Complementary slackness Theorem

UNIT – III
Non-linear programming: Unconstrained optimization techniques**,** Introduction**:** Classification of Unconstrained minimization methods, **Direct Search Methods:** Random Search Methods: Descent Method and Fletcher Powell Method, Grid Search Method

UNIT – IV
Non-linear programming: Constrained optimization technique, Introduction, Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria

UNIT-V
Geometric Programming, Unconstrained Minimization Problems: Solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality. **Constrained minimization Problems:** Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

TEXT BOOK:
1. Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.
2. J. C. Panth, Introduction to Optimization Techniques, (7-e) Jain Brothers, New Delhi.

REFERENCES:
1. Harvey M. Wagner, Principles of Operation Research, Printice-Hall of India Pvt. Ltd. New Delhi.
2. Peressimi A.L., Sullivan F.E., Vhl, J. J. Mathematics of Non-linear Programming, Springer – Verlag.

WEB REFERENCE:
https://onlinecourses.nptel.ac.in/noc24_ee122/preview
https://archive.nptel.ac.in/courses/111/105/111105039/
https://onlinecourses.nptel.ac.in/noc21_ce60/preview

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(23HS0858) MATHEMATICAL FOUNDATION OF QUANTUM TECHNOLOGIES
(Open Elective -II)

COURSE OBJECTIVES
The course is designed to
1. *To provide students with essential linear algebra foundations including vector spaces, inner products, and operators for quantum mechanical applications.*
2. *To develop understanding of the transition from finite-dimensional systems to infinite-dimensional function spaces and Hilbert space concepts.*
3. *To establish quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution principles.*
4. *To enable students to apply quantum mechanical principles to solve problems in simple quantum systems and understand statistical interpretation.*
5. *To introduce advanced concepts in composite systems, measurement processes, and modern perspectives in quantum mechanics.*

COURSE OUTCOMES
After successful completion of this course, the students should be able to
1. *Apply linear algebra concepts to function spaces and analyze the transition from finite to infinite dimensional systems.*
2. *Understand vector spaces, inner products, and linear operators with applications to quantum systems.*
3. *Analyze quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution.*
4. *Apply quantum mechanical principles to solve problems in simple quantum systems and evaluate statistical interpretations.*
5. *Understand statistical applications and interpretation with measurement processes..*
6. *Evaluate advanced concepts in composite systems and synthesize understanding of measurement processes and modern quantum theory.*

UNIT I
Linear Algebra Foundation for Quantum Mechanics
Vector spaces definition and examples (R^2, R^3, function spaces), Inner products (dot product, orthogonality, normalization), Linear operators (matrices, eigenvalues, eigenvectors), Finite-dimensional examples (2×2 matrices, spin-1/2 systems), Dirac notation introduction ($|\psi\rangle$, $\langle\varphi|$, $\langle\varphi|\psi\rangle$), Change of basis (transformations, unitary matrices).

UNIT II
From Finite to Infinite Dimensions
Function spaces (L^2 space, square-integrable functions), Inner products for functions ($\int \psi^*\phi \, dx$), Orthogonal function sets (Fourier series, basis functions), Introduction to Hilbert space concept (complete inner product spaces), Position and momentum representations (wave functions), Operators on functions (d/dx, multiplication by x)..

UNIT III
Quantum Mechanical Formalism

Mathematical formulation (states as vectors, observables as operators), Measurement theory (Born rule, expectation values, probabilities), Uncertainty relations (mathematical derivation from commutators), Time evolution (Schrödinger equation, unitary evolution).

UNIT IV
Applications and Statistical Interpretation

Simple applications (infinite square well, harmonic oscillator), Statistical interpretation (ensembles, pure vs mixed states), Measurement process (von Neumann measurement scheme).

UNIT V
Advanced Topics

Composite systems (tensor products basic introduction), Reversibility and irreversibility (unitary evolution vs measurement), Thermodynamic connections (equilibrium states, entropy), Modern perspectives (decoherence, measurement problem conceptual).

TEXT BOOKS
1. David J. Griffiths, Darrell F. Schroeter, ―*Introduction to Quantum Mechanics*, 3rd Edition, Cambridge University Press (2018).
2. R. Shankar, *Principles of Quantum Mechanics*, 2nd Edition, Kluwer Academy/Plenum Publishers (1994).

REFERENCES
1. George. F. Simmons, ―*Introduction to Topology and Modern Analysis*, MedTech Science Press.
2. Gilbert Strang, *Linear Algebra and Its Applications*, 4th Edition, Cengage Learning (2006).
3. John von Neumann and Robert T Beyer, *Mathematical Foundations of Quantum Mechanics*,Princeton Univ. Press (1996).

WEB RESOURCES
1. https://eclass.uoa.gr/modules/document/file.php/CHEM248/Griffiths%20-%20Introduction%20to%20Quantum%20Mechanics%203rd%20ed%202018.pdf

2. https://fisica.net/mecanica-quantica/Shankar%20-%20Principles%20of%20quantum%20mechanics.pdf

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(23HS0843) PHYSICS OF ELECTRONIC MATERIALS AND DEVICES
(Open Elective course–II)

COURSE OBJECTIVES
The course objectives for Optimization Techniques typically include
1. *To make the students to understand the concept of crystal growth, defects in crystals and thin films.*
2. *To provide insight into various semiconducting materials and their properties.*
3. *To develop a strong foundation in semiconductor physics and device engineering.*
4. *To elucidate excitonic and luminescent processes in solid-state materials.*
5. *To understand the principles, technologies, and applications of modern display systems.*

COURSE OUTCOMES
After successful completion of this course, the students should be able to
1. *Understand crystal growth and thin film preparation*
2. *Summarize the basic concepts of semiconductors*
3. *Illustrate the working of various semiconductor devices*
4. *Explain the different type of Transistors*
5. *Analyze various luminescent phenomena and the devices based on these concepts*
6. *Explain the working of different display devices.*

UNIT-I
Fundamentals of Materials Science: Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. The basic idea of point, line, and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RF and glow discharge)

UNIT II
Semiconductors: Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, Diffusion and recombination, Diffusion length. The Fermi level & Fermi-Dirac distribution, Electron and Hole in quantum well, change of electron-hole concentration- Qualitative analysis, Temperature dependency of carrier concentration, Conductivity and mobility, Effects of temperature and doping on mobility, High field effects.

UNIT III
Physics of Semiconductor Devices: Introduction, Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Heterojunctions, Transistors, MOSFETs.
UNIT IV
Excitons and Luminescence- Luminescence: Different types of luminescence, basic definitions, Light emission in solids, Inter-band luminescence, Direct and indirect gap materials.

Photoluminescence: General Principles of photoluminescence, Excitation and relaxation, OLED, Quantum-dot.

Electro-luminescence: General Principles of electroluminescence, light emitting diode, diode laser.

UNIT V

Display devices: LCD, three-dimensional display: Holographic display, light-field displays: Head-mounted display, MOEMS (Micro-Opto-Electro-Mechanical Systems) and MEMS displays

TEXTBOOKS:

1. S. O. Kasap, *Principles of Electronic Materials and Devices*, 4th Edition, McGraw-Hill Education (India) Pvt. Ltd., 2021.
2. Donald A. Neamen, *Semiconductor Physics & Devices: Basic Principles*, 4th Edition, McGraw-Hill, 2012.

REFERENCE BOOKS:

1. B. G. Streetman and S. Banerjee, *Solid State Electronic Devices*, 6th Edition, PHI Learning.
2. Eugene A. Irene, *Electronic Materials Science*, Wiley, 2005.
3. Grover and Jamwal, *Electronic Components and Materials*, Dhanpat Rai and Co., New Delhi, 2012.
4. Wei Gao, Zhengwei Li, and Nigel Sammes, *An Introduction to Electronic Materials for Engineers*, 2nd Edition, World Scientific Publishing Co. Pvt. Ltd., 2011.

NPTEL course links:
1. https://nptel.ac.in/courses/113/106/113106062/
2. https://onlinecourses.nptel.ac.in/noc20_ph24/preview

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(23HS0807) CHEMISTRY OF POLYMERS AND APPLICATIONS
(Open Elective course –II)

COURSE OBJECTIVES
The course objectives for Optimization Techniques typically include
1. *To understand the basic principles of polymers*
2. *To understand natural polymers and their applications.*
3. *To impart knowledge to the students about synthetic polymers, their preparation and importance.*
4. *To enumerate the applications of hydrogel polymers*
5. *To enumerate applications of conducting and degradable polymers in engineering.*

COURSE OUTCOMES(CO)
After successful completion of this course, the students should be able to
1. *Understand fundamentals of polymers and moulding of plastics.*
2. *Analyze the chemical and physical properties of natural polymers and their applications.*
3. *Apply the knowledge of thermoplastic and thermoset polymers in practical situations.*
4. *Evaluate the environmental and industrial relevance of synthetic polymers and their applications.*
5. *Understand the fundamental principles of hydrogel in polymer networks.*
6. *Analyze the preparation and mechanism of conducting and degradable polymers*

UNIT – I
Polymers-Basics and Characterization: Basic concepts: monomers, repeating units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: addition, condensation, copolymerization, and coordination polymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity, and molecular weight distribution. Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers

UNIT – II
Natural Polymers & Modified cellulosics: Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

UNIT – III

Synthetic Polymers: Addition and condensation polymerization processes– Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties. Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers (PE, PVC), Butadiene polymers (BUNA-S, BUNA-N), nylons, Urea-formaldehyde, phenol – formaldehyde, Melamine Epoxy, and Ion exchange resins.

UNIT-IV

Hydrogels of Polymer networks: Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, Applications of hydrogels in drug delivery.

UNIT – V

Conducting and Degradable Polymers- Conducting polymers: Introduction, Classification, Mechanism of conduction in Poly Acetylene, Poly Aniline, Poly Thiophene, Doping, Applications.
Degradable polymers: Introduction, Classifications, Examples, Mechanism of degradation, poly lactic acid, Nylon-6, Polyesters, applications.

TEXT BOOKS:
1. F. W. Billmeyer, *A Textbook of Polymer Science*.
2. G. S. Mishra, *Polymer Chemistry*.

REFERENCES BOOKS:
1. K. J. Saunders, *Organic Polymer Chemistry*, Chapman and Hall.
2. B. Miller, *Advanced Organic Chemistry*, Prentice Hall.
3. Premamoy Ghosh, *Polymer Science and Technology*, 3rd Edition, McGraw-Hill, 2011

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(23HS0823) ACADEMIC WRITING AND PUBLIC SPEAKING
(Open Elective course –II)

COURSE OBJECTIVES:
The course objectives for Optimization Techniques typically include
1. *To encourage all round development of the students by focusing on writing skills*
2. *To make the students aware of non-verbal skills*
3. *To develop analytical skills*
4. *To deliver effective public speeches*

COURSE OUTCOMES (CO):
By the end of the program students will be able to
1. *Understand various elements of Academic Writing*
2. *Identify sources and avoid plagiarism*
3. *Demonstrate the knowledge in writing a Research paper*
4. *Analyze different types of essays*
5. *Assess the speeches of others and know the positive strengths of speakers*
6. *Build confidence in giving an impactful presentation to the audience*

UNIT - I
Introduction to Academic Writing: Introduction to Academic Writing – Essential Features of Academic Writing – Courtesy – Clarity – Conciseness – Correctness – Coherence – Completeness – Types – Descriptive, Analytical, Persuasive, Critical writing

UNIT - II
Academic Journal Article: Art of condensation- summarizing and paraphrasing - Abstract Writing, writing Project Proposal, writing application for internship, Technical/Research/Journal Paper Writing – Conference Paper writing - Editing, Proof Reading – Plagiarism

UNIT - III
Essay & Writing Reviews: Compare and Contrast – Argumentative Essay – Exploratory Essay – Features and Analysis of Sample Essays – Writing Book Report, Summarizing, Book/film Review- SoP

UNIT - IV
Public Speaking: Introduction, Nature, characteristics, significance of Public Speaking – Presentation – 4 Ps of Presentation – Stage Dynamics – Answering Strategies –Analysis of Impactful Speeches- Speeches for Academic events

UNIT - V

Public Speaking and Non-Verbal Delivery : Body Language – Facial Expressions-Kinesics – Oculesics – Proxemics – Haptics – Chronomics - Paralanguage – Signs

TEXTBOOKS:
1. Critical Thinking, Academic Writing and Presentation Skills: MG University Edition Paperback – 1 January 2010 Pearson Education; First edition (1 January 2010)
2. Pease, Allan & Barbara. The Definitive Book of Body Language RHUS Publishers, 2016

REFERENCE BOOKS:
1. Alice Savage, Masoud Shafiei Effective Academic Writing,2Ed.,2014 .sserP ytisrevinU drofxO
2. Shalini Verma, Body Language, S Chand Publications 2011.
3. Sanjay Kumar and Pushpalata,Communication Skills 2E 2015, Oxford.
4. Sharon Gerson, Steven Gerson,Technical Communication Process and Product, Pearson, New Delhi, 2014
5. Elbow, Peter. Writing with Power. OUP USA, 1998

ONLINE LEARNING RESOURCES:
1. https://youtu.be/NNhTIT81nH8p
2. https://www.youtube.com/watch?v=478ccrWKY-A
3. https://www.youtube.com/watch?v=nzGo5ZC1gMw
4. https://www.youtube.com/watch?v=Qve0ZBmJMh4
5. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
6. https://archive.nptel.ac.in/courses/109/107/109107172/#
7. https://archive.nptel.ac.in/courses/109/104/109104107/

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(23CS1209) FOG COMPUTING LAB

COURSE OBJECTIVES

The main objective of this lab is to:
1. *Provide hands-on experience in setting up and simulating fog computing environments.*
2. *Understand the interaction between IoT devices, fog nodes, and the cloud.*
3. *Analyze performance parameters like latency, energy efficiency, and resource allocation in fog environments.*
4. *Apply fog computing concepts to real-time and critical applications such as health monitoring, smart transportation, and smart cities.*

COURSE OUTCOMES (COs)

After successful completion of this course, students will be able to:
1. *Set up and configure basic fog computing environments using simulators/tools.*
2. *Simulate communication between IoT devices, fog nodes, and cloud servers.*
3. *Evaluate performance metrics such as latency, energy, and throughput.*
4. *Analyze and design fog-based applications in real-time use cases.*
5. *Integrate security and resource optimization strategies in fog environments.*
6. *understanding fog computing principles, programming models, security challenges, and the ability to develop and analyze fog-based applications using technologies like containers.*

LIST OF THE EXPERIMENTS:

1. Introduction to Fog Computing Architecture with Simulation Setup (using iFogSim)

2. Simulate Basic Fog Environment with IoT Device and Fog Node Communication

3. Create Multi-tier Fog Topology with Edge–Fog–Cloud Layers

4. Simulation of Load Balancing among Fog Nodes

5. Analyze Latency and Bandwidth Parameters in Fog vs Cloud

6. Simulate Power Consumption in Fog Networks

7. Analyze Fault Tolerance and Failover Handling in Fog Nodes

8. Security Implementation: Data Encryption & Authentication in Fog Nodes

9. Implement Resource Allocation in Fog Nodes

10. Deploy Smart Healthcare Monitoring Application in Fog Environment

TEXT BOOKS:

1. Fog and Edge Computing: Principles and Paradigms, First Edition(2019) Rajkumar Buyya, Satish Narayana Srirama, wiley publication

2. Fog Computing in the Internet of Things: Intelligence at the Edge, Amir Vahid Dastjerdi, Rajkumar Buyya, Springer, 2019.

REFERENCES:

1. Amir Vahid Dastjerdi and Rajkumar Buyya, ―Fog Computing: Helping the Internet of Things Realize its Potential‖, University of Melbourne.

2. Handbook of Fog Computing, Beniamino Di Martino, Rajiv Ranjan, Schahram Dustdar, Springer, 2018.

3. Sensors, Cloud, and Fog: The Enabling Technologies for the Internet of Things Paperbackby SudipMisra , Subhadeep Sarkar , Subarna Chatterjee.

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III B.Tech – II Sem.

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(23CS1210) CRYPTOGRAPHY & DATA SECURITY LAB

COURSE OBJECTIVES

The Objectives of the course:

1. *Provide deeper understanding into cryptography, its application to network security threats/vulnerabilities to networks and countermeasures.*
2. *Explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.*
3. *Presenting symmetric and asymmetric cryptographic systems and covering most important parts of cryptology through introducing many cryptographies technique and algorithms.*
4. *Explaining the hash function as an application of cryptography aligning with the*
5. *concept of message integrity and digital signature authentication*
6. *Understand the issues involved in using Hash functions and ECC symmetric keys.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Understand security concepts and type of attacks and network security algorithms.*
2. *Apply symmetric and asymmetric key cryptography technique to encrypt and decrypt text.*
3. *Apply the knowledge of symmetric key algorithm*
4. *Apply Cryptography Hash Function for message authentication and to solve other applications.*
5. *Understand the concept of security with different key management things.*
6. *Comprehend and apply authentication, email security, web security services and mechanisms.*

LIST OF EXPERIMENTS

1. Write a program to implement mono alphabetic cipher.
2. Write a program to implement ceaser cipher.
3. Write a program to implement affine cipher.
4. Write a program to implement Rail Fence cipher technique.
5. a)Symmetric Ciphers: Classical Encryption Techniques (Substitution)
   b) Symmetric Ciphers: Classical Encryption Techniques (Transposition)
6. Program to implement the Random bit generation and stream ciphering.
7. Advance Encryption Standards: Building Functions (Substitute Bits and Transformation)
8. Program to implement the Cryptography Data Integrity one way hash function.
9. Write a program to implement Secure Hash Algorithm(SHA).
10. Write a program to implement Elliptic Curve Digital Signature Scheme.

TEXT BOOKS

1. William Stallings , *Cryptography and Network Security – Principles and Practice*, Pearson Education, 6th Edition.
2. Wade Trappe, Lawrence C Washington, *Introduction to Cryptography with coding theory*, Pearson.

REFERENCES

1. W. Mao, *Modern Cryptography – Theory and Practice*, Pearson Education
2. Mark Stamp ,*Information Security, Principles, and Practice*, Wiley India.
3. Forouzan Mukhopadhyay, *Cryptography and Network Security* , Mc Graw Hill, 3rd Edition.

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(23HS0818) SOFT SKILLS
(Skill Enhanced course)

COURSE OBJECTIVES
The Objectives of the course:
1. *To encourage all round development of the students by focusing on soft skills*
2. *To make the students aware of critical thinking and problem-solving skills*
3. *To enhance healthy relationship and understanding within and outside an organization*
4. *To function effectively with heterogeneous teams*

COURSE OUTCOMES (CO):
On successful completion of the course, the students will be able to
1. *List out various elements of soft skill*
2. *Describe methods for building professional image*
3. *Apply critical thinking skills in problem solving*
4. *Analyze the needs of an individual and team for well-being*
5. *Assess the situation and take necessary decisions*
6. *Create a productive work place atmosphere using social and work-life skills ensuring personal and emotional well-being*

UNIT – I
Soft Skills & Communication Skills: Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills - Significance, process, types - Barriers of communication - Improving techniques
Activities:
Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity (The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)
Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.
Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.
Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT – II
Critical Thinking: Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:
Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationl evaluating the views of others - Case Study, Story Analysis

UNIT – III
Problem Solving & Decision-Making Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles
Activities:
Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT – IV
Emotional Intelligence & Stress Management: Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self- Regulation – Stress factors – Controlling Stress – Tips
Activities:
Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.
Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment, and frustration in the form of written and oral presentation, Organizing Debates

UNIT – V
Corporate Etiquette: Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette -Corporate grooming tips - Overcoming challenges
Activities
Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

TEXTBOOKS:
1. Mitra Barun K, *Personality Development and Soft Skills*, Oxford University Press, Pap/Cdr edition 2012
2. Dr Shikha Kapoor, *Personality Development and Soft Skills: Preparing for Tomorrow*, KI 2018, international Publishing house

REFERENCES:
1. Sharma, Prashant, *Soft Skills: Personality Development for Life Success,* BPB Publications 2018.
2. Alex K,*Soft SkillsS.Chand& Co,* 2012 (Revised edition
3. Gajendra Singh Chauhan& Sangeetha Sharma,*Soft Skills: An Integrated Approach to*

*Maximise Personality*Published by Wiley, 2013

4. Pillai, Sabina & Fernandez Agna, *Soft Skills and Employability Skills*, Cambridge University Press, 2018

Online Learning Resources:

1. https://youtu.be/-Y-R9hDl7lU
2. https://youtu.be/gkLsn4ddmTs
3. https://youtu.be/2bf9K2rRWwo
4. https://youtu.be/FchfE3c2jzc
5. https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/
6. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
7. https://onlinecourses.nptel.ac.in/noc21_hs76/
8. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y- bOO1_q
9. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7Kl J

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(23HS0816) TECHNICAL PAPER WRITING & IPR
(Non-Credit Course)

COURSE OBJECTIVES:
The Objectives of the course:
1. *To enable the students to practice the basic skills of research paper writing*
2. *To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.*
3. *To practice the basic skills of performing quality literature review*
4. *To help them in knowing the significance of real-life practice and procedure of Patents.*
5. *To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks*

COURSE OUTCOMES:
On successful completion of the course, the students will be able to
1. *Identify key secondary literature related to their proposed technical paper writing*
2. *Explain various principles and styles in technical writing*
3. *Use the acquired knowledge in writing a research/technical paper*
4. *Analyze rights and responsibilities of holder of Patent, Copyright, trademark, International Trademark etc.*
5. *Evaluate different forms of IPR available at national & international Level*
6. *Develop skill of making search of various forms of IPR by using modern tools and techniques.*

UNIT – I
Principles Of Technical Writing:
Styles In Technical Writing; Clarity, Precision, Coherence And Logical Sequence in Writing-Avoiding Ambiguity- Repetition, And Vague Language- Highlighting Your Findings-Discussing Your Limitations -Hedging and Criticizing -Plagiarism and Paraphrasing.

UNIT – II
Technical Research Paper Writing:
Abstract-Objectives-Limitations-Review of Literature- Problems and Framing Research Questions-Synopsis.

UNIT – III
Process of Research: Publication Mechanism:
 Types of Journals- Indexing-Seminars- Conferences-Proof Reading–Plagiarism Style; Seminar & Conference Paper Writing; Methodology-Discussion-Results- Citation Rules.

UNIT – IV
Introduction to Intellectual Property:
Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights: Purpose and Function of Trade-Marks, Acquisition of Trade-Mark Rights, Protectable Matter, Selecting Evaluating Trade Mark and Trade Mark Registration Processes.

UNIT – V
Law of Copy Rights:
Fundamentals of Copy Right Law, Originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice of Copy Right, International Copy Right Law, Law of Patents: Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer. Patent Law and Intellectual Property Audits.

TEXT BOOKS:

1. Deborah E. Bouchoux, *Intellectual Property Rights*, Cengage Learning India, 2013.
2. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practices*, Oxford University Press.

REFERENCES BOOKS:
1. R. Myneni, *Law of Intellectual Property*, 9th Edition, Asia Law House, 2019.
2. Prabuddha Ganguli, *Intellectual Property Rights*, Tata McGraw-Hill, 2001.
3. P. Narayan, *Intellectual Property Law*, 3rd Edition, Eastern Law House, 2007.
4. Adrian Wallwork, *English for Writing Research Papers*, 2nd Edition, Springer, Cham, Heidelberg, New York, 2016.
5. Dan Jones and Sam Dragga, *Technical Writing Style*.

ONLINE RESOURCES
1. https://theconceptwriters.com.pk/principles-of-technical-writing/
2. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
3. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
4. https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/
5. https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf
6. https://lawbhoomi.com/intellectual-property-rights-notes/
7. https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf