23BST01- LINEAR ALGEBRA & CALCULUS

(Common to All Branches of Engineering)

Credits:3
L:T:P::3:0:0

Sessional Marks:30
University Exam Marks:70

Course Objectives:

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

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.
CO2: Utilize mean value theorems to real life problems.
CO3: Familiarize with functions of several variables which is useful in optimization.
CO4: Learn important tools of calculus in higher dimensions.
CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

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).

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.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014, Third Edition (Reprint 2021)

Course Outcomes - Program Outcomes (CO - PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	L		L							
CO2	M	H		L								
CO3	H	M		L								
CO4	H	M		L								
CO5	M	H	M		L							

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DIRECTOR
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23BSTO3-ENGINEERING PHYSICS

(Common for all branches of Engineering)

(2)

Credits-3
L:T:P::3:0:0

Sessional Marks:30
University Exam Marks:70

Course Objectives:

To bridge the gap between the Physics in school at10+2levelandUGlevel engineeringcoursesby identifying the importance of the optical phenomenon like interference, diffraction etc,enlightening the periodic arrangement of atoms in crystalline solids and of concepts quantummechanics,introducenovelconceptsofdielectricandmagneticmaterials,physicsofsemiconductors.

Course Outcomes:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction.CO2:Familiarizewith thebasics ofcrystalsand their structures.
CO3:Explainfundamentalsofquantummechanicsandapplyittoonedimensionalmotionofparticles.
CO4:Summarizevarioustypesofpolarizationofdielectricsandclassifythemagneticmaterials.
CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids.CO6:Identifythe typeof semiconductor using Hall effect.

UNITI Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference inthin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings,Determinationofwavelength andrefractiveindex.
Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due tosingle slit, N-slits (Qualitative) – Diffraction Grating - Dispersive power andresolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization -Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave andQuarter waveplates.

UNITII 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 - Millerindices– separation between successive(hkl)planes.
X-raydiffraction:Bragg'slaw-X-rayDiffractometer–crystalstructuredeterminationbyLaue'sand powder methods

UNITIII Dielectricand Magnetic Materials

DielectricMaterials:Introduction-Dielectricpolarization-Dielectricpolarizability,Susceptibility, Dielectric constant and Displacement Vector – Relation between the electricvectors-Typesofpolarizations-Electronic,IonicandOrientation

polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complexdielectricconstant –Frequencydependenceof polarization–dielectricloss.

MagneticMaterials:Introduction-Magneticdipolemoment-Magnetization-Magneticsusceptibility and permeability – Atomic origin of magnetism - Classification of magneticmaterials:Dia,para,Ferro,anti-ferro&Ferrimagneticmaterials-DomainconceptforFerromagnetism&Domainwalls(Qualitative)-Hysteresis-softandhardmagneticmaterials.

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 dependent wave equations– Particle in a one-dimensional infinite potential well.

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

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 effect and its applications.

Textbooks:

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

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi. Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

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

Course Outcomes –Programs Outcomes (CO-PO) Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M										
CO2	H	L			M				L			
CO3	H	M										
CO4	H	L	M	L	L			L	L			L
CO5	H	H										
CO6	H	M	L	M	L			L	L			M

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23BST05 - COMMUNICATIVE ENGLISH

(3)

(Common to All Branches of Engineering)

Credits:2
L:T:P::2:0:2

Sessional Marks:30
University Exam Marks:70

Course Objectives:

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

Course Outcomes:

CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
CO2: Apply grammatical structures to formulate sentences and correct word forms.
CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions.
CO4: Evaluatereading / listening texts and to write summaries based on global comprehension of these texts.
CO5: Create a coherent paragraph, essay, and resume.

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 of information.
Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar: Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

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)

GrammarCohesivedeviceslinkers,useofarticlesandzeroarticle;prepositions.

Vocabulary: Homonyms,Homophones, Homographs.

UNIT III

Lesson:BIOGRAPHY:ElonMusk

Listening: Listeningforglobalcomprehensionandsummarizingwhatislistened to.
Speaking: Discussingspecifictopicsinpairsorsmallgroupsandreportingwhatisdiscussed
Reading: Readingatextindetailbymakingbasicinferences-recognizingandinterpretingspecificcontextclues; strategiesto usetextclues for comprehension.
Writing: Summarizing,Note-making,paraphrasing
Grammar: Verbs-tenses;subject-verbagreement;Compoundwords,Collocations
Vocabulary: Compoundwords,Collocations

UNITIV

Lesson:INSPIRATION:TheToys ofPeacebySaki

Listening: Making predictions while listening to conversations/ transactional dialogueswithoutvideo;listeningwith video.
Speaking: Role plays for practice of conversational English in academic contexts (formalandinformal)-askingfor andgivinginformation/directions.
Reading: Studying the use of graphic elements in texts to convey information, revealtrends/patterns/relationships,communicateprocesses or display complicateddata.
Writing: LetterWriting:OfficialLetters,Resumes
Grammar: Reportingverbs,Direct&Indirectspeech,Active&PassiveVoice
Vocabulary: Wordsoftenconfused,Jargons

UNITV

Lesson:MOTIVATION: ThePowerofIntrapersonalCommunication(AnEssay)

Listening: Identifyingkeyterms, understandingconceptsandansweringaseriesofrelevant questionsthattestcomprehension.

Speaking: Formaloralpresentationson topicsfromacademiccontexts

Reading: Readingcomprehension.

Writing: Writingstructuredessays onspecifictopics.

Grammar: Editingshorttexts– identifyingandcorrectingcommonerrorsingrammarandusage(articles, prepositions, tenses,subjectverbagreement)

Vocabulary: TechnicalJargons

Textbooks:

1. Pathfinder:CommunicativeEnglishforUndergraduateStudents,1st Edition,OrientBlackSwan, 2023 (Units1,2 &3)
2. EmpoweringwithLanguagebyCengagePublications, 2023(Units 4&5)

ReferenceBooks:

1. Dubey,ShamJi &Co.English forEngineers,Vikas Publishers,2020
2. Bailey,Stephen.Academicwriting:AHandbookforInternationalStudents.Routledge,2014.
3. Murphy,Raymond.EnglishGrammarinUse,FourthEdition,CambridgeUniversityPress,2019.
4. Lewis,Norman.WordPowerMadeEasy-TheCompleteHandbookforBuildingaSuperiorVocabulary. Anchor, 2014.

WebResources:

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

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1							H			M	L	
CO2						H		M				L
CO3		H		M			L					
CO4	L			H					M			
CO5			L		M							H

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23CST01: INTRODUCTION TO PROGRAMMING
(Common to All branches of Engineering)

Credits: 3 **Sessional Marks: 30**
L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

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

Course Outcomes

A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.
CO2: Analyse a problem and develop an algorithm to solve it.
CO3: Implement various algorithms using the C programming language.
CO4: Understand more advanced features of C language.
CO5: Develop problem-solving skills and the ability to debug and optimize the code.

UNIT 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, do- while) 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.

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Director
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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. "The C Programming Language", Brian W. Kernighan and Dennis M.Richie, Prentice-Hall, 1988
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books

1. E. Balagurusamy, "Computing fundamentals and C Programming", McGraw-Hill Education, 2008.
2. Rema Theraja, "Programming in C", Oxford, 2nd Edition, 2016.
3. Behrouz A. Forouzan, Richard F. Gilberg, E.V. Prasad, "C Programming: A Problem Solving Approach", Cengage Learning, 1st edition, 2011

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L										H		
CO2		H	M	L											H
CO3	M	L	H										M	H	
CO4	H	M		L									H		
CO5		L	H	M									M	H	

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23EET01: BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common to All branches of Engineering)

(5)

Credits - 3
L: T: P:: 3: 0: 0

Sessional Marks: 30
University Exam Marks: 70

Course Objectives

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

Course Outcomes:

After the completion of the course students will be able to

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

CO2: 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.

CO3: 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.

CO4: Analyze different electrical circuits, performance of machines and measuring instruments.

CO5: Evaluate different circuit configurations, Machine performance and Power systems operation.

PARTA: 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, timeperiod, 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.Introduction to measuring instruments.

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UNIT-III Energy Resources, Electricity Bill& Safety Measures

Energy Resources: Introductory aspects of Conventional and non-conventional energy resources.

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, TataMcGrawHill, 2019, FirstEdition.
2. Power System Engineering, P.V.Gupta, M.L.Soni, U.S.Bhatnagar and A.Chakrabarti, Dhanpat Rai &Co, 2013.
3. Fundamentals of Electrical Engineering, RajendraPrasad, PHIpublishers,2014,Third Edition.

Reference Books:

1. Basic Electrical Engineering,D.P.KothariandI. J.Nagrath, McGrawHill,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.

WebResources:

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

Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	-	-	-	-	-	-	-	-	-	-	M	-
CO2	H	M	L	-	-	-	-	-	-	-	-	-	-	H	-
CO3	H	M	-	-	-	-	-	-	-	-	-	-	-	M	-
CO4	M	H	-	-	-	-	-	-	-	-	-	-	-	H	-
CO5	M	M	H	-	-	-	-	-	-	-	-	-	-	H	-

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PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

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

Course Outcomes:

After the completion of the course students will be able to

CO 1: Understand semiconductor devices, including the historical evolution of electronics, characteristics of PN Junction Diode, and the operation of Zener Diode.

CO 2: Analyze and design basic electronic circuits, such as rectifiers and amplifiers, and demonstrate competence in working with power supplies and amplification systems.

CO 3: Explain number systems, Boolean algebra, and the functionality of logic gates.

CO 4: Understand the significance of electronic instrumentation systems and their components, as well as the principles of block diagrams.

CO 5: Apply their knowledge of semiconductor devices, basic electronic circuits, and digital electronics to solve real-world problems, troubleshoot electronic systems, and make informed decisions in electronic design and implementation.

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics ofPN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar JunctionTransistor — CB, CE, CC Configurations and Characteristics.

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. Block diagram of Public Address system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3code,Graycode,Hammingcode.BooleanAlgebra,BasicTheoremsandpropertiesofBooleanAlgebra,TruthTablesandFunctionalityofLogicGates–NOT,OR,AND,NOR,NAND,XORand XNOR.

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Textbooks:

1. R.L.Boylestad&LouisNashlesky,ElectronicDevices&CircuitTheory,PearsonEducation, 2021.
2. R.P.Jain,Modern DigitalElectronics, 4th Edition, TataMcGraw Hill,2009

Reference Books:

1. R.S.Sedha, ATextbookof ElectronicDevicesandCircuits,S. Chand&Co,2010.
2. SantiramKal,BasicElectronics-Devices,CircuitsandITFundamentals,PrenticeHall,India,2002.
3. R.T.Paynter,IntroductoryElectronicDevices&Circuits–ConventionalFlowVersion,PearsonEducation,2009.

Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	-	-	-	-	-	-	-	-	-	-	M	H
CO2	H	M	M	-	-	-	-	-	-	-	-	-	-	H	-
CO3	H	M	-	-	-	-	-	-	-	-	-	-	-	-	H
CO4	M	H	-	-	-	-	-	-	-	-	-	-	-	H	-
CO5	M	L	H	-	-	-	-	-	-	-	-	-	-	H	-

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23BSP03-ENGINEERING PHYSICS LAB
(Common to All Branches of Engineering)

Credits:1
L:T:P::0:0:2

Sessional Marks:30
University Exam Marks:70

Course Objectives:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize theimportance of energy gap in the study of conductivity and Hall effect in semiconductors andstudy the parameters and applications of dielectric and magnetic materials by conductingexperiments.

Course Outcomes: The studentswill beable to

CO1: Operate optical instruments like travelling microscope and spectrometer.
CO2:Estimatethewavelengthsofdifferentcoloursusingdiffractiongrating.
CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.
CO4:Evaluatedielectricconstantandmagneticsusceptibilityfordielectricandmagneticmaterialsrespectively.
CO5: Calculate the band gap of a given semiconductor.
CO6: Identifythetypeof semiconductorusingHalleffect.

List of Experiments:

1. Determinationofradiusofcurvatureof a givenPlano-convexlensbyNewton'srings.
2. Determinationofwavelengthsofdifferentspectrallinesinmercuryspectrumusingdiffractiongratingin normal incidenceconfiguration.
3. VerificationofBrewster'slaw
4. Determinationofdielectricconstantusingcharginganddischargingmethod.
5. Studythevariation ofB versus Hbymagnetizing the magneticmaterial (B-H curve).
6. DeterminationofwavelengthofLaserlightusingdiffractiongrating.
7. EstimationofPlanck'sconstantusingphotoelectriceffect.
8. Determinationofthe resistivityof semiconductorsbyfourprobemethods.
9. Determinationofenergygapof asemiconductorusingp-n junctiondiode.
10. MagneticfieldalongtheaxisofacurrentcarryingcircularcoilbyStewartGee'sMethod.
11. DeterminationofHallvoltageandHallcoefficientofagivensemiconductorusingHalleffect.
12. Determinationoftemperaturecoefficients of athermistor.
13. Determinationofaccelerationduetogravityandradiusof Gyrationbyusingacompound pendulum.
14. DeterminationofmagneticsusceptibilitybyKundt'stubemethod.
15. Determinationofrigiditymodulusofthematerialofthegivenwireusing Torsionalpendulum.
16. Sonometer:Verificationoflawsofstretchedstring.
17. Determinationofyoung'smodulusforthegivenmaterialofwoodenscalebynon-uniformbending(ordouble cantilever) method.

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

References:

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

Web Resources

- www.vlab.co.in

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

Course Outcomes –Programs Outcomes (CO-PO) Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		M					H			
CO2	H	M		L					H			
CO3	H	M		H	L				M			
CO4	H	H		H	M				H			L
CO5	H	H		H	M				M			L
CO6	H	H	L	M	L				H			

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23BSP05-COMMUNICATIVE ENGLISH LAB

(Common to All Branches of Engineering)

(8)

Credits- 1
L:T:P::0:0:2

Sessional Marks:30
University Exam Marks:70

Course Objectives:

Themainobjectiveofintroducingthiscourse,CommunicativeEnglishLaboratory,istoexposethe students to a variety of self-instructional, learner friendly modes of language learning. Thestudents will get trained in basic communication skills and also make them ready to face jobinterviews.

Course Outcomes:

CO1:UnderstandthedifferentaspectsoftheEnglishlanguageproficiencywithemphasisonLSRWskills.
CO2:Applycommunication skillsthrough variouslanguagelearningactivities.
CO3:Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.
CO5:Create effective Course Objectives:

List of Topics:

1. Vowels&Consonants
2. Neutralization/AccentRules
3. CommunicationSkills&JAM
4. RolePlayorConversationalPractice
5. E-mailWriting
6. ResumeWriting,Coverletter,SOP
7. GroupDiscussions-methods&practice
8. Debates-Methods&Practice
9. PPTPresentations/PosterPresentation
10. InterviewsSkills

Suggested Software:

- WaldenInfotech
- YoungIndiaFilms

Reference Books:

1. RamanMeenakshi,Sangeeta-Sharma.*TechnicalCommunication*.OxfordPress.2018.
2. TaylorGrant:*EnglishConversationPractice*,TataMcGraw-HillEducationIndia,2016
3. Hewing's,Martin.Cambridge*AcademicEnglish*(B2).CUP,2012.
4. J. Sethi&P.V.Dhamija.*A CourseinPhoneticsandSpokenEnglish*,(2nd Ed),Kindle, 2013

WebResources:

SpokenEnglish:

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

Voice&Accent:

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

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1		L					H			M		
CO2	H					M		L				
CO3		H		M			L					
CO4				H					L		M	
CO5			L		M							H

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Semester: I – I

B.Tech (CSE) – R23

23CSP01: COMPUTER PROGRAMMING LAB

(9)

(Common to All branches of Engineering)

Credits: 1.5
L:T:P :: 0:0:3

Sessional Marks: 30
University Exam Marks: 70

Course Objectives

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

Course Outcomes

A student after completion of the course will be able to

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

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

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

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

UNIT I

WEEK 1

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

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
ii) Exposure to Turbo C, gcc
iii) Writing simple programs using printf(), scanf()

WEEK 2

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

Suggested Experiments /Activities:

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

Lab 2: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

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

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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 on1Darray.
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.

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WEEK 8:

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

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK 9:

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

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

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

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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 experimentsbyparameterpassingusingcallbyvalue.Basicmethodsofnumericalintegration

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

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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", Dorling Kindersley Pvt. Ltd, Pearson, 2010
2. Byron Gottfried, "Schaum's Outline of Programming with C", McGrawHill, 2000.

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Prentice- Hall of India, 2002
2. Behrouz A. Forouzan, Richard F. Gilberg, E.V. Prasad, "C Programming: A Problem Solving Approach", Cengage Learning, 1st edition, 2011

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Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		M		L					H				H		
CO2	M	H								L			H		
CO3	H		L						M					M	
CO4			H	M					L					M	

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Semester:I-I B.Tech Degree for ME-23

23MEP01: ENGINEERING WORKSHOP (10)

(Common to All branches of Engineering)

Credits – 1.5
L: T: P::0: 0:3

Sessional Marks: 30
University Exam Marks: 70

Course Objectives

1. To familiarize students with wood working, sheet metal operations, fitting and electrical housewiring skills.

Course Outcomes

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

CO1: Identify workshop tools and their operational capabilities.
CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO3: Apply fitting operations in various applications.
CO4: Apply basic electrical engineering knowledge for House Wiring Practice

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.

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Textbooks:

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

Reference Books:

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

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				M			L		M			H	M	
CO2	H	H	L							M			H	M	
CO3	H					M				M		L	M	M	
CO4	L	M			H					M			H	M	

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Semester: I – I

B.Tech (CSE) – R23

23CSP02: IT WORKSHOP
(Common to all Branches of Engineering)

Credits: 1
L:T:P :: 0:0:2

Sessional Marks: 30
University Exam Marks: 70

Course Objectives

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

A student after completion of the course will be able to

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

PC Hardware & Software Installation

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

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

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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

Task 1: 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 LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word–Accessing, over simplification, saving files, Using help and resources, rulers, format painter inward.

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

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

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clip art, Drawing toolbar and Word Art, Formatting Images, Text boxes,

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Paragraphs and Mail Merge in word.

EXCEL

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

Task 1: Creating a Scheduler - Features to be covered: Grid lines, 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 – Chat GPT

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."

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

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

Reference Books

1. Vikas Gupta, "Comdex Information Technology Course Kit", WILEY Dream tech, 2005
2. Cheryl A Schmidt, "The Complete Computer Upgrade and Repair Text Book", WILEY Dream tech, 3rd edition, 2013
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2nd edition, 2012.
4. Kate J. Chase, "PC Hardware - A Handbook", PHI (Microsoft), 2004
5. LaTeX Companion, Leslie Lamport, Pearson, 1994.
6. David Anfinson and Kenneth Quamme, "IT Essentials: PC Hardware and Software Companion Guide", CISCO Press, Pearson Education, 3rdedition, 2008
7. Patrick Regan, "IT Essentials: PC Hardware and Software Labs and Study Guide", CISCO Press, Pearson Education, 3rdedition, 2008
8. http://www.promptingguide.ai/.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M				H				L					H	
CO2	H	M										L	H		
CO3	H		M		L										H
CO4	H			M	L								H		
CO5	H		L		M								H		

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23PEP01- HEALTH AND WELLNESS, YOGA AND SPORTS

(12)

(Common to All branches of Engineering)

Credits: 0.5

L:T:P::0:0:1

Sessional Marks:30

University Exam Marks:70

Course Objectives:

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

Course Outcomes:

After completion of the course the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

CO2: Demonstrate an understanding of health-related fitness components.

CO3: Compare and contrast various activities that help enhance their health.

CO4: Assess current personal fitness levels.

CO5: Develop Positive Personality

UNIT 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,Physical, Physiological,psychological effects of Asanas-Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriyas, Mudra, Bandhas, Dhyana, Surya Namaskar, Pranayama and Meditation in Yoga.

UNIT III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.Practicing general and specific warm up, aerobics

ii) Practicing cardiorespiratory fitness, treadmill, run test, 10 min run(or) walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. 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 many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

[illegible] for 10 marks by the concerned teacher for [illegible]

[illegible]

Course Outcomes –Programs Outcomes (CO-PO) Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			H			M	H					L
CO2			H			H	M	H				H
CO3			H			M	M					H
CO4		M				H	M					H
CO5		H				H	M					H

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(14)

23BST04 - CHEMISTRY

(Common to EEE, ECE, CSE, IT) & allied branches)

Credits:3
L:T:P::3:0:0

Sessional Marks:30
University Exam Marks:70

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches.

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

CO1: Compare the materials of construction for battery and electrochemical sensors.
CO2: Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers.
CO3: Explain the principles of spectrometry, slc in separation of solid and liquid mixtures.
CO4: Apply the principle of Band diagrams in the application of conductors and semiconductors.
CO5: Summarize the concepts of Instrumental methods.

UNIT I Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo- and 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.

Supercapacitors: 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.

Primarycells–Zinc-airbattery,Secondarycells–lithium-ionbatteries-workingofthebatteriesincluding cell reactions; Fuel cells, hydrogen-oxygenfuel cell– working of the cells. PolymerElectrolyteMembraneFuel cells (PEMFC).

UNIT IV PolymerChemistry

Introductiontopolymers,functionalityofmonomers,chaingrowthandstepgrowthpolymerization,coordinationpolymerization,withspecificexamplesandmechanismsofpolymerformation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC,Teflon, Bakelite, Nylon-6,6,carbonfibres.

Elastomers–Buna-S,Buna-N–preparation,propertiesandapplications.

Conductingpolymers–polyacetylene,polyaniline,–mechanismofconductionandapplications.Bio-Degradablepolymers-PolyGlycolicAcid(PGA),PolylLacticAcid (PLA).

UNIT V Instrumental MethodsandApplications

Electromagneticspectrum.Absorptionofradiation:Beer-Lambert'slaw.UV-VisibleSpectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modesand selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC:Principle,Instrumentation and Applications.

Textbooks:

1. JainandJain,EngineeringChemistry,16/e,DhanpatRai, 2013.
2. PeterAtkins,JuliodePaulaandJamesKeeler,Atkins'PhysicalChemistry,10/e,OxfordUniversityPress,2010.

ReferenceBooks:

1. SkoogandWest,PrinciplesofInstrumentalAnalysis,6/e,Thomson,2007.
2. J.D.Lee,ConciseInorganicChemistry,5th Edition,WileyPublications,Feb.2008
3. TextbookofPolymerScience, FredW. Billmayer Jr,3rdEdition

Course Outcomes –Programs Outcomes (CO-PO) Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					M						
CO2	H		H			L	M					
CO3		H		M								
CO4	H		M									
CO5				L	H							

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ME

Semester:I-II

B.Tech Degree for ME-23

23CMT01: BASIC CIVIL AND MECHANICAL ENGINEERING (16)

(Common to All branches of Engineering)

Credits - 3
L: T: P::3: 0:0

Sessional Marks: 30
University Exam Marks: 70

Course Objective

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

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

CO1. Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

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.

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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).

Textbooks:

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

Reference Books:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	L	H				L			M			H	M	
CO2	M	H	L				M			M		L	M	H	M
CO3	H	L	M				M			M		L	M	L	L
CO4	H	M	M	H			L			M		L	L	H	
CO5	M	H	M	L			M			M		L	M	H	M

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PART B: BASIC MECHANICAL ENGINEERING

(17)

Course Objectives: The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in differentsectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems andintroduce basics of robotics and its applications.

Course Outcomes: On completion of the course, the student should be able to

CO1: Understand the different manufacturing processes.
CO2: Explain the basics of thermal engineering and its applications.
CO3: Describe the working of different mechanical power transmission systems and power plants.
CO4: Describe the basics of robotics and its applications.

UNIT I

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.
Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT II

Manufacturing Processes: Principles of Casting, Forming, 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.

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UNIT III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants. **Mechanical Power Transmission** - Belt Drives, Chain, Rope drives, Gear Drives and theirapplications. **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. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

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

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
										M			H	M	
CO1	H	L	M	M	M	H	M			M		L	M	H	M
CO2	M	M	M	M	H	M	M			M		L	M	L	L
CO3	H	L	M			M	M			M		L	L	H	
CO4	H	L	M	H			L			M		L			

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23MED01: ENGINEERING GRAPHICS
(Common to All branches of Engineering)

18

Credits - 3
L: T: P:: 1:0: 4

Sessional Marks: 30
University Exam Marks: 70

Course Objectives

1. To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
2. To impart knowledge on the projection of points, lines and plane surfaces
3. To improve the visualization skills for better understanding of projection of solids
4. To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5. To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

Course Outcomes

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

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
CO3: Understand and draw projection of solids in various positions in first quadrant.
CO4: Explain principles behind development of surfaces.
CO5: 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

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

UNIT IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT 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 Transformations using Auto CAD (*Not for end examination*).

Textbook:

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

Reference Books:

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.

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H									M			H		
CO2		H	L							M			H	M	
CO3		L	M	H						M				H	
CO4	H									M			H	M	
CO5			M	H	L					M				M	

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23BSP04 - CHEMISTRY LAB

(Common to EEE, ECE, CSE, IT & allied branches)

(19)

Credits:1
L:T:P::0:0:2

Sessional Marks:30
University Exam Marks:70

Course Objectives:

- Verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.
CO2: Prepare advanced polymer Bakelite materials.
CO3: Measure the strength of an acid present in secondary batteries.
CO4: Analyse the IR spectra of some organic compounds.
CO5: 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

Reference:

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

Reference:

- "Vogel'sQuantitativeChemicalAnalysis6thEdition6thEdition"PearsonPublications
- byJ. Mendham, R.C.Denney, J.D.Barnesand B.Sivasankar

Course Outcomes –Programs Outcomes (CO-PO) Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M								
CO2			H									
CO3		H				M						
CO4		H		M								
CO5	H	H										

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23EEP01: ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP
(Common to All branches of Engineering)

Credits – 1.5 | **Sessional Marks: 30**
L: T: P:: 0: 0: 3 | **University Exam Marks: 70**

CourseObjectives:

To impart knowledge on the fundamental Laws & theorems of electrical circuits, functions of electrical machines and energycalculations.

CourseOutcomes:

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, Power factor; concept of wiring and operation of Electrical Machines andTransformer.
CO2: 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.
CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and powerfactor.
CO4: Analyse various characteristics of electrical circuits, electrical machines and Measuring instruments.
CO5: Design suitable circuits and methodologies for the measurement of various electrical Parameter; Household and commercial wiring.

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Breadboard, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screw driver set,wirestripper,flux, knife/blade, solderingiron, de-soldering pump etc.
   - Provide some exercises otha thard ware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Qmeter, PowerSupplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by thestudents.

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

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- Testing of components like Resistor, Capacitor, Diode,Transistor, ICsetc.- Compare values of components like resistors, inductors, capacitors etc with themeasuredvalues byusinginstruments

PARTA: ELECTRICAL ENGINEERING LAB

Listofexperiments:

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

ReferenceBooks:

1. Basic Electrical Engineering, D.C.Kulshreshtha, TataMcGrawHill, 2019,First Edition.
2. Power System Engineering, P.V.Gupta, M.L.Soni, U.S.Bhatnagarand A.Chakrabarti, DhanpatRai & Co, 2013.
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

Note: Minimum Six Experiments to be performed.

Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	-	-	-	-	-	-	-	-	-	-	M	H
CO2	H	M	M	-	-	-	-	-	-	-	-	-	-	H	-
CO3	H	M	-	-	-	-	-	-	-	-	-	-	-	-	H
CO4	M	H	-	-	-	-	-	-	-	-	-	-	-	H	-
CO5	M	L	H	-	-	-	-	-	-	-	-	-	-	H	-

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23EEP01: ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP
(Common to All branches of Engineering)

22

Credits – 1.5
L: T: P:: 0: 0: 3

Sessional Marks: 30
University Exam Marks: 70

PARTB: ELECTRONICSENGINEERINGLAB

Course Objectives:

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

Course Outcomes: At the end of the course, the student will be able to
CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.

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 rectifiers
4. Implementation of full wave rectifiers.
5. Plot Input & Output characteristics of BJT
6. CE and CB configurations
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gatesusing 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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23NSP01: NSS/COMMUNITY SERVICE

(Common to All branches of Engineering)

(23)

Credits:0.5
L:T:P::0:0:1

Sessional Marks: 30
University Exam Marks:70

Course Objectives:

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

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

CO1: Understand the importance of discipline, character and service motto.
CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO3: Explore human relationships by analyzing social problems.
CO4: Determine to extend their help for the fellow beings and downtrodden people.
CO5: Develop leadership skills and civic responsibilities.

UNIT I Orientation

General Orientation on NSS/Community Service activities, careerguidance.

Activities:

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

UNIT 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.

23NSP01: NSS/COMMUNITY SERVICE

(23)

(Common to All branches of Engineering)

Credits:0.5
L:T:P::0:0:1

Sessional Marks: 30
University Exam Marks:70

Course Objectives:

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

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

CO1: Understand the importance of discipline, character and service motto.
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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, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

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

- [illegible]
- [illegible]
- [illegible]

Course Outcomes –Programs Outcomes (CO-PO) Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								M				H
CO2		H				M				L		M
CO3		H				M						M
CO4	L							M				H
CO5			L					M			M	

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EEE

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23EET02: ELECTRICAL CIRCUIT ANALYSIS-I
(EEE & allied branches)

Credits - 3
L: T: P:: 3: 0: 0

Sessional Marks: 30
University Exam Marks: 70

Course Objectives:
To develop an understanding of the fundamental laws, elements of electrical circuits and to apply circuit analysis toDC and AC circuits.

Course Outcomes:
CO1: Remembering the basic electrical elements and different fundamental laws.
CO2: Understand the network reduction techniques, transformations, concept of self-Inductance andmutual inductance, phasor diagrams, resonance and network theorems.
CO3: Apply the concepts to obtain various mathematical and graphical representations.
CO4: Analyse nodal and mesh networks, series and parallel circuits, steady state response, different circuit topologies (with R, L and C components).
CO5: Evaluation of Network theorems, electrical, magnetic and single-phase circuits.

UNIT-I INTRODUCTION TO ELECTRICAL CIRCUITS
Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources, node and mesh analysis.

UNIT-II MAGNETIC CIRCUITS
Basic definition of MMF,flux and reluctance, analogy between electrical and magnetic circuits,Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dotconvention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

UNIT-III SINGLEPHASECIRCUITS
Characteristics of periodic functions, Average value, R.M.S. value, form factor, representationof a sine function, concept of phasor, phasor diagrams, node and mesh analysis. Steady state analysisof R, L andC circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RLcircuit, series RC circuit, series RLCcircuit, parallel RLcircuit, parallel RC circuit.

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UNIT-IV RESONANCE AND LOCUSDIAGRAMS

SeriesResonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and and bandwidth; Locus diagram: RL, RC, RLC with R,Land C variables.

UNIT-V NETWORK THEOREMS (DC &AC EXCITATIONS)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfertheorem, Reciprocity theorem, Millman'stheorem and compensationtheorem

Textbooks:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, TataMcGrawHill Education, 2005, sixthedition.
2. Network Analysis, M.E. VanValkenburg, PearsonEducation,2019, Revised ThirdEdition.

ReferenceBooks:

1. Fundamentals of Electrical Circuits, Charles K.AlexanderandMathewN.O.Sadiku, McGrawHill Education (India),2013,Fifth Edition
2. Electric Circuits(Schaum'soutlineSeries),Mahmood Nahvi,Joseph Edminister,and K.Rao, Mc Graw Hill Education, 2017, Fifth Edition.
3. Electric Circuits, David A.Bell, Oxford UniversityPress, 2009, SeventhEdition.
4. Introductory Circuit Analysis, Robert LBoylestad, Pearson Publications, 2023, FourteenthEdition.
5. CircuitTheory: Analysis and Synthesis, A.Chakrabarti, DhanpatRai&Co., 2018, SeventhRevised Edition.

WebResources:

1. https://onlinecourses.nptel.ac.in/noc23_ee81/preview
2. https://nptel.ac.in/courses/108104139
3. https://nptel.ac.in/courses/108106172
4. https://nptel.ac.in/courses/117106108

Course Outcome-Program Outcome- Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	M	-	-	L	-	-
CO2	L	H	M	-	-	-	-	-	-	M	-	-	-	H	-
CO3	H	M	-	-	-	-	-	-	-	M	-	-	-	M	-
CO4	L	H	M	-	-	-	-	-	-	M	-	-	-	M	-
CO5	H	M	-	-	-	-	-	-	-	M	-	-	-	M	-

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23EEP02: ELECTRICAL CIRCUITS LAB
(EEE & allied branches)

Credits – 1.5
L: T: P:: 0: 0: 3

Sessional Marks: 30
University Exam Marks: 70

Course Objectives:

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

Course Outcomes:

CO1: Understand the concepts of network theorems, node and mesh networks, series and Parallel resonance and Locus diagrams.
CO2: Apply various theorems to compare practical results obtained with theoretical Calculations.
CO3: Determine self, mutual inductances and coefficient of coupling values, parameters of Choke coil.
CO4: Analyse different circuit characteristics with the help of fundamental laws and various configurations.
CO5: Create locus diagrams of RL, RC series circuits and examine series and parallel resonance.

List of Experiments:

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

ReferenceBooks:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Network Analysis,M.E.VanValkenburg,Pearson Education,2019,Revised Third Edition

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23BST02 -DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All Branches of Engineering)

(13)

Credits: 3
L:T:P::3:0:0

Sessional Marks:30
University Exam Marks:70

Course Objectives:

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

CO1: Solve the differential equations related to various engineering fields.

CO2: Identify solution methods for partial differential equations that model physical processes.

CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO4: 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,

UNIT V **Vector integration**

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.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017.

Course Outcomes - Program Outcomes (CO - PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M	L	L						
CO2	H	M	H									
CO3	M	H	M	L	L							
CO4	H	M	L	L								

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23BST07: DISCRETE MATHEMATICS & GRAPH THEORY II-I
(Common to CSE and all CSE allied branches)

Credits: 3
L:T:P::3:0:0

Sessional Marks: 30
University Exam Marks: 70

Course Objectives:

- To equip students with the knowledge of logical connectives, compound propositions and symbols to predicate logic.
- Identify binary operations on Sets, Relations, Functions and understand the concepts of groups, semi-group and monoid.
- Know the concepts of Permutations & Combinations and use Binomial theorem to expand the expressions.
- Use generating functions to solve recurrence relations.
- Provide fundamental concepts associated with simple graph and directed graphs.

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

CO1: Apply mathematical logic to solve problems.
CO2: Understand the concepts and perform the operations related to sets, relations and functions.
Gain the conceptual background needed and identify structures of algebraic nature.
CO3: Apply basic counting techniques to solve combinatorial problems.
CO4: Formulate problems and solve recurrence relations.
CO5: 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 IV 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:
J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002.
Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and

Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.

Reference Books:

1. Joe L. Mott, Abraham Kandel and Theodore P. 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:

http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓								
CO2	✓	✓	✓									
CO3	✓	✓			✓							
CO4	✓	✓	✓	✓								
CO5	✓	✓	✓		✓							

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23HMT01 - UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Credits – 3
L:T:P::2:1:0

Sessional Marks: 30
University Exam Marks: 70

Course Objectives:

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

Course Outcomes:

COs	Statements	Blooms Level
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	L1, L2
CO2	Identify one's self, and one's surroundings (family, society nature)	L1, L2
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life	L3
CO4	Relate human values with human relationship and human society	L4
CO5	Justify the need for universal human values and harmonious existence	L5
CO6	Develop as socially and ecologically responsible engineers	L3, L6

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

READINGS:

Textbook and Teachers Manual

a. The Textbook

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

b. The Teacher's Manual

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

Reference Books

1. *JeevanVidya: EkParichaya,* A Nagaraj, 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 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%2023.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-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								√				
CO2						√						
CO3								√				
CO4				√								
CO5								√				
CO6						√						

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23CST03: Digital Logic & Computer Organization

Credits: 3 **Sessional Marks: 30**
L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

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

After completion of the course, students will be able to

CO1: Differentiate between combinational and sequential circuits based on their characteristics and functionalities. (L2)

CO2: Demonstrate an understanding of computer functional units. (L2)

CO3: Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems. (L3)

CO4: Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability. (L3)

CO5: Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques. (L3)

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, Parity Generator and Checker, Encoders, Decoders, Multiplexers, De-Multiplexers

UNIT – II

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

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

UNIT – III

Processor Organization: Fundamental Concepts, Von-Neumann Architecture, IAS Machine, addressing modes, Execution of a Complete Instruction, Multiple-Bus Organization

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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 – IV

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

UNIT – V

Pipelining: Basic Concepts – Role of Cache Memory, Pipeline Performance, Data Hazards – Operand Forwarding, Handling Data Hazards in Software, Side Effects, Instruction Hazards – Unconditional Branches, Conditional Branches and Branch Prediction, Performance Considerations – Effect of Instruction Hazards, Number of Pipeline Stages.

Textbooks

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.

Reference Books

1. Computer Organization and Architecture, William Stallings, 11th Edition, Pearson.
2. Computer Systems Architecture, M. Morris Mano, 3rd Edition, Pearson
3. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier
4. Fundamentals of Logic Design, Roth, 5th Edition, Thomson

Online Learning Resources

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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	-	M	L	-	-	-	-	-	-	-	-	-	M	-	-
CO3	-	M	H	-	-	-	-	-	-	-	-	-	H	-	-
CO4	L	M	-	-	-	-	-	-	-	-	-	-	H	-	-
CO5	-	M	-	H	-	-	-	-	-	-	-	-	L	-	-

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Semester: II – I

B.Tech(CSE) – R23

23CST04: Advanced Data Structures & Algorithm Analysis

Credits: 3
L:T:P :: 3:0:0

Sessional Marks: 30
University Exam Marks: 70

Course Objectives

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

After completion of the course, students will be able to

CO1: Illustrate the working of the advanced tree data structures and their applications (L2)
CO2: Understand the Graph data structure, traversals and apply them in various contexts. (L2)
CO3: Use various data structures in the design of algorithms (L3)
CO4: Recommend appropriate data structures based on the problem being solved (L5)
CO5: Analyze algorithms with respect to space and time complexities (L4)

UNIT – I

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

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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, 2nd Edition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press

Reference Books

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, 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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	H	-	M	-	-	-	-	-	-	-	-	-	M	-	-
CO3	-	-	-	M	-	-	-	-	-	-	-	-	M	-	-
CO4	-	L	-	M	-	-	-	-	-	-	-	-	H	-	-
CO5	M	H	-	-	-	-	-	-	-	-	-	-	L	-	-

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23CST05: Database Management Systems

Credits: 3 **Sessional Marks: 30**

L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

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

After completion of the course, students will be able to

CO1: Understand the basic concepts of database management systems (L2)

CO2: Analyze a given database application scenario to use ER model for conceptual design of the database (L4)

CO3: Utilize SQL proficiently to address diverse query challenges (L3).

CO4: Employ normalization methods to enhance database structure (L3)

CO5: Assess and implement transaction processing, concurrency control and database recovery protocols in databases. (L4)

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,

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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 dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form (BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

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

Text Books

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)

Reference Books

1. Introduction to Database Systems, 8thedition, C J Date, Pearson.
2. Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson
3. Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022

Web-Resources

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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	-	-	-	-	-	-	-	-	-	-	L	-	-
CO2	L	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO3	-	M	-	H	-	-	-	-	-	-	-	-	M	-	-
CO4	-	M	H	-	-	-	-	-	-	-	-	-	M	-	-
CO5	L	-	M	-	-	-	-	-	-	-	-	-	L	-	-

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23HMT03 - ENVIRONMENTAL SCIENCE II-I

(COMMON TO ALL CSE,ECE,EEE,MEC)

Credits: 0 **Sessional Marks:30**

L:T:P::20:0:0 **University Exam Marks: 70**

Course Objectives:

- To make the students to get awareness on environment.
- 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
- To save earth from the inventions by the engineers.

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 with BI0-Diversity and Conservation.

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

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:

Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.

1. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
2. J.P.Sharma, Comprehensive Environmental studies. Laxmi publications.
3. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
4. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House

Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓						
CO2	✓	✓		✓		✓						
CO3	✓	✓				✓						
CO4	✓			✓		✓						

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23CSP04: Advanced Data Structures & Algorithm Analysis Lab

Credits: 1.5 **Sessional Marks: 30**
L:T:P :: 0:0:3 **University Exam Marks: 70**

Course Objectives

1. Acquire practical skills in constructing and managing Data structures
2. Apply the popular algorithm design methods in problem-solving scenarios

Course Outcomes

After completion of the course, students will be able to

CO1: Design and develop programs to solve real world problems with the popular algorithm design methods. (L5)

CO2: Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs. (L2)

CO3: Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications. (L5)

CO4: Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems. (L3)

CO5: Compare the performance of different of algorithm design strategies (L4)

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.

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4. Implement BFT and DFT for given graph, when graph is represented by
   a) Adjacency Matrix b) Adjacency Lists
5. Write a program for finding the biconnected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.

Reference Books

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2nd Edition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill

Online Learning Resources

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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	-	H	-	-	-	-	-	-	-	-	-	H	-	-
CO2	L	H		-	-	-	-	-	-	-	-	-	H	-	-
CO3	-	L	H	-	-	-	-	-	-	-	-	-	H	-	-
CO4	-	M	-	H	-	-	-	-	-	-	-	-	H	-	-
CO5	-	M	-	H	-	-	-	-	-	-	-	-	H	-	-

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Semester: II – I

B.Tech(CSE) – R23

23CSP05: Database Management Systems Lab

Credits: 1.5

L:T:P :: 0:0:3

Sessional Marks: 30

University Exam Marks: 70

Course Objectives

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

After completion of the course, students will be able to

CO1: Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment (L3)

CO2: Constructing and execute queries to manipulate and retrieve data from databases. (L3)

CO3: Develop application programs using PL/SQL. (L3)

CO4: Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality (L4)

CO5: Establish database connectivity through JDBC (Java Database Connectivity) (L3)

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)

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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

Reference Books

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.

Online Learning Resources

1. http://www.scoopworld.in
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	M	H	-	-	-	-	-	-	-	H	-	-
CO2	-	-	L	M	-	-	-	-	-	-	-	-	H	-	-
CO3	-	M	H	-	-	-	-	-	-	-	-	-	H	-	-
CO4	M	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO5	-	M	-	-	H	-	-	-	-	-	-	-	H	-	-

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23CSS01: Python Programming
(Skill Enhancement Course)

Credits: 2 **Sessional Marks: 30**
L:T:P :: 0:1:2 **University Exam Marks: 70**

Course Objectives
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
After completion of the course, students will be able to

CO1: 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. (L4)

CO2: Apply Python programming concepts to solve a variety of computational problems (L3)

CO3: 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 (L3)

CO4: Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas (L2)

CO5: Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)

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.

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4. Demonstrate the following Operators in Python with suitable examples.
   i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

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

Reference Books

1. Gowri shankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

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Online Learning Resources/Virtual Labs:

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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	L	-	H	-	-	-	-	-	-	-	-	H	-	-
CO2	-	L	H	-	-	-	-	-	-	-	-	-	H	-	-
CO3	M	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO4	M	-	-	-	H	-	-	-	-	-	-	-	H	-	-
CO5	-	M	-	H	-	-	-	-	-	-	-	-	H	-	-

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23HMT02 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Credits: 2 **Sessional Marks: 30**
L:T:P::2:0:0 **University Exam Marks: 70**

Course Objectives:

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

Course Outcomes:

COs	Statements	Blooms Level
CO1	Define the concepts related to Managerial Economics, financial accounting and management	L2
CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets	L2
CO3	Apply the Concept of Production cost and revenues for effective Business decision	L3
CO4	Analyze how to invest their capital and maximize returns	L4
CO5	Evaluate the capital budgeting techniques.	L5
CO6	Develop the accounting statements and evaluate the financial performance of business entity	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-Short run and long run Production Function- Isoquants and Iso costs, Cost & Break-Even Analysis - Cost concepts, 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. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Price-Output Determination.

UNIT - IV Financial Accounting

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).

UNIT - V Capital Budgeting

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

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

Reference Books:

Ahuja Hl Managerial economics Schand.
S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							√					
CO2											√	
CO3					√							
CO4											√	
CO5												√
CO6											√	

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23BST11 PROBABILITY & STATISTICS

Credits: 3 | Sessional Marks: 30

L:T:P::3:0:0 | University Exam Marks: 70

Course Objectives:

- Understand and calculate measures of central tendency, variability and correlation coefficients.
- Understand and apply the basic principles of probability, including sample spaces, events, and probability axioms.
- Understand the statistical concepts of estimation, hypothesis testing, regression, correlation analysis and multiple regression.
- Equip students with essential tools for statistical analyses at the graduate level.
- Perform and interpret results from t-tests, test, F-chi-square tests.

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

CO1 Acquire knowledge in finding the analysis of the data quantitatively or categorically and various statistical elementary tools.

CO2 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.

CO3 Apply the theoretical probability distributions like binomial, Poisson, and Normal in the relevant application areas.

CO4 Analyse to test various hypotheses included in theory and types of errors for large samples.

CO5 Apply the different testing tools like t-test, F-test, chi-square test to analyse 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), $\chi 2$ - test for goodness of fit, $\chi 2$ - 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.

Reference Books:

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

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓			✓						
CO2	✓	✓	✓									
CO3	✓	✓	✓		✓	✓						
CO4	✓	✓	✓	✓								
CO5	✓	✓	✓	✓	✓	✓						

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23CST06: Operating Systems

Credits: 3 **Sessional Marks: 30**
L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

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

After completion of the course, students will be able to

CO1: Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication. (L1)
CO2: Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection. (L2)
CO3: Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. (L3)
CO4: Illustrate different conditions for deadlock and their possible solutions. (L2)
CO5: Analyze the memory management and its allocation policies. (L4)

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.

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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.

Text Books

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

Reference Books

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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	M	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO3	-	M	-	H	-	-	-	-	-	-	-	-	M	-	-
CO4	-	M	H	-	-	-	-	-	-	-	-	-	L	-	-
CO5	L	H	-	-	-	-	-	-	-	-	-	-	M	-	-

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23CST07: Object Oriented Programming through Java

Credits: 3 **Sessional Marks: 30**
L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

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

After completion of the course, students will be able to

CO1: Analyze problems, design solutions using OOP principles, and implement them efficiently in Java. (L4)

CO2: Design and implement classes to model real-world entities, with a focus on attributes, behaviours, and relationships between objects (L4)

CO3: Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch. (L3)

CO4: Apply Competence in handling exceptions and errors to write robust and fault-tolerant code. (L3)

CO5: Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX. (L3)

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.

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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 (Text Book 2)

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.

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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 (Text Book 3)

Text Books

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

References Books

1. The Complete Reference Java, 11th edition, Herbert Schildt, TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO2	-	M	H	-	-	-	-	-	-	-	-	-	H	-	-
CO3	-	M	-	H	-	-	-	-	-	-	-	-	M	-	-
CO4	-	-	-	M	H	-	-	-	-	-	-	-	L	-	-
CO5	-	L	-	M	-	-	-	-	-	-	-	-	M	-	-

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23CST08: Formal Languages and Automata Theory

Credits – 3 **Sessional Marks: 30**
L:T:P :: 3:0:0 **University Exam Marks: 70**

Course Objectives

To expose the students to the following:

1. Designing finite automata to accept a set of strings of language and machine formats.
2. Basic concepts related to regular expressions and decidable problems for regular languages.
3. Knowledge about context free grammars to generate strings from a context free language and convert them into normal forms.
4. Understand the Push down Automata, Acceptance of strings, Equivalence of PDA's and conversion of PDA to CFG and vice-versa.
5. Various types of Turing machines, decidable and undecidable problems of Turing machine.

Course Outcomes

After successful completion of course the student should be able to

CO1: Identify a formal notation of strings and the hierarchy of languages, grammars and machines, Arden's theorem, Simplification of CFG, Equivalence of PDA, Turing Machine

CO2: Design finite automata, Push down Automata, Linear Bounded Automata, Turing Machine to accept a set of strings of a language.

CO3: Apply the rules of Regular Expressions for regular languages for context free grammars to resolve the real-time problems.

CO4: Determine whether the given language is regular or not, equivalence of languages accepted by Push-Down Automata and languages generated by context free grammars.

CO5: Analyse languages Regular, Context free, context sensitive, Recursively enumerable of Turing machine.

UNIT – I

Finite Automata: Alphabets, Strings, Grammar and Languages, Chomsky Hierarchy, Finite Automata, Representation of FA, Types of Finite Automata, Conversion of NFA into DFA, Equivalence of DFA and NFA, Finite Automata with Epsilon transitions (ϵ-NFA or NFA- ϵ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem, Applications and Limitation of Finite Automata.

UNIT – II

Regular Expressions: Regular Expressions (RE), Identity Rules, The Arden's Theorem, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Pumping Lemma for RLs, Decision problems of RLS, Applications of REs and FAs.

UNIT – III

Context Free Grammars: Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars, Left recursion and Left

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factoring, Linear Grammar, Conversion Methods of Linear Grammar, Normal Forms for Context Free Grammars, Pumping Lemma for CFLs, Closure Properties, Applications of Context Free Grammars.

UNIT – IV

Pushdown Automata: Pushdown Automata, Instantaneous Description, Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Conversion of CFG to PDA and PDA to CFG, Equivalence of Pushdown Automata, Two Stack Pushdown Automata.

UNIT – V

Turing Machine: Turing Machine, Instantaneous Descriptions, Representation of TMs, Language Acceptance of a Turing Machine, Design of Turing Machines, Variations of Turing Machines, Church's Thesis, Universal Turing Machine, Linear Bounded Automata, TM Languages, Unrestricted grammar, Properties of Recursive and Recursively enumerable languages, Un decidability, Reducibility, Un-decidable problems about TMs, Post Correspondence Problem (PCP) Modified PCP.

Text Books

1. Krithivasan Kamala, Rama R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education, 2009.
2. Shyamalendu Kandar, "Introduction to Automata Theory, Formal Languages and Computation" Pearson education, 2013.

Reference Books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory Languages, and Computation", Pearson Education Asia, 2012.
2. Peter Linz, "An Introduction to formal languages and automata", 6th Edition, Jones & Bartlett 2012.
3. Rajendra Kumar "Theory of Automata, Languages and Computation", McGraw Hill, 2014.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H	-	M	-	-	-	-	-	-	-	-	H	-	-
CO2	-	-	H	-	M	-	-	-	-	-	-	-	H	M	-
CO3	L	-	-	-	H	M	-	-	-	-	-	-	H	-	L
CO4	-	H	-	M	-	L	-	-	-	-	-	-	H	-	-
CO5	-	M	-	H	-	L	-	-	-	-	-	-	H	-	-

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23CSP06: Operating Systems Lab

Credits: 1.5 **Sessional Marks: 30**
L:T:P :: 0:0:3 **University Exam Marks: 70**

Course Objectives

1. Provide insights into system calls, file systems, semaphores,
2. Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
3. Implement Bankers Algorithms to Avoid the Dead Lock

Course Outcomes

After completion of the course, students will be able to

CO1: Trace different CPU Scheduling algorithms (L2).
CO2: Implement Bankers Algorithms to Avoid the Dead Lock (L3).
CO3: Evaluate Page replacement algorithms (L5).
CO4: Illustrate the file organization techniques (L4).
CO5: Illustrate Inter process Communication and concurrent execution of threads (L4)

Experiments covering the Topics:

- UNIX fundamentals, commands & system calls
- CPU Scheduling algorithms, thread processing
- IPC, semaphores, monitors, deadlocks
- Page replacement algorithms, file allocation strategies
- Memory allocation strategies

Sample Experiments:

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls
3. fork, exec, getpid, exit, wait, close, stat, opendir and readdir
4. Simulate UNIX commands like cp, ls, grep, etc.,
5. Simulate the following CPU scheduling algorithms
6. FCFS b) SJF c) Priority d) Round Robin
7. Control the number of ports opened by the operating system with
8. Semaphore b) Monitors.
9. Write a program to illustrate concurrent execution of threads using pthreads library.
10. Write a program to solve producer-consumer problem using Semaphores.
11. Implement the following memory allocation methods for fixed partition
12. First fit b) Worst fit c) Best fit
13. Simulate the following page replacement algorithms
    a) FIFO b) LRU c) LFU
14. Simulate Paging Technique of memory management.

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15. Implement Bankers Algorithm for Dead Lock avoidance and prevention
16. Simulate the following file allocation strategies
    a) Sequential b) Indexed c) Linked

Reference Books

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

Online Learning Resources

1. https://www.cse.iitb.ac.in/~mythili/os/
2. http://peterindia.net/OperatingSystems.html

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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CO2	-	-	-	M	-	-	-	-	-	-	-	-	H	-	-
CO3	-	-	-	H	-	-	-	-	-	-	-	-	H	-	-
CO4	-	-	-	-	M	-	-	-	-	-	-	-	H	-	-
CO5	-	-	-	M	-	-	-	-	-	-	-	-	H	-	-

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23CSP07: Object Oriented Programming through Java Lab

Credits: 1.5 **Sessional Marks: 30**
L:T:P :: 0:0:3 **University Exam Marks: 70**

Course Objectives

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

After completion of the course, students will be able to

CO1: Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling. (L2)

CO2: Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively. (L3)

CO3: Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes. (L2)

CO4: Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges. (L3)

CO5: Proficiently construct graphical user interface (GUI) applications using JavaFX (L4)

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 Experiments:

Exercise – 1

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. 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 StringBuffer to delete, remove character.

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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 Books

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

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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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

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CO2	-	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO3	-	-	-	M	-	-	-	-	-	-	-	-	H	-	-
CO4	-	-	H	-	-	-	-	-	-	-	-	-	H	-	-
CO5	-	-	M	-	-	-	-	-	-	-	-	-	H	-	-

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23CSS02: Full Stack Development – 1
(Skill Enhancement Course)

Credits: 2 **Sessional Marks: 30**
L:T:P :: 0:1:2 **University Exam Marks: 70**

Course Objectives

1. Make use of HTML elements and their attributes for designing static web pages
2. Build a web page by applying appropriate CSS styles to HTML elements
3. Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes

CO1: Design Websites. (L6)
CO2: Apply Styling to web pages. (L3)
CO3: Make Web pages interactive. (L3)
CO4: Design Forms for applications. (L6)
CO5: Choose Control Structure based on the logic to be implemented. (L4)

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>, , 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.

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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

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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)

Text Books

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

Reference Books

1. Programming the World Wide Web, 7th Edition, 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

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	H	-	-	-	-	-	-	-	-	-	H	-	-
CO2	-	M	-	-	-	-	-	-	-	-	-	-	H	-	-
CO3	-	-	-	-	H	-	-	-	-	-	-	-	H	-	-
CO4	-	-	H	-	-	-	-	-	-	-	-	-	H	-	-
CO5	-	-	-	-	M	-	-	-	-	-	-	-	H	-	-

HoD
Department of CSE
School of Engineering & Technology
Sri Padmavati Mahila Visvavidyalayam
(Women's University)

BoS Chairman
School of Engineering & Technology
Sri Padmavati Mahila Visvavidyalayam
(Women's University)

23HMP01: DESIGN THINKING & INNOVATION

Credits–2
L: T: P::1:0:2

Sessional Marks: 30
University Exam Marks: 70

Course Objectives: The objectives of the course are to

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

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

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 - III 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 - 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 modeling, 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.

Developing & testing prototypes.

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

Textbooks:

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

Reference Books:

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

Online Learning Resources:

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

Course Outcomes:

COs	Statements	Blooms Level
CO1	Define the concepts related to design thinking.	L1
CO2	Explain the fundamentals of Design Thinking and innovation.	L2
CO3	Apply the design thinking techniques for solving problems in various sectors.	L3
CO4	Analyse to work in a multidisciplinary environment.	L4
CO5	Evaluate the value of creativity.	L5

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			H							M			M		M
CO2	H	M								M			M		H
CO3		M	H							M					H
CO4		H		M						M					H
CO5		H								M					H

Co-ordinator

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