DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SEMESTER – I

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES									
1	HS	U23EN101	Technical English - I	3	0	0	3	3
2	BS	U23MA101	Engineering Mathematics	3	1	0	4	4
3	BS	U23PH101	Engineering Physics	3	0	0	3	3
4	BS	U23CY101	Engineering Chemistry	3	0	0	3	3
5	ES	U23CP101	Programming in C	3	0	2	5	4
6	ES	U23BE104	Basic Electrical and Electronics Engineering	3	0	0	3	3
7	HS	U23TA101	தமிழர் மரபு /Heritage of Tamils	1	0	0	1	1
PRACTICAL COURSES									
8	BS	U23PC101	Physics and Chemistry Laboratory	0	0	3	3	1.5
9	HS	U23EN102	Professional Communication Laboratory	0	0	3	3	1.5
10	SIP	U23IP101	Student Induction Programme	0	0	0	2 Weeks	0
TOTAL CREDITS									24

SEMESTER – II

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES									
1	HS	U23EN201	Technical English - II	3	0	0	3	3
2	BS	U23MA201	Vector Calculus and Complex Functions	3	1	0	4	4
3	BS	U23PH203	Physics for Computer Technology	3	0	0	3	3
4	ES	U23EG101	Engineering Graphics	2	0	4	6	4
5	ES	U23PY201	Problem Solving and Python Programming	3	0	2	5	4
6	PC	U23CS201	Data Structures	3	0	0	3	3
7	HS	U23TA201	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	1	0	0	1	1
PRACTICAL COURSES									
8	ES	U23EP101	Engineering Practices Laboratory	0	0	3	3	1.5
9	PC	U23CS202	Data Structures Laboratory	0	0	3	3	1.5
TOTAL CREDITS									25

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SEMESTER – III

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES								
1	BS	U23MA304	Probability and Statistics	3	1	0	4	4
2	ES	U23EC301	Digital Principles and Computer Organisation	3	0	2	5	4
3	PC	U23CS301	Foundation of Data Science	3	0	0	3	3
4	PC	U23CS302	Database Management Systems	3	0	0	3	3
5	PC	U23CS303	Object Oriented Programming	3	0	2	5	4
6	PC	U23CS403	Theory of Computation	3	0	0	3	3
PRACTICAL COURSES								
7	PC	U23CS304	Data Science Laboratory	0	0	3	3	1.5
8	PC	U23CS305	Database management Systems Laboratory	0	0	3	3	1.5
EMPLOYABILITY ENHANCEMENT COURSES								
9	EEC	U23EEC301	Employability Skills – I	0	0	2	2	1
TOTAL CREDITS								25

SEMESTER – IV

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES								
1	PC	U23CS401	Machine Learning Techniques	3	0	2	5	4
2	PC	U23CS402	Design and Analysis of Algorithms	3	0	2	5	4
3	PC	U23CS404	Operating Systems	3	0	0	3	3
4	PC	U23CS405	Computer Networks	3	0	0	3	3
5	PC	U23AI401	Statistical Inference	3	0	0	3	3
6	MNC	U23MX01	Personal Values	2	0	0	0	0
PRACTICAL COURSES								
7	PC	U23CS406	Operating Systems Laboratory	0	0	3	3	1.5
8	PC	U23CS407	Computer Networks Laboratory	0	0	3	3	1.5
EMPLOYABILITY ENHANCEMENT COURSES								
9	EEC	U23EEC401	Employability Skills – II	0	0	2	2	1
TOTAL CREDITS								21

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U23EN101	TECHNICAL ENGLISH - I	L	T	P	C
	(Common to all branches)	3	0	0	3

Prerequisites: Fundamentals of Analytical Skills in English

COURSE OBJECTIVES:

- To enhance reading comprehension skills for technical articles to grasp and interpret complex concepts.

- To prepare students' for effective communication and writing in technical and professional contexts.

- To develop the ability to write persuasive job applications and structured resumes effectively.

UNIT I	INTRODUCTION	9

Reading – Requirement for Reading – reading short technical texts from journals and newspapers; **Writing** –Compare and Contrast Essay; Email Writing; **Grammar** – Parts of Speech, Mixed Tenses, Prepositional phrases; **Vocabulary Development** – Contextual meaning of words.

UNIT II	READING AND LANGUAGE DEVELOPMENT	9

Reading – Reading Advertisements, User Manuals, Brochures; **Writing** - Process Writing, Interpreting charts & graphs; **Grammar** – Active and Passive Voice transformations, Infinitive and Gerunds; **Vocabulary Development** – Vocabulary used in formal & informal letters / emails and reports.

UNIT III	TECHNICAL WRITING AND GRAMMAR	9

Reading – Reading Longer texts both general and technical, practice in speed reading; **Writing** – Writing responses to complaints, Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay; **Grammar** – Error correction; If Clauses, Compound Words, Punctuation; **Vocabulary Development** – Sentence Completion.

UNIT IV	REPORT WRITING	9

Reading – Reading for detailed comprehension: Skimming and Scanning; **Writing**- Recommendations, Writing Reports – Accident Report, Survey Report, Minutes of a meeting; **Grammar** – Reported Speech, Modals; **Vocabulary Development** – Technical Vocabulary.

UNIT V	GROUP DISCUSSION AND JOB APPLICATIONS	9

Reading – Reading and understanding Technical Articles; **Writing** – Writing Job Application – Resume Preparation (via email and hard copy); **Grammar** – Numerical Adjectives, Relative Clauses, Idioms and Phrases; **Vocabulary Development** – Verbal Analogies.

TOTAL: 45 PERIODS

TEXT BOOKS:

1 Veena Selvam, "English for Science and Technology", Cambridge University Press, 2021.

2 N P Sudharshana,m, C Saveetha, "English for Technical Communication", Cambridge University Press, New Delhi, 2016.

REFERENCES:

1 E Suresh Kumar, "Engineering English", Orient Black swan, Hyderabad, 2015.

2 Meenakshi Raman, Sangeetha Sharma, "Technical Communication Principles and Practice", Oxford University Press, New Delhi, 2014.

3 Marion Grussendorf, "English for Presentations", Oxford University Press, 2007.

ONLINE RESOURCES:

1 https://iimskills.com/coursera-technical-writing-course/
2 https://www.udemy.com/course/easy-english-grammar-course
3 https://www.coursera.org/learn/introduction-to-research-for-essay-writing

COURSE OUTCOMES:

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

CO1 Write essays and emails.

CO2 Describe any process, interpretation of charts and graphs both general and technically.

CO3 Write letters and responses to complaints.

CO4 Write Recommendations, minutes and reports of events.

CO5 Write Job application with Resume.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	3	-	3	-	1
CO2	3	-	-	-	-	-	-	3	-	3	-	1
CO3	3	-	-	-	-	-	-	3	-	3	-	1
CO4	3	-	-	-	-	-	-	3	-	3	-	1
CO5	3	-	-	-	-	-	-	3	-	3	-	1

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U23MA101	ENGINEERING MATHEMATICS	L	T	P	C
	(Common to all branches)	3	1	0	4

Prerequisites: Fundamental Concepts on Matrices and Calculus

COURSE OBJECTIVES:

- To enhance the utilization of matrix algebra techniques that is needed by engineers for practical applications in engineering.
- To familiarize the students with differential calculus and functions of several variables.
- To acquaint the students with the mathematical tools required for the assessment of multiple integrals and their practical applications.

UNIT I   **MATRICES**   **12**

Symmetric and orthogonal matrices – Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley – Hamilton theorem (Without proof) Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II   **DIFFERENTIAL CALCULUS**   **12**

Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rules (sum, product, quotient, chain rules) – Implicit differentiation – Logarithmic differentiation – Applications: Maxima and Minima of functions of one variable.

UNIT III   **FUNCTIONS OF SEVERAL VARIABLES**   **12**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   **INTEGRAL CALCULUS**   **12**

Definite and Indefinite integrals – Substitution rule – Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions – Improper integrals.

UNIT V   **MULTIPLE INTEGRALS**   **12**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. S K Pundir, Bhupander Singh, "Differential Calculus", Pragathi Prakashan Publishers Pvt. Ltd., 2023.

2   B S Grewal, "Higher Engineering Mathematics", 45th Edition, Khanna Publishers, 2018.

REFERENCES:

1   R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 6th Edition, Narosa Publications, 2021.
2   Ravish R Singh, Mukul Bhatt, "Advanced Engineering Mathematics", 2nd Edition, Tata McGraw Hill, 2020.
3   H C Taneja, "Advanced Engineering Mathematics", Dreamtech Press, 2019.
4   T K V Iyengar, M V A A N Prasad, B Krishna Gandhi, "Engineering Mathematics", Special Edition, S. Chand & Company Ltd., 2023.

ONLINE RESOURCES :

1   http://nptel.ac.in/courses/111105035/10

2   http://nptel.ac.in/courses/111105035/5

3   http://nptel.ac.in/courses/111105035/17

COURSEOUTCOMES:

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

CO1   Apply Cayley-Hamilton theorem and orthogonal transformation for different process of matrices.

CO2   Analyze the differentiation rules to find the extreme values of functions.

CO3   Apply the concepts of partial derivatives and total derivatives in Taylor's series, Jacobians and maxima and minima of functions.

CO4   Evaluate definite and improper integrals using techniques of integration

CO5   Evaluate area and volume using double and triple integrals.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	-	-	-	-	-	-	-
CO2	3	3	1	2	-	-	-	-	-	-	-	-
CO3	3	2	1	2	-	-	-	-	-	-	-	-
CO4	3	3	2	3	-	-	-	1	-	-	-	1
CO5	3	3	2	3	-	-	-	1	-	-	-	1

U23PH101	ENGINEERING PHYSICS	L	T	P	C
	(Common to all branches)	3	0	0	3

Prerequisites: Fundamentals of Mechanics and Optics

COURSE OBJECTIVES:

- To enable the students effectively understand concepts of mechanics and elastic properties of materials.
- To gain knowledge about thermal physics, ultrasonics, lasers, optical fibres with applications.
- To introduce the basics of quantum mechanics, crystal structures and imperfections.

UNIT I	MECHANICS AND ELASTICITY	9

Center of mass (CM) – Rotational kinematics – Moment of Inertia (M.I.) – Theorems of M.I.:parallel and perpendicular axes theorems – M.I. of continuous bodies – Conservation of angular momentum – Elasticity – Hooke's law – Stress-Strain diagram – Poisson's ratio – Factors affecting elasticity – Bending moment – Depression of a cantilever –Young's modulus by uniform bending – I-shaped girders.

UNIT II	THERMAL PHYSICS AND ULTRASONICS	9

Modes of heat transfer – Thermal conductivity – Newton's law of cooling – Lee's disc method – Radial heat flow – Rubber tube method – Characteristics and Production of ultrasonics by magnetostriction and piezoelectric methods – Acoustic grating – Non-destructive testing – Medical applications: Sonogram.

UNIT III	LASERS AND FIBRE OPTICS	9

Laser: characteristics and properties – Einstein's coefficients derivation – Population inversion –Types of lasers: Nd-YAG laser, CO_2 laser, semiconductor laser – Applications of lasers – Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle – Classification of optical fibres (material, refractive index, mode) – Optical-fibre communication system (Block diagram only).

UNIT IV	QUANTUM MECHANICS	9

Black body radiation – Photons and light waves – Electrons and matter waves – Compton effect: Theory and experimental verification – The Schrodinger equation: Time dependent and time independent forms – Physical significance of wave function –Particle in an infinite potential well:1D – Electron microscopes: Scanning Electron Microscope and Transmission Electron Microscope.

UNIT V	CRYSTAL PHYSICS	9

Lattice – Bravais lattice – Lattice planes – Miller indices – d-spacing in cubic lattice– Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP crystal structures – Crystal imperfections: point, line and surface defects.

TOTAL: 45 PERIODS

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TEXT BOOKS:

1. D. Kleppner, R Kolenkow, "An Introduction to Mechanics", Tata McGraw Hill, 2017.
2. Arthur Beiser, Shobhit Mahajan, S Rai Choudhury, "Concepts of Modern Physics", Tata McGraw Hill, 2017.

REFERENCES:

1. R. Wolfson, "Essential University Physics", Volume 1 & 2, 4th Edition, Pearson Education, 2020.
2. K Thyagarajan, A Ghatak, "Lasers: Fundamentals and Applications", 2nd Edition, Laxmi Publication, 2019.
3. P K Palanisamy, "Materials Science", Scitech Publication India Pvt. Ltd., 2015.

ONLINE RESOURCES:

1. https://www.coursera.org/courses?query=physics
2. https://archive.nptel.ac.in/courses/115/102/115102124/
3. https://onlinecourses.nptel.ac.in/noc24_ph17/preview

COURSE OUTCOMES:

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

CO1 Comprehend the basics of mechanics and elastic properties of materials.
CO2 Explain the thermal physics concepts, production and applications of ultrasonic waves.
CO3 Apply the basic concepts of lasers and optical fibre in various fields.
CO4 Describe the basics of quantum mechanical phenomenon and electron microscopes.
CO5 Explain the fundamentals of crystal structures and imperfections.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	1	1	1	-	-	-	1
CO4	2	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-

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U23CY101	ENGINEERING CHEMISTRY	L	T	P	C
	(Common to all branches)	3	0	0	3

Prerequisites: Fundamentals of Basic Chemistry

COURSE OBJECTIVES:

- To make the students conversant with water treatment techniques and the electrochemical reactions.

- To facilitate the understanding of fuel classification, preparation, combustion and environmental impact.

- To acquire a deep understanding of renewable energy sources and nano materials, their properties and applications.

UNIT I	WATER AND ITS TREATMENT	9

Water: Sources and impurities, hardness, alkalinity. Boiler troubles: Scale and sludge. Treatment of boiler feed water: Internal treatment (sodium aluminate and calgon conditioning) and External treatment Ion exchange demineralization process, Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination), Desalination of brackish water: Reverse Osmosis.

UNIT II	ELECTRO CHEMISTRY AND DEVICE CORROSION	9

Electrochemistry: Introduction, Electrochemical cells – electrolytic cell – reversible and irreversible cells. Electrode potential – Oxidation and reduction Potentials – emf, Nernst equation and applications. Reference electrodes – Calomel electrode – Electro chemical series – its applications.

Device Corrosion: Introduction- chemistry of IC and PCB – causes of corrosion on IC, PC-miniaturization and complex material utilization- forms of corrosion – anodic and cathodic corrosion-Prevention of corrosion.

UNIT III	FUELS AND COMBUSTION	9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method), Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking – octane number, diesel oil – cetane number; Power alcohol and biodiesel.

Combustion of Fuels: Introduction: Calorific value – higher and lower calorific values, Theoretical calculation of calorific value; Flue gas analysis – ORSAT Method. CO_2 emission and carbon foot print.

UNIT IV	ENERGY SOURCES AND STORAGE DEVICES	9

Solar energy conversion: Principle, working and applications of solar cells; recent developments in solar cell materials. Wind energy; Geothermal energy. Hydrogen as fuel: Sources of hydrogen – Hydrogen production methods – electrolysis, limitations and applications.

Storage Devices: Batteries – Types of batteries, Primary battery – dry cell, Secondary battery – lead acid battery and lithium – ion battery; Electric vehicles working principles.

UNIT V	NANO CHEMISTRY	9

Basics: Distinction between molecules, nanomaterials and bulk materials; Types of nanomaterials: Definition, properties and uses of nano particles and nanotube. Preparation

of nano materials: laser ablation, chemical vapours deposition, electrochemical deposition and electro spinning. An application of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jain P C, Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2021.

2. Chatla Naga Babu, G Kanthimathi, "Text Book of Engineering Chemistry", 1st Edition, AG Publishing House, 2023.

REFERENCES:

1. Reza K Haghi, Fransico Torrens, "Engineering Technology and Industrial Chemistry with Applications", Apple Academic Press, 2021.

2. Anna Klinkova, "Nano Chemistry", 1st Edition, Springer. 2023.

3. Stroud N, "Fundamentals of Engineering Chemistry", American Academic Publishers, 2023.

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc22_ch27/preview
2. https://nptel.ac.in/courses/105107207
3. https://onlinecourses.nptel.ac.in/noc19_mm21/preview

COURSEOUTCOMES:

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

CO1 Describe the type of factors present in boilers and the method used to treat hard water.

CO2 Apply the principles of electrochemistry to corrosion process and the applications of protective coatings to overcome the corrosion.

CO3 Summarize the various solid, liquid and gaseous fuels manufacturing methods and basic reactions involved in combustion reaction.

CO4 Describe the types of batteries their reactions and the significance of storage renewable energy resource.

CO5 Apply the basic concepts of nanomaterials and its application in various sectors.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	-	1	1	-	-	-	-	1
CO2	3	2	1	-	-	1	1	-	-	-	-	1
CO3	2	2	1	-	-	1	1	1	-	-	-	1
CO4	2	2	1	-	-	1	1	-	-	-	-	1
CO5	3	2	1	-	-	1	-	-	-	-	-	1

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U23CP101	PROGRAMMING IN C	L	T	P	C
	(Common to all Branches)	3	0	2	4

Prerequisites: Mathematical Fundamentals

COURSE OBJECTIVES:

- To understand the basic construct of C Language and develop C programming of these construct.
- To develop C program using arrays, strings and modular applications using functions.
- To develop applications in C using pointers, structures and union.

UNIT I	BASICS OF C PROGRAMMING	9

Introduction to programming paradigms – Applications of C Language - Structure of C program – C programming: Data Types – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/ Output statements, Assignment statements. Illustrative Programs: Use of Variables in expression and their evaluation, Temperature Conversion (Fahrenheit to Celsius) Problem.

UNIT II	DECISION MAKING AND LOOPING	9

Simple if Statements, The if.else statements, Nesting of if...else statements, else...if Ladder, switch Statements, goto Statements, while, do...while, for Statements , Illustrative Problems: EB Bill Computations, Determination of Average Cost and the range of the values , and Square root of a Series , Student Grade System.

UNIT III	ARRAYS AND STRINGS	9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search. Illustrative Programs: palindrome Checking using arrays and String, Concatenation of strings.

UNIT IV	FUNCTIONS AND POINTERS	9

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions – Pointers – Pointer operators, Parameter passing: Pass by value, Pass by reference. Illustrative Program: Fibonacci Series, Towers of Hanoi.

UNIT V	STRUCTURES AND UNION	9

Structure - Nested structures – Array of structures – Self-referential structures – Dynamic memory allocation - Singly linked list – typedef – Union - Storage classes and Visibility. Illustrative Program: To Print name and address of Employee, Generate Student Mark List.

45 PERIODS

PRACTICAL EXERCISES:

1. I/O statements, operators, expressions.
2. Decision-making constructs: if-else, goto, switch-case, break-continue.
3. Loops: for, while, do-while
4. Arrays: 1D and 2D, multi-dimensional arrays, traversal.
5. Strings: operations.

6. Functions and Pointers: Passing parameters by (value, reference), passing arrays to function, Recursion using pointers.
7. Structures and Unions: Nested Structures, Arrays of Structures and Unions

30 PERIODS
TOTAL: 75 PERIODS

TEXT BOOKS:

1 Reema Thareja, "Programming in C", Oxford University Press, 2nd Edition, 2018.

2 Brian W Kernighan, Dennis M Ritchie, "The C Programming language", 3rd Edition, Prentice Hall of India, 2019.

REFERENCES:

1 Paul Deitel, Harvey Deitel, "C How to Program with an Introduction to C++", 8th Edition, Pearson Education, 2018.

2 Yashwant Kanetkar, "Let us C", 17th Edition, BPB Publications, 2020.

3 Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", 2nd Edition, Oxford University Press, 2013.

4 Anita Goel, Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2016.

ONLINE RESOURCES:

1 https://onlinecourses.nptel.ac.in/noc22_cs40/preview
2 https://onlinecourses.swayam2.ac.in/cec24_cs05/preview
3 https://onlinecourses.swayam2.ac.in/nou24_cs06/preview

COURSE OUTCOMES:

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

CO1   Describe knowledge on C Programming constructs.

CO2   Apply the simple applications in C using decision making and looping.

CO3   Design the various applications using arrays and strings.

CO4   Write and implement modular applications in C using functions and Pointers.

CO5   Apply the User defined concept in C using Structures and Unions.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	1	1	1	-	1
CO2	3	3	3	3	-	-	-	1	1	1	-	1
CO3	3	3	3	3	-	-	-	1	1	1	-	1
CO4	3	3	3	3	1	-	-	1	1	1	-	1
CO5	3	3	3	3	1	-	-	1	1	1	-	1

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BASIC ELECTRICAL AND ELECTRONICS ENGINEERING   L   T   P   C
                          (Common to CSE, IT, AIDS & CSE (CS)   3   0   0   3

Prerequisites: Engineering Physics

COURSE OBJECTIVES:

- To understand and gain the knowledge of Electric Circuits and Analysis.
- To understand and gain the knowledge of Electrical Machines and its Applications.
- To understand and gain the knowledge of Analog Devices, Digital Electronics and Measuring Instruments.

UNIT I   ELECTRICAL CIRCUITS   9

DC Circuits: Ohm's Law – Kirchhoff's Laws – Simple problems – Nodal Analysis, Mesh analysis with independent sources only, AC Circuits: Average value – RMS Value- Instantaneous power, real power, reactive power and apparent power- power factor.

UNIT II   ELECTRICAL MACHINES   9

DC Generator: Construction and Working principle – EMF equation – Types – Applications, DC motor: Working Principle – Torque Equation – Types – Applications, Transformer: Construction – Working principle – Types – Applications, Induction motor: Construction and Working principle of Single phase and Three phase Induction motor-Types – Applications.

UNIT III   ANALOG ELECTRONICS   9

Semiconductor Materials – Operation and Characteristics of PN Junction Diodes, Zener Diode, Bipolar Junction Transistors, JFET, MOSFET – Half wave and Full wave Rectifier circuits.

UNIT IV   DIGITAL ELECTRONICS   9

Review of Number Systems –Representation of logic functions – SOP and POS forms- minimization using K maps (Simple Problems only) – Combinational logic circuits: Adder and Subtractor.

UNIT V   MEASUREMENTS AND INSTRUMENTATION   9

Elements of a generalized measurement system – Static and Dynamic Characteristics – Classification of instruments – moving coil and moving iron meters – Dynamometer type watt meters – Induction type Energy meter – Measurement of Resistances using Megger – DSO.

TOTAL: 45 PERIODS

TEXT BOOKS:

1   Kothari D P, I J Nagrath, "Basic Electrical and ElectronicsEngineering", 2nd Edition, Tata McGraw Hill, 2020.
2   S K Bhattacharya "Basic Electrical and Electronics Engineering", 2nd Edition, Pearson Education, 2017.

REFERENCES:

1   Thomas L Floyd, "Digital Fundamentals", 11th Edition, PearsonEducation, 2017.

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2   Kothari D P, I J Nagrath, "Basic Electrical Engineering", 4th Edition, Tata McGraw Hill, 2019.

3   Sedha R S, "A text book of Applied Electronics", S Chand & Co., 2017.

ONLINE RESOURCES:
1   https://nptel.ac.in/courses/108105112.
2   https://www.udemy.com/course/basic-electrical-engineering-electrical-engineering.
3   https://www.coursera.org/learn/electronics.

COURSE OUTCOMES:

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

CO1   Solve the circuits using basic electrical theorems.
CO2   Explain the working principle and applications of electrical machines.
CO3   Summarize the characteristics of Analog electronic devices.
CO4   Explain the basic concepts of Digital Electronics.
CO5   Describe the operating principles of measuring instruments.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	-	-	1	-	-	-	1
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	2	2	1	1	1	-	-	-	-	-	-	-
CO4	2	2	1	1	-	-	-	-	-	-	-	-
CO5	2	2	1	1	-	-	-	1	-	-	-	-

U23TA101	தமிழர் மரபு	L	T	P	C
	(Common to all Branches)	1	0	0	1

நோக்கம்:

- பாரம்பரியக் கலாச்சாரத்தின் நுண்ணறிவையும் மற்றும் கட்டிடக்கலையின் அற்புதங்களில் நடைபெறும் பொறியியல் நுட்பங்களை எடுத்துரைப்பதாகும்.

- தமிழ்மொழி, பண்பாடு, கலைகள், மரபுகளின் வரலாற்றைப் பற்றி எடுத்துரைப்பதன் நோக்கமாகும்.

- அந்தணர்க்கும் அரசர்க்கும் கல்வியையும், வணிகர்களுக்கு வியாபாரத்தையும், வேளாண் மக்களுக்கு உழவுத்தொழிலையும் தமிழர் மரபின் எடுத்துரைப்பதாகும்.

அலகு – 1	மொழி மற்றும் இலக்கியம்	3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு – 2	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை	3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு – 3	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்	3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு – 4	தமிழர்களின் திணைக்கோட்பாடுகள்	3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு – 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுய மரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL: 15 PERIODS

TEXT BOOKS:

1. முனைவர் ஆ. பூபாலன் "தமிழர் மரபு", வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 – 24 அண்ணா பல்கலைக்கழகம்.

2. முனைவர் ஆ. ஹேமமாலினி "தமிழர் மரபு", வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 – 24 அண்ணா பல்கலைக்கழகம்.

REFERENCES:

1. முனைவர் கே.கே. பிள்ளை "தமிழக வரலாறு, மக்களும், பண்பாடும்,", வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 1972.

2. முனைவர் இல. சுந்தரம், "பொருநை, ஆற்றங்கரை நாகரிகம்,", வெளியீடு: தொல்லியல் துறை மற்றும் தமிழ்நாடு அரசுத் துறை, 2022.

3. Dr. S. V. சுப்பிரமணியன், ஹச.மு.நு. திருநாவுக்கரசு "தமிழர்களின் வரலாற்று பாரம்பரியம்", சர்வதேச தமிழ் ஆய்வு நிறுவனம், 2022.

ONLINE RESOURCES:

1. https://unacademy.com/lesson/introduction-and-administrative-system-of-cultural-heritage-of-tamil-in-tamil/ATMT6TK4

2. https://unacademy.com/lesson/society-and-sangam-literature-in-tamil/ C5QL4L0Q

3. https://unacademy.com/lesson/classical-tamil-literature-epigraphy-and-hero-stones-in-tamil/817FIREX

COURSE OUTCOMES:

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

CO1 மொழிகள், இலக்கியங்கள் மற்றும் காப்பியங்கள் பற்றி தொகுக்க இயலும்.
Summarize about languages, literatures and scripts.

CO2 நடுகற்கள், நவீன சிற்பங்கள், ஐம்பொன் சிலைகள், மற்றும் இசைக் கருவிகள் பற்றி விளக்க இயலும்.
Explain middle stone, modern sculptures, panchaloga idols and musical instruments.

CO3 நாட்டுப்புறத் தெய்வங்கள், கலைகள் மற்றும் வீர விளையாட்டுகள் பற்றி விளக்க இயலும்.
Explain about the folk gods, arts and heroic sports.

CO4 தமிழர்களின் திணைக்கோட்பாடுகள் பற்றி தொகுக்க இயலும்.
Summarize the political theories of tamils.

CO5 இந்திய தேசிய இயக்கம், மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு பற்றி தொகுக்க இயலும்.
Summarize Indian national movement contribution of Tamils to Indian culture.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	-	-	-

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| U23PC101 | PHYSICS AND CHEMISTRY LABORATORY | L | T | P | C |
| | (Common to all branches) | 0 | 0 | 3 | 1.5 |

Prerequisites: Principles of Physics and Chemistry

COURSE OBJECTIVES:

- To provide an experimental foundation for the theoretical concepts introduced in the lectures.
- To teach how to make careful experimental observations and how to think about and draw conclusions from such data.
- To help students understand the role of direct observation in physics and chemistry to distinguish between inferences based on theory and the outcomes of experiments.

PHYSICS LABORATORY

LIST OF EXPERIMENTS (Any FIVE Experiments)

1. Determination of Young's modulus by Non uniform bending method.
2. Determination of Rigidity modulus of wire and moment of inertia using torsional pendulum.
3. Determination of Young's modulus by Simple harmonic oscillations of cantilever.
4. Determination of Wavelength of the Laser using grating.
5. Determination of Numerical aperture and acceptance angle in an optical fiber.
6. Determination of velocity of sound and compressibility of liquid –Ultrasonic Interferometer.
7. Determination of thickness of a thin sheet of wire–Air wedge.

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS (Any FIVE Experiments)

1. Determination of total, temporary and permanent hardness of water by EDTA method.
2. Determination of chloride content of water sample by Argentometric method.
3. Determination of alkalinity in water sample.
4. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Conductometric titration of strong acid Vs strong base.
7. Conductometric titration of barium chloride Vs sodium sulphate.
8. Estimation of iron content of the given solution by using potentiometer.

TOTAL: 45 PERIODS

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COURSE OUTCOMES:

CO1 Calculate the Young's modulus by non-uniform bending, simple harmonic oscillations by Torsion Pendulum.

CO2 Calculate the thickness of a thin wire by air wedge and velocity of sound, compressibility of liquid using ultra sonic interferometer.

CO3 Calculate the wavelength, acceptance angle and numerical aperture using laser.

CO4 Estimate the amount of Hardness, chloride, alkalinity in water samples.

CO5 Estimate the amount of acid, iron content present in a given solution by using pH, conductivity and potentiometric titration.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	-	-	-	1	1	2	-	1
CO2	3	2	1	1	-	-	-	1	1	2	-	1
CO3	3	2	1	1	-	-	-	1	1	2	-	1
CO4	3	3	1	3	-	-	-	1	1	2	-	1
CO5	3	3	1	3	-	-	-	1	1	2	-	1

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U23EN102	PROFESSIONAL COMMUNICATION LABORATORY	L	T	P	C
	(Common to all branches)	0	0	3	1.5

Prerequisites: Basic Communication Skills

COURSE OBJECTIVES:

- To enhance their employability and career prospects by equipping them with soft skills.
- To emphasize the importance of interview etiquette and prepare for job interviews.
- To cultivate a general awareness of current affairs to engage in a professional world.

UNIT I   9

Introduction to basic Communication Skills of learning – Listening – Empathetic Listening-Key role in Organizational communication; Speaking – role plays – asking about routine actions and expressing opinions.

UNIT II   9

Introduction to Soft Skills – Hard skills & soft skills - employability and career Skills – Grooming as a professional with values – Time Management – General awareness of Current Affairs.

UNIT III   9

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice – presenting the visuals effectively – 5 minute presentations.

UNIT IV   9

Introduction to Group Discussion – Participating in group discussions – understanding group dynamics – brainstorming the topic – questioning and clarifying – GD strategies- activities to improve GD skills.

UNIT V   9

Interview etiquette – dress code – body language – attending job interviews – telephone/Skype interview -one to one interview & panel interview – FAQs related to job interviews.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1   Apply communication proficiency by mastering empathetic listening and speaking skills.

CO2   Apply soft skills fostering comprehensive competence.

CO3   Apply effective techniques to deliver presentations in all aspects.

CO4   Apply effective strategies for active participation in Group Discussion.

CO5   Apply interview etiquette to navigate various interview formats for Job Interviews.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	1	-	-	1	1	1	-	1
CO2	1	-	-	-	1	-	-	1	1	1	-	1
CO3	1	-	-	-	1	-	-	1	1	1	-	1
CO4	1	-	-	-	1	-	-	1	1	1	-	-
CO5	1	-	-	-	1	-	-	1	1	1	-	1

U23EN201	TECHNICAL ENGLISH - II	L	T	P	C
	(Common to all branches)	3	0	0	3

Prerequisites: Basics of Communication discourse

COURSE OBJECTIVES:

- To develop a high level of proficiency in the English language, encompassing LSRW skills to engage effectively.
- To equip students with a strong foundation in English grammar and vocabulary to understand technical texts.
- To foster critical thinking skills including the ability to evaluate texts critically.

UNIT I	GENERAL READING AND FREE WRITING	9

Listening –Short texts (Listening to Audio & Video) Types of Listening – formal and informal conversations – Telephone conversation; Listening to voicemail & messages; **Speaking** – Basics in speaking – speaking on given topics & situations – recording speeches and strategies to improve; **Reading** – Critical Reading – finding key information in a given text – shifting facts from opinions; **Writing** – free writing on any given topic – autobiographical writing, developing hints, Note – Making; **Grammar** – Tenses; **Vocabulary Development** – Word Formation.

UNIT II	LISTENING AND SUMMATION	9

Listening – Listening to podcasts / anecdotes / event narration, documentaries and interviews with celebrities; **Speaking** – Narrating personal experiences / events / Reporting and summarizing documentaries / podcasts / interviews; **Reading** – Reading biographies, travelogues, newspaper reports, Excerpts from literature and travel & technical blogs. **Writing** –Short Report on an event (field trip etc.) **Grammar** – Question types: Wh / Yes or No; **Vocabulary Development** – One word substitution.

UNIT III	SPEAKING AND ANALYSIS SKILLS	9

Listening – Dialogues & Conversations, focused audio track – **Speaking** – Role Play – Asking about routine actions and Expressing Opinions – Group Interaction – Speaking in formal situations (teachers, officials, foreigners); **Reading** – Reading longer texts & Making a Critical Analysis of the given text; **Writing** – Types of Paragraphs and Essays – Rearrangement of Jumbled sentences; **Grammar** - Cause & Effect Expressions; **Vocabulary Development** – Synonyms & Antonyms.

UNIT IV	READING AND LANGUAGE PROGRESSION	9

Listening – Listening to Dialogues or conversations and completing exercises based on them; **Speaking** – Speaking about one – speaking about one's friend; **Reading** – Comprehension, Reading Different Types of Texts – magazines; **Writing** – Letter Writing - formal or informal letters – E Mails – Conventions of personal email; **Grammar** – Discourse Markers (connectives & sequence words); **Vocabulary development** – Homonyms and Homophones.

UNIT V	COMPREHENSIVE WRITING	9

Listening –Listening to Speeches / Presentations, Listening to broadcast and telecast from

Radio and TV; **Speaking** – Participating in Conversations – short group conversations – Making presentations on given topics; **Reading** –Email communication – Reading the attachment files having a poem / joke / proverb; **Writing** – Creative writing, Poster making, dialogue writing; **Grammar** – Degrees of Comparison, Fixed / Semi-Fixed Expressions; **Vocabulary Development** Abbreviations & Acronyms (as used in technical contexts).

TOTAL: 45 PERIODS

TEXT BOOKS:

1   Venkatraman G, "Effective Technical Communication" 1st Edition, Pearson Education, 2022.

2   Lakshminarayanan K R, "English for Communication", Scitech Publications, 2022.

REFERENCES:

1   Raman, Meenakshi, Sharma, Sangeetha, "Technical Communication Principles and Practice", Oxford University Press, New Delhi, 2015.

2   Sharma Sangeetha, Mishra Binod, "Communication Skills for Engineers and Scientists", 2nd Edition, Prentice Hall of India, 2023.

3   Ruchi Agarwal, "Academic Writing for Students: A Practical Guide", Eliva Press, 2024.

ONLINE RESOURCES:

1   https://onlinecourses.nptel.ac.in/noc22_hs05/preview
2   https://www.coursera.org/specializations/creative-writing
3   https://www.coursera.org/courses-writing

COURSE OUTCOMES:

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

CO1   Apply the concepts of writing in an effective way.

CO2   Write concise reports in a professional context.

CO3   Write different kinds of Paragraphs and Essays.

CO4   Write Email and formal / informal letters without grammatical errors.

CO5   Analyze collaborative work through writing process.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	3	-	3	-	1
CO2	3	-	-	-	-	-	-	3	-	3	-	1
CO3	3	-	-	-	-	-	-	3	-	3	-	1
CO4	3	-	-	-	-	-	-	3	-	3	-	1
CO5	3	-	-	-	-	-	-	3	-	3	-	1

U23MA201	VECTOR CALCULUS AND COMPLEX FUNCTIONS	L	T	P	C
	(Common to all branches)	3	1	0	4

Prerequisites: Engineering Mathematics

COURSE OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems
- To make the students to understand the vector calculus such as divergence, curl needed, for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas.

UNIT I	DIFFERENTIAL EQUATIONS	12

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Linear differential equation with variable coefficients – Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients – Undetermined coefficients.

UNIT II	BASICS OF VECTOR CALCULUS	12

Gradient and directional derivative – Divergence and curl – Vector identities – Irrotational and solenoidal vector fields – Work done by a force – Conservative force field.

UNIT III	APPLICATIONS OF VECTOR CALCULUS	12

Line integral over a plane curve – Surface integral – Area of a curved surface – Volume integral – Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT IV	ANALYTIC FUNCTIONS	12

Analytic functions – Necessary and sufficient conditions for analyticity in cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions $(z + a, az, z^2, 1/z)$ – Bilinear transformation

UNIT V	COMPLEX INTEGRATION	12

Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semi – circular contour (without poles on real axis).

TOTAL: 60 PERIODS

TEXT BOOKS:

1. B S Grewal, "Higher Engineering Mathematics", Khanna Publishers, 45th Edition, 2020.
2. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10th Edition, 2020.

REFERENCES:

1   H K Dass, "Advanced Engineering Mathematics", S. Chand & Company Ltd., 20th Edition, 2019.
2   Ravish R Singh, Mukul Bhatt, "Advanced Engineering Mathematics", 2nd Edition, Tata McGraw Hill, 2020.
3   H C Taneja, "Advanced Engineering Mathematics", Dreamtech Press, 2019.
4   T K V Iyengar, M V A A N Prasad, B Krishna Gandhi, "Engineering Mathematics", Special Edition, S. Chand & Company Ltd., 2023.

ONLINE RESOURCES:

1   https://nptel.ac.in/courses/111105134

2   https://nptel.ac.in/courses/111107111

3   https://nptel.ac.in/courses/111103070

COURSE OUTCOMES:

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

CO1 Solve higher order differential equations of different types for engineering applications.

CO2 Explain the concepts of vector calculus.

CO3 Evaluate line, surface and volume integrals in various vector fields using Greens, Stokes and Gauss theorems.

CO4 Analyze the properties and mappings for constructing analytic functions.

CO5 Evaluate the complex and contour integral using Cauchy's theorem.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	-	-	1	-	-	-	-
CO2	3	2	1	1	-	-	-	1	-	-	-	-
CO3	3	3	2	3	-	-	-	1	-	-	-	-
CO4	3	3	2	2	-	-	-	1	-	-	-	-
CO5	3	3	2	3	-	-	-	1	-	-	-	-

U23PH203   **PHYSICS FOR COMPUTER TECHNOLOGY**   **L T P C**

Prerequisites: **Engineering Physics**   **3 0 0 3**

COURSE OBJECTIVES:

- To make the students gain knowledge on conducting materials and semiconducting materials.
- To instil knowledge on physics of magnetic and superconducting materials.
- To inculcate an idea of significance of optoelectronic devices, new engineering materials and their applications.

UNIT I   **CONDUCTING MATERIALS**   **9**

Conductors – Classical free electron theory of metals–Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Success and failures of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – Carrier concentration in metals – Energy bands in solids.

UNIT II   **SEMICONDUCTING MATERIALS**   **9**

Intrinsic semiconductor – Carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – Compound semiconductors – Direct and indirect band gap – n-type and p-type semiconductor: derivation of carrier concentration – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – Experimental verification of Hall-effect – Applications.

UNIT III   **MAGNETIC AND SUPERCONDUCTING MATERIALS**   **9**

Origin of magnetic moment – Magnetic properties of Dia, Para, Ferro, anti-Ferro and ferrite materials – Domain theory – Hysteresis – Soft and hard magnetic materials – Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity (Qualitative) – High temperature superconductors – Applications of superconductors: SQUID, Cryotron, Magnetic levitation.

UNIT IV   **OPTICAL MATERIALS**   **9**

Classification of optical materials – Carrier generation and recombination processes – Absorption, emission and scattering of light in metals, insulators and semiconductors (concepts) – Opto electronic devices: light detectors and solar cells – Light emitting diode (LED) – Organic LED – Laser diodes – Optical data storage techniques.

UNIT V   **NEW ENGINEERING MATERIALS**   **9**

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy and application – Metallic glasses: properties, preparation and applications – Nanomaterials: properties – preparation: top-down and bottom-up approach – Quantum structures: Q–dot, Q-wire, Q – well – Carbon Nano tubes (CNT): properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1   S O Kasap, "Principles of Electronic Materials and Devices ", Tata McGraw Hill, 2020.

2   Donald A Neamen, "Semiconductor Physics and Devices Basic Principles", Jain Book Agency, 2024.

REFERENCES:

1   Y Slimani, E Hannachi, "Super Conducting Materials, Fundamentals, Synthesis and Applications", Springer, 2022.

2   Kelly S Potter, Joseph Simmons, "Optical Materials", 2nd Edition, Elsevier, 2021.

3   Visakh P M, Artem Semkin, R Balakrishnan, S Lazovic, "Nanotechnology in Electronics: Materials, Properties, Devices", John Wiley & Sons, 2022.

ONLINE RESOURCES:

1   https://onlinecourses.nptel.ac.in/noc24_ph05/preview

2   https://onlinecourses.nptel.ac.in/noc24_ph02/preview

3   https://onlinecourses.nptel.ac.in/noc21_ph14/preview

COURSE OUTCOMES:

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

CO1   Explain the properties of conducting materials based on free electron theories.

CO2   Describe the types of semiconducting materials and its applications.

CO3   Summarize the magnetic and superconducting properties of materials and its uses.

CO4   Apply the various optical phenomena in optoelectronic devices.

CO5   Explain the characteristics, preparations and applications of new engineering materials.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	1	1	-	-	-	-	1
CO5	2	2	-	-	-	1	1	-	-	-	-	1

U23EG101	ENGINEERING GRAPHICS	L	T	P	C
	(Common to all branches)	2	0	4	4

Prerequisites: Nil

COURSE OBJECTIVES:

- To prepare the students for drawing freehand sketch of simple objects and engineering curves.
- To prepare the students for drawing orthographic projection of solids, section of solids and development of lateral surfaces of various solids.
- To prepare the students for drawing pictorial projections like isometric and perspective projection of simple solids.

UNIT I   **PLANE CURVES**   **6+12**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT II   **PROJECTION OF POINTS, LINES AND PLANE SURFACES**   **6+12**

Orthographic projection- principles – Principal planes – First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III   **PROJECTION OF SOLIDS AND FREE HAND SKETCHING**   **6+12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views – Freehand sketching of multiple views from pictorial views of objects.

UNIT IV   **SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES**   **6+12**

Sectioning of simple solids in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids (without Cut out) — Prisms, pyramids cylinders and cones.

UNIT V   **ISOMETRIC AND PERSPECTIVE PROJECTIONS**   **6+12**

Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL: 90 PERIODS

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TEXT BOOKS:

1   Bhatt N D, Panchal V M, "Engineering Drawing", Charotar Publishing House, 54th Edition, 2023.
2   Natrajan K V, "A Text Book of Engineering Graphics", 36th Edition, Dhanalakshmi Publishers, 2023.

REFERENCES:

1   Gopalakrishna K R, "Engineering Drawing" (Vol. I&II Combined), Subhas Publications, 27th Edition, 2017.
2   Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International Private Limited, 2008.
3   Parthasarathy N S, Vela Murali, "Engineering Graphics", Oxford University Press, 2015.
4   Basant Agarwal and Agarwal C. M, "Engineering Drawing", Tata McGraw Hill, 2nd Edition, 2019.

ONLINE RESOURCES:

1   https://archive.nptel.ac.in/courses/112/102/112102304/

2   https://nptel.ac.in/courses/112103019

3   https://onlinecourses.nptel.ac.in/noc24_ar02/preview

COURSE OUTCOMES:

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

CO1   Draw the various curves used in engineering practices.

CO2   Draw the projections of straight lines which are inclined to both the planes.

CO3   Draw the projections of solids inclined to one plane and parallel to other plane.

CO4   Draw the projections of sectioned solids and draw the development of lateral surfaces of a solid.

CO5   Draw the isometric projections and perspective projections of simple solids.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	-	-	1	-	1	-	-
CO2	3	3	3	3	-	-	-	1	-	1	-	-
CO3	3	3	3	3	-	-	-	1	-	1	-	-
CO4	3	3	3	3	-	-	-	1	-	1	-	-
CO5	3	3	3	3	-	-	-	1	-	1	-	-

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U23PY201	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
	(Common to all Branches)	3	0	2	4

Prerequisites: Programming in C

COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving using Python conditionals and loops
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data and to input/output with files in Python.

UNIT I	COMPUTATIONAL THINKING AND PROBLEM SOLVING	9

Fundamentals of Computing – Identification of Computational Problems - Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion), Towers of Hanoi, insert a card in a list of sorted cards.

UNIT II	DATA TYPES, EXPRESSIONS, STATEMENTS	9

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points,

UNIT III	CONTROL FLOW, FUNCTIONS, STRINGS	9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, Strings: string slices, immutability, string functions and methods, Lists as arrays, linear search, binary search.

UNIT IV	LISTS, TUPLES, DICTIONARIES	9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing; Illustrative programs: histogram, Retail bill preparation, sorting.

UNIT V	FILES, MODULES, PACKAGES	9

Files and exceptions: text files, reading and writing files, format operator; errors and exceptions, handling exceptions, modules, packages; Illustrative programs: GCD, setting offset in a file, wordcount, copyfile, voter's age, validation, marks range validation.

45 PERIODS

PRACTICAL EXERCISES:

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing)
2. Python programming using simple statements and expressions (exchange the values of two variables, compute Simple Interest).
3. Scientific problems using Conditionals and Iterative loops. (Prime factor of an Integer, Bin to Decimal, Octal and Hexa).
4. Implementing programs using Functions. (Factorial, largest number in alist).
5. Implementing programs using Strings. (Reverse, palindrome, character count, replacing characters).
6. Implementing operations of lists, tuples, and dictionaries.

7a   Implementing operations of file handling. (Copy from one file to another, word count).

7b   Implementing real-time/technical applications using Exception handling. (Divide by zero error, voter's age validity, student mark range validation).

30 PERIODS

TOTAL: 75 PERIODS

TEXT BOOKS:

1   Allen B Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

2   Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1   Paul Deitel, Harvey Deitel, "Python for Programmers", 1st Edition, Pearson Education, 2021.

2   G Venkatesh, Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.

3   John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modelling and Understanding Data", 3rd Edition, MIT Press, 2021

4   Eric Matthes, "Python Crash Course, A Hands-on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.

5   Martin C Brown, "Python: The Complete Reference", 4th Edition, Tata McGraw Hill, 2018.

ONLINE RESOURCES

1   http://www.digimat.in/nptel/courses/video/106106212/L01.html

2   https://onlinecourses.swayam2.ac.in/cec24_cs03/preview

3   https://onlinecourses.swayam2.ac.in/cec24_cs01/preview

COURSE OUTCOMES:

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

CO1   Solve simple computational problems using notations.

CO2   Write python programs using statements and Expressions.

CO3   Apply control flow and functional concepts in a user define problems.

CO4   Apply python data structures - list, tuples and dictionaries for compound data.

CO5   Describe file handling and exceptional handling in python for solving problems.

CO – PO – PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	-	-	1	1	1	-	1
CO2	3	3	3	3	1	-	-	1	1	1	-	1
CO3	3	2	1	2	1	-	-	1	1	1	-	1
CO4	3	2	1	2	1	-	-	1	1	1	-	1
CO5	2	2	1	1	1	-	-	1	1	1	-	1

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U23CS201	DATA STRUCTURES	L	T	P	C
Prerequisites: C Programming		3	0	0	3

COURSE OBJECTIVES:

- To understand the concepts of linear and non-linear data structures.
- To understand and gain the knowledge of sorting, searching and hashingalgorithms.
- To apply Tree and Graph data structures.

UNIT I	**LIST**	9

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation– Singiy linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT – Radix Sort – Multilists.

UNIT II	**STACKS AND QUEUES**	9

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue-Applications of Queues.

UNIT III	**TREES**	9

Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search TreeADT – AVLTrees – Priority Queue (Heaps) – Binary Heap.

UNIT IV	**MULTIWAY SEARCH TREES AND GRAPHS**	9

B-Tree – B+ Tree – Graph Definition – Representation of Graphs – Types of GraphBreadth – first traversal – Depth-first traversal

UNIT V	**SORTING AND SEARCHING**	9

Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort – Merge Sort – Hashing – Hash Functions – Separate Chaining

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition,Pearson Education, 2020.
2. Lovelyn Rose, "Data Structures", 2nd Edition, Wiley & Sons, 2019.

REFERENCES:

1. Yedidyah Langsam, Aaron M Tenenbaum, "Data Structures Using C and C++", 2nd Edition, Pearson Education, 2015.
2. Thomas H Cormen, Charles E Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", 4th Edition, Tata McGraw Hill, 2022.

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3 Kruse, "Data Structures and Program Design in C", 2nd Edition, Pearson Education, 2006.

ONLINE RESOURCES:

1 https://www.coursera.org/learn/data-structures.

2 https://onlinecourses.swayam2.ac.in/nou24_cs06/preview.

3 https://www.mygreatlearning.com/academy/learn-for-free/courses/data-structures-in-c

COURSE OUTCOMES:

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

CO1 Describe abstract data types for linear data structures.
CO2 Explain Stack, Queue ADT's operations and its applications.
CO3 Apply various algorithms of tree data structures for solving real world problems.
CO4 Apply appropriate graph algorithm for solving a given problem.
CO5 Analyse various searching, sorting and hashing techniques.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	-	-	-	-	-	2	2
CO2	2	2	1	1	-	-	-		-	-	-	-	2	2
CO3	3	2	1	2	-	-	-	1	-	-	-	-	2	2
CO4	3	2	1	2	2	-	-	1	-	-	-	-	2	2
CO5	3	3	2	2	-	-	-	1	-	-	-	-	2	2

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U23TA201	தமிழரும் தொழில்நுட்பமும்	L	T	P	C
	(Common to all Branches)	1	0	0	1

நோக்கம்:

- அறிவியல் மற்றும் பொறியியல் சார்ந்த அறிவுத்திறனைப் பெருக்குவதன் மூலம் உலக அளவில் அவர்களின் தரத்தை உயர்த்துவதன் நோக்கமாகும்.
- தமிழர் தொழில்நுட்பம் ஏனைய நாகரிகங்களுக்கு இணையான வளர்ச்சியைக் கொண்டதே இதன் நோக்கமாகும்.
- வேளாண்மை, கட்டிடக்கலை, இசைக்கருவிகள், கப்பற்கலை, போர்க்கலை என பல துறைகளில் தமிழர் தொழில்நுட்பத்தை சிறந்து விளங்குவதே நோக்கமாகும்.

அலகு – 1   நெசவு மற்றும் பானைத் தொழில்நுட்பம்   3

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறில் குறியீடுகள்.

அலகு – 2   வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்   3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை வடிவமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோவில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு – 3   உற்பத்தித் தொழில்நுட்பம்   3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எ∴கு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு – 4   வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம்   3

அணை, - ஏரி, குளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பொருங்கடல் குறித்த பண்டைய அறிவு - அறிவு சார் சமூகம்.

அலகு – 5   அறிவியல் தமிழ் மற்றும் கணித்தமிழ்   3

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருள்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொந்குவைத் திட்டம்.

TOTAL: 15 PERIODS

TEXT BOOKS:

1. முனைவர் ஆ. பூபாலன் "தமிழரும் தொழில்நுட்பமும்" வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 - 2024 அண்ணா பல்கலைக்கழகம்.
2. முனைவர் ஆ. ஹேமமாலினி "தமிழரும் தொழில்நுட்பமும்" வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 - 2024 அண்ணா பல்கலைக்கழகம்.

REFERENCES:

1. முனைவர் கே. கே. பிள்ளை "தமிழக வரலாறு, மக்களும், பண்பாடும்," வெளியீடு:

தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 1972.

2 முனைவர் இல. சுந்தரம், "பொருநை, ஆற்றங்கரை நாகரிகம்," வெளியீடு: தொல்லியல் துறை மற்றும் தமிழ்நாடு அரசுத் துறை, 2022.

3 Dr. S. V. சுப்பிரமணியன், நூச.மு.நு. திருநாவுக்கரசு "தமிழர்களின் வரலாற்று பாரம்பரியம்", சர்வதேச தமிழ் ஆய்வு நிறுவனம், 2022.

ONLINE RESOURCES:

1 https://youtu.be/7qTXrUs02fs?si=SBBluhJu1i14o6yw

2 https://youtu.be/A0mxzo4f-s4?si=1C92FLv93BliZ2pn

3 https://youtu.be/Qia72HEV_uE?si=dp06r09Gi1SsKEyQ

COURSE OUTCOMES:

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

CO1 தமிழின் தொன்மையான வரலாறு மற்றும் தொழில் நுட்பத்தை தொகுக்க இயலும்.
Summarize the ancient history and technology of Tamil.

CO2 சங்க கால வாழ்க்கை முறை மற்றும் கட்டிடக்கலை நுட்பங்களைப் பற்றி விளக்க இயலும்.
Explain the lifestyle and architectural techniques of the sangam period.

CO3 பண்டைய தமிழ் மக்களின் வணிக நடை முறைகள் மற்றும் நாணய பரிமாற்றம் பற்றி விளக்க இயலும்.
Explain the business practices and currency exchange of ancient Tamil people.

CO4 சங்க காலத்தில் வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்ப முறைகளைப் பற்றி தொகுக்க இயலும்.
Summarize the Agriculturen and Irrigation Technology in sangam period.

CO5 கணினி பயன்பாடுகளில், தமிழின் தொழில்நுட்ப வளர்ச்சியினைப் பற்றி விளக்க இயலும்.
Explain the computer applications in Tamil technological development.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	:	-
CO5	1	-	-	-	-	-	-	-	-	-	-	-

U23EP101	ENGINEERING PRACTICES LABORATORY	L	T	P	C
	(Common to all branches)	0	0	3	1.5

Prerequisites: Nil

COURSE OBJECTIVES:

- Drawing pipeline plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household woodwork.

- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping In parts; Assembling simple mechanical assembly of common household equipment's; Making a tray out of metal sheet using sheet metal work.

- Wiring various electrical joints in common household electrical wire work. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & MECHANICAL)
PART I   CIVIL ENGINEERING PRACTICES
I. PLUMBING WORK:

1. Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
2. Preparing plumbing line sketches.
3. Laying pipe connection to the delivery side of a pump.
4. Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

II. WOOD WORK:

1. Sawing,
2. Planing
3. Making joints like T-Joint Mortise joint, Tenon joint, and Dovetail joint.
4. Studying joints in door panels and wooden furniture.
5. Studying common industrial trusses using models.

PART II   MECHANICAL ENGINEERING PRACTICES
I. WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Practicing gas welding.

II. BASIC MACHINING WORK:

a) (Simple) Turning.
b) (Simple) Drilling.
c) (Simple) Tapping.

III. ASSEMBLY WORK:

a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an air conditioner.

IV. SHEET METAL WORK:

a) Making of a square tray.

V. FOUNDRY WORK:
a) Demonstrating basic foundry operations.

GROUP B (ELECTRICAL AND ELECTRONICS)
PART III   ELECTRICAL ENGINEERING PRACTICES
a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket.
b) Staircase wiring.
c) Fluorescent Lamp wiring with introduction to CFL and LED types.
d) Energy meter wiring and related calculations/ calibration.
e) Study of Iron Box wiring and assembly.
f) Study of Fan Regulator (Resistor type and Electronic type using Diac/ Triac/ quadrac).
g) Study of emergency lamp wiring/Water heater.

PART IV   ELECTRONICS ENGINEERING PRACTICES
I.   SOLDERING WORK:
a) Soldering simple electronic circuits and checking continuity.
ELECTRONIC ASSEMBLY AND TESTING WORK:
a) Assembling and testing electronic components on a small PCB.
II.   ELECTRONIC EQUIPMENT STUDY:
a) Study an element of smart phone.
b) Assembly and dismantle of LED TV.
c) Assembly and dismantle of computer/ laptop.

TOTAL: 45 PERIODS

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

CO1   Apply the basic concept of Plumbing and carpentry in various Residential buildings.
CO2   Apply the concept of arc welding in welding of steel plate.
CO3   Analyze the basics of machining operations and sheet metal works.
CO4   Apply the various electrical joints in common household electrical wire work.
CO5   Apply the basic concept of assemble and testing of simple electronic components on PCB.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	-	1	-	1	1	1	-	-
CO2	3	2	1	2	-	1	-	1	1	1	-	-
CO3	3	3	2	2	-	1	-	1	1	1	-	-
CO4	3	2	1	2	-	1	-	1	1	1	-	-
CO5	3	2	1	2	-	1	-	1	1	1	-	-

U23CS202   **DATA STRUCTURES LABORATORY**   **L T P C**

Prerequisites: C Programming   **0 0 3 1.5**

COURSE OBJECTIVES:

- To apply Stack, Queue and List ADT's operations for solving a given problem.
- To solve various operations like traversal, insertion, deletion on tree and graph data structure.
- To analyze various kinds of searching and sorting techniques.

LIST OF EXPERIMENTS

1. Implementation of Stack, Queue ADT using array.
2. Implementation of Singly linked list.
3. Linked list implementation of Stack and Linear Queue ADTs.
4. Implementation of Polynomial Manipulation using Linked list.
5. Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion.
6. Implementation of Binary Search Trees.
7. Implementation of Heaps.
8. Tree representation and traversal algorithms.
9. Graph representation and traversal algorithms.
10. Implementation of Searching Algorithms.
11. Implementation of Selection and Insertion Sort.
12. Implementation of Merge and Bubble Sort.
13. Implementation of Hash tables.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1   Apply Stack, Queue and List ADT's operations for solving a given problem

CO2   Solve various operations like traversal, insertion, deletion on tree data structure.

CO3   Solve various applications using graph algorithms.

CO4   Analyze various kinds of searching and sorting techniques

CO5   Apply appropriate hashing techniques for the given problem

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	1	1	2	-	1	3	2
CO2	3	2	1	2	-	-	-	1	1	2	-	1	3	2
CO3	3	2	1	2	-	-	-	1	1	2	-	1	3	2
CO4	3	3	2	2	-	-	-	1	1	2	-	1	3	2
CO5	3	2	1	2	2	-	-	1	1	2	-	1	3	2

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U23MA304	PROBABILITY AND STATISTICS	L	T	P	C

U23MA304 PROBABILITY AND STATISTICS L T P C

Pre requisites: Engineering Mathematics 3 1 0 4

COURSE OBJECTIVES:

- To introduce the basic concepts of probability and two dimensional random variables.
- To acquaint the knowledge of random processes which plays an important role in real life problems.
- To introduce the concepts of design of experiments which plays important roles in the field of agriculture and statistical.

UNIT I	PROBABILITY AND RANDOM VARIABLES	12

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II	TWO DIMENSIONAL RANDOM VARIABLES	12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables.

UNIT III	RANDOM PROCESSES	12

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations.

UNIT IV	DESIGN OF EXPERIMENTS	12

One way and Two way classifications - Completely randomized design –Randomized block design – Latin square design.

UNIT V	STATISTICAL QUALITY CONTROL	12

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL: 60 PERIODS

TEXT BOOKS:

1 P Sivaramakrishna Das, C Vijayakumari, "Probability and Statistics", 2nd Edition, Pearson Education, 2020.
2 R E Walpole, R H Myers, S L Myers and K Ye, "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, 2021.

REFERENCES:

1 Richard A Johnson, "Miller and Freund's Probability and Statistics for Engineers", 9th Edition, Pearson Education, 2018

2 Geoffrey Grimmett, David Stirzaker, "Probability and Random Processes", 4th Edition, Oxford University Press, 2020.
3 Anthony Croft, Robert Davison, "Mathematics for Engineers", 5th Edition, Pearson Education, 2019.

ONLINE RESOURCES:

1 https://freevideolectures.com/course/4941/nptel-probabilitystatistics
2 https://cosmolearning.org/courses/introduction-probabilitystatistics/video-lectures/
3 https://nptel.ac.in/courses/111105041/

COURSE OUTCOMES:

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

CO1 Apply the concept of probability and standard distributions in real life problems.

CO2 Analyze the concepts of two-dimensional random variables.

CO3 Apply the concept of random processes in engineering disciplines.

CO4 Analyze the concepts of design of experiments using ANOVA.

CO5 Apply the control charts for measurements in statistical quality control.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	1	-	-	-	1	3	3
CO2	3	3	2	2	-	-	-	-	-	-	-	1	2	2
CO3	3	3	2	2	-	-	-	1	-	-	-	1	2	1
CO4	3	3	2	2	-	-	-	1	-	-	-	1	2	3
CO5	3	2	1	2	-	-	-	-	-	-	-	1	2	1

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U23EC301   DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION   **L T P C**

Prerequisites: Nil

                                                                  3 0 2 4

COURSE OBJECTIVES:

- To present the fundamentals of digital circuits and simplification methods
- To bring out the analysis and design procedures for synchronous and asynchronous Sequential circuits.
- To understand the basic structure and operation of a digital computer.

UNIT I   BASIC CONCEPTS   9

Review of number systems-representation-conversions, Review of Boolean algebra – theorems, sum of product and product of sum simplification, canonical forms min term and max term, Simplification of Boolean expressions-Karnaugh map, Implementation of Boolean expressions using universal gates.

UNIT II   COMBINATIONAL LOGIC CIRCUITS   9

Problem formulation and design of combinational circuits – Code-Converters (Binary to Gray code, Gray to Binary, BCD to Excess-3 code,Excess-3 to BCD), Half and Full Adders, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Mux/Demux, Case study: Digital trans-receiver Parity Generator/Checker, Seven Segment display decoder

UNIT III   SEQUENTIAL CIRCUITS   9

Latches, Flip flops – SR, JK, T, D, Master/Slave FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment, Counters, Shift registers, Stable and Unstable states, output specifications, Hazards, Essential Hazards, Design of Hazard free circuits.

UNIT IV   COMPUTER FUNDAMENTALS   9

Functional Units of a Digital Computer: Von Neumann Architecture and Harvard Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes.

UNIT V   PROCESSOR AND MEMORY   9

Instruction Execution – Building a Data Path- Pipelining- basic memory, static ROM, PROM, EPROM, EEPROM, Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA.

                                                              45 PERIODS

PRACTICAL EXERCISES:

1   Verification of Boolean theorems using logic gates.

2   Design and implementation of combinational circuits using gates for arbitrary functions.

3   Implementation of 4-bit binary adder/subtractor circuits.

4 Implementation of code converters.

5 Implementation of BCD adder, encoder and decoder circuits

6 Implementation of functions using Multiplexers.

7 Implementation of the synchronous counters and shift register.

30 PERIODS
TOTAL: 75 PERIODS

TEXT BOOKS:

1 M Morris Mano, Michael D Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL and System Verilog", 6th Edition, Pearson Education, 2020.

2 David A Patterson, John L Hennessy, "Computer Organization and Design, The Hardware/Software Interface", 6th Edition, Morgan Kaufmann, 2020.

REFERENCES:

1 Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", 6th Edition, Tata McGraw Hill, 2022.

2 William Stallings, "Computer Organization and Architecture – Designing for Performance", 11th Edition, Pearson Education, 2022.

3 M Morris Mano, "Digital Logic and Computer Design", 6th Edition, Pearson Education, 2018.

ONLINE RESOURCES

1 https://archive.nptel.ac.in/courses/117/105/117105078

2 https://www.coursera.org/courses?query=computer%20architecture

3 https://onlinecourses.nptel.ac.in/noc21_ee39/preview

COURSE OUTCOMES:

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

CO1 Apply Boolean Algebra and Simplification procedures relevant to digital logic.

CO2 Design various combinational digital circuits using logic gates.

CO3 Design synchronous and asynchronous sequential digital circuits using logic gates.

CO4 Summarize the basic structure and operation of a digital computer.

CO5 Analyze the data path unit of processor and concept of various memories.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	2	2	2	-	1	2	2
CO2	3	3	3	3	1	-	-	2	2	2	-	1	2	2
CO3	3	3	3	3	1	-	-	2	2	2	-	1	2	2
CO4	2	2	1	1	-	-	-	-	-	-	-	-	2	2
CO5	3	3	2	2	-	-	-	-	-	-	-	-	2	2

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U23CS301	FOUNDATION OF DATA SCIENCE	L	T	P	C
		3	0	0	3

Prerequisites: Problem Solving and Python Programming

COURSE OBJECTIVES:

- To understand the data science fundamentals and process
- To describe the data for the data science process and the relationship between data.
- To utilize the Python libraries for Data Wrangling and interpret data using visualizationlibraries in Python.

UNIT I	INTRODUCTION	9

Data Science: facets of data – Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation – Exploratory Data analysis – build the model- presentingfindings and building applications – Data Mining – Data Warehousing.

UNIT II	DESCRIBING DATA	9

Types of Data – Types of Variables - Basic Statistical descriptions of Data-Describing Data with Tables and Graphs –Describing Data with Averages – Describing Variability – Normal Distributions and Standard (z) Scores.

UNIT III	DESCRIBING RELATIONSHIPS	9

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r2 –multiple regression equations – regression towards the mean.

UNIT IV	PYTHON LIBRARIES FOR DATA WRANGLING	9

Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combiningdatasets – aggregation and grouping – pivot tables.

UNIT V	DATA VISUALIZATION	9

Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting – Geographic Data with Basemap – Visualization with Seaborn.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Robert S Witte, John S Witte, "Statistics", 11th Edition, John Wiley & Sons, 2018.

2. Jake VanderPlas, "Python Data Science Handbook", 1st Edition, O'Reilly Media, 2019.

REFERENCES:

1. Allen B Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2019.

2. David Cielen, Arno D B Meysman, Mohamed Ali, "Introducing Data Science",2nd Edition, Manning Publications, 2018.

ONLINE RESOURCES:

1. http://www.digimat.in/nptel/courses/video/106105186/L01.html
2. http://www.coursera.org/learn/foundation-of-data-science
3. https://www.classcentral.com/course/foundations-of-data-science-158485

COURSE OUTCOMES:

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

CO1   Summarize the Data Science Process.
CO2   Explain the different types of data description for data science process.
CO3   Explain the relationships between data.
CO4   Explain the Python Libraries for Data Wrangling.
CO5   Describe Visualization Libraries in Python to interpret and explore data.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	1	-	-	-	-	2	2
CO2	2	2	1	1	1	-	-	1	-	-	-	-	1	1
CO3	2	2	1	1	1	-	-	1	-	-	-	-	2	2
CO4	2	2	1	1	1	-	-	1	-	-	-	1	1	1
CO5	2	2	1	1	1	-	-	1	-	-	-	1	2	2

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U23CS302	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Prerequisites: Data Structures

COURSE OBJECTIVES:

- To learn the fundamentals of data models, relational algebra and SQL
- To represent a database system using ER diagrams and to learn normalization techniques.
- To understand the fundamental concepts of transaction, concurrency and recovery processing, internal storage structures using different file and indexing techniques and Advanced Data bases.

UNIT I   RELATIONAL DATABASES   9

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL.

UNIT II   DATABASE DESIGN   9

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form.

UNIT III   TRANSACTIONS   9

Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control –Two Phase Locking-Timestamp – Multi version – Validation and Snapshot isolation– Deadlock Handling – Recovery Concepts – Recovery based on deferred and immediate update.

UNIT IV   IMPLEMENTATION TECHNIQUES   9

RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations.

UNIT V   ADVANCED TOPICS   9

Distributed Databases: Architecture, Data Storage, Transaction Processing, Query processing and optimization – NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases.

TOTAL: 45 PERIODS

TEXT BOOKS:

1   Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", 8th Edition, Tata McGraw Hill, 2021.

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2 Ramez Elmasri, Shamkant B Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2018.

REFERENCES:

1 Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", 4th Edition, Tata McGraw Hill, 2021.
2 Jeffrey A Hoffer, Ramesh Venkataraman, Heikki Topi, "Modern Database Management", 14th Edition, Pearson Education, 2022.
3 Hector Garcia-Molina, Jeffrey D Ullman, Jennifer Widom, "Database Systems: The Complete Book", 3rd Edition, Pearson Education, 2021.

ONLINE RESOURCES:

1 https://archive.nptel.ac.in/courses/106/105/106105175/
2 https://www.coursera.org/articles/relational-database
3 https://archive.nptel.ac.in/courses/106105174/

COURSE OUTCOMES:

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

CO1 Write SQL Queries using SQL commands and Relational Algebra.

CO2 Design Database using E-R Model and Normalize the database.

CO3 Summarize transaction Concepts, Concurrency and Recovery Techniques.

CO4 Describe Internal Storage Structures using files, Indexing, Hashing and Query Optimization.

CO5 Comprehend Advanced Data bases and Database Security.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	-	-	-	1	2	2
CO2	3	3	3	3	-	-	-	1	-	-	-	-	2	2
CO3	2	2	1	1	-	-	-	-	-	-	-	-	2	2
CO4	2	2	1	1	-	-	-	-	-	-	-	-	2	2
CO5	2	2	1	1	-	-	-	1	-	-	-	1	2	2

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U23CS303	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	2	4

Prerequisites: Programming in C

COURSE OBJECTIVES:

- To understand the Object Oriented Programming concepts using Java
- To develop Java application with threads, generic classes, exceptions and use I/O streams.
- To design and build Graphical User Interface Application using JAVAFX.

UNIT I	INTRODUCTION TO OOP AND JAVA	9

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java –Constructors-Methods -Access specifiers - Static members- Java Doc comments

UNIT II	INHERITANCE, PACKAGES AND INTERFACES	9

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces:Packages – Packages and Member Access –Importing Packages – Interfaces.

UNIT III	EXCEPTION HANDLING AND MULTITHREADING	9

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model– Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

UNIT IV	I/O, GENERICS, STRING HANDLING	9

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: GenericProgramming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

UNIT V	JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS	9

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls –ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – MenuItem.

45 PERIODS

PRACTICAL EXERCISES:

1. Solve problems by using sequential search and binary search.
2. Develop stack and queue data structures using classes and objects.
3. Solve the above problem using an interface.

4   Implement exception handling and creation of user defined exceptions.

5   Write a program to perform file operations.

6   Develop applications to demonstrate the features of generics classes.

7   Develop applications using JavaFX controls, layouts and menus.

30 PERIODS

TOTAL: 75 PERIODS

TEXT BOOKS:

1   Herbert Schildt, "Java: The Complete Reference", 11th Edition, Tata McGraw Hill, 2019.

2   Herbert Schildt, "Introducing JavaFX 8 Programming", 1st Edition, Tata McGraw Hill, 2018.

REFERENCES:

1   Cay S Horstmann, "Core Java Fundamentals", Volume 1, 11th Edition, Prentice Hall, 2018.

2   Y Daniel Liang, "Introduction To Java Programming, Comprehensive", 10th Edition, Pearson Education, 2018.

3   Walter Savitch, "Java An Introduction To Problem Solving And Programming", Pearson Education, 2019.

ONLINE RESOURCES:

1   https://onlinecourses.nptel.ac.in/noc22_cs47
2   https://www.w3schools.com
3   https:// jenkov.com/tutorials/javafx

COURSE OUTCOMES:

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

CO1   Comprehend OOPS concept and basic concepts of JAVA.

CO2   Apply the principles of inheritance, packages and interfaces

CO3   Apply features of exception handling and multithreading in Java program.

CO4   Develop Java applications with I/O, Generic and string handling.

CO5   Design Java application using JAVAFX Event handling.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	-	-	-	-	-	2	2
CO2	3	2	2	2	1	2	-	2	2	-	-	2	2	1
CO3	3	2	2	2	1	2	-	2	2	-	-	2	1	2
CO4	3	3	3	3	2	2	-	2	2	-	-	2	2	1
CO5	3	3	3	3	2	2	-	2	2	-	-	2	1	2

U23CS403   THEORY OF COMPUTATION   L T P C
                                                     3 0 0 3

Prerequisites: Data Structures

COURSE OBJECTIVES:

- To understand foundations of computation including automata theory with regular expressions and languages.
- To design Normal Forms and Turning machines.
- To design context free grammar and push down automata.

UNIT I   AUTOMATA AND REGULAR EXPRESSIONS   9

Need for automata theory - Introduction to formal proof – Finite Automata (FA) Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) Equivalence between NFA and DFA-Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimization of DFAs.

UNIT II   REGULAR EXPRESSIONS AND LANGUAGES   9

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions-Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages.

UNIT III   CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA   9

Types of Grammar - Chomsky's hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG Deterministic Pushdown Automata.

UNIT IV   NORMAL FORMS AND TURING MACHINES   9

Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages –Turing Machine: Basic model – definition and representation – Instantaneous Description – Language acceptance by TM – TM as Computer of Integer functions Programming techniques for Turing machines (subroutines).

UNIT V   POWER DEVICES AND DISPLAY DEVICES   9

Unsolvable Problems and Computable Functions –PCP-MPCP- Recursive and recursively enumerable languages – Properties - Universal Turing machine -Tractable and Intractable problems-P and NP completeness – Kruskal's algorithm – Travelling Salesman Problem- 3-CNF SAT problems.

                                                  TOTAL: 45 PERIODS

TEXT BOOKS:

1 Dexter C Kozen, "Theory of Computation", 2nd Edition, Springer, 2020.
2 Manish K Sah, Sagar Khandelwal, "Theory of Computation", 6th Edition, Ashirwad, 2019.

REFERENCES:

1 J E Motwani R, Ullman J D, "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2017.
2 K L P Mishra, N Chandrasekaran, "Theory of Computer Science: Automata Languages and Computation", 3rd Edition, Prentice Hall of India, 2018.
3 Varsha H Patil, Vaishali S Pawar, "Theory of Computation Simplified: Simulate Real-world Computing Machines and Problems with Strong Principles of Computation", BPB Publications, 2022.

ONLINE RESOURCES:

1 http://www.digimat.in/nptel/courses/video/106104148/L01.html
2 https://www.classcentral.com/course/youtube-toc-theory-of-computation-46804
3 https://archive.nptel.ac.in/courses/106/104/106104148/

COURSE OUTCOMES:

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

CO1 Describe Automata Theory by using Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata.
CO2 Apply Regular expressions for any pattern.
CO3 Design context free grammar with Derivations with parse trees and Languages Push Down Automata with equivalence.
CO4 Design Turing machine for computational functions of CNF, CFG and GNF.
CO5 Explain Undecidable, Tractable , Intractable problems and Kruskal's algorithms.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	1	-	-	-	1	2	2
CO2	3	2	1	2	-	-	-	1	-	-	-	1	2	2
CO3	3	3	3	3	-	-	-	1	-	-	-	1	2	2
CO4	3	3	3	3	-	-	-	1	-	-	-	1	2	2
CO5	2	2	1	1	-	-	-	1	-	-	-	1	2	2

U23CS304	DATA SCIENCE LABORATORY	L	T	P	C
		0	0	3	1.5

Prerequisites : Problem Solving and Python Programming

COURSE OBJECTIVES:

- To develop data analytic code in python
- To be able to use python libraries for handling data.
- To develop analytical applications using python and perform data visualization using plots.

PRACTICAL EXCERCISES:

1. Working with Numpy arrays and Pandas data frames
2. Perform following preprocessing techniques on loan prediction dataset
   a) Feature Scaling   b) Feature Standardization
   c) Label Encoding   d) One Hot Encoding
3. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.
4. Read the following file formats Pickle file, Image files using PIL Multiple files using Glob
5. Implement basic plots using Matplotlib.
6. Python program to perform frequency distributions, averages, Variability
7. Python program to perform Normal curves, Correlation and scatter plots, Correlation coefficient
8. Develop python program for Regression
9. Develop python program for Z-test
10. Implement with python ANOVA
11. Python program to perform Building and validating linear models
12. Develop python program Building and validating logistic models

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Summarize the python libraries for data science.
CO2 Design the basic statistical and probability measures for data Science.
CO3 Design a descriptive analysis on the benchmark dataset.
CO4 Design Correlation and Regression Analytics on standard data set.
CO5 Design data using visualization packages in python.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	2	-	-	1	-	-	-	1	2	2
CO2	3	3	3	3	1	-	-	1	-	-	-	1	2	2
CO3	3	3	3	3	1	-	-	1	-	-	-	1	2	2
CO4	3	3	3	3	2	-	-	1	-	-	-	1	2	2
CO5	3	3	3	3	2	-	-	1	-	-	-	1	2	2

U23CS305   **DATABASE MANAGEMENT SYSTEMS LABORATORY**   **L T P C**

Prerequisites: **Programming in C**   **0 0 3 1.5**

COURSE OBJECTIVES:

- To study the principles to be followed to create an effective relational database and write SQL queries to store/retrieve data to/from database systems.
- To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To learn how to use database management systems.

PRACTICAL EXERCISES

1	Implementation of DDL commands of SQL with suitable examples
2	Implementation of DML commands of SQL with suitable examples
3	Implementation of different types of where clause conditions and also implement aggregate functions in SQL.
4	Implementation of different types of operators in SQL
5	Implementation of different types of Joins
6	Study and implementation of sub queries in SQL.
7	Study and implementation of pattern matching in SQL.
8	Study and implementation of different types of constraints.
9	Write user defined functions in SQL.
10	Write stored procedures in SQL
11	Execute complex transactions and realize DCL and TCL commands. Write SQL Triggers for insert, delete, and update operations in database table.
12	Write SQL Triggers for insert, delete, and update operations in database table.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Create databases with different types of key constraints.

CO2 Analyze simple and complex SQL queries using DML and DCL commands.

CO3 Apply advanced features such as stored procedures and triggers incorporate in GUI based application development

CO4 Create an XML database and validate with meta-data(XML schema)

CO5 Create and manipulate data using NOSQL database

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	1	1	-	1	2	2
CO2	3	3	2	2	-	-	-	-	1	1	-	1	2	2
CO3	3	2	1	1	1	-	-	-	1	1	-	1	2	2
CO4	3	3	3	3	1	-	-	-	1	1	-	1	2	2
CO5	3	3	3	3	1	-	-	-	1	1	-	1	2	2

U23EEC301	EMPLOYABILITY SKILLS – I	L	T	P	C

Prerequisites: Nil   0   0   2   1

COURSE OBJECTIVES:

- To educate and enrich the students on quantitative aptitude, logical reasoning and written communication.

UNIT I   QUANTITATIVE APTITUDE – PART 1   6

Numbers: Number system – Squaring of Numbers – Square Roots – Cube Roots – Divisibility – HCF, LCM – Decimals – Clocks.

UNIT II   QUANTITATIVE APTITUDE – PART 2   6

Averages – problem on Ages – Ratio & Proportion – Mixture and Allegations.

UNIT III   LOGICAL REASONING – PART – 1   6

Alphabet Test Series – Number Test Series– Analogies – Odd Words – Statement & Conclusions – Blood Relations – Odd man out.

UNIT IV   EFFECTIVE ENGLISH – SPOKEN ENGLISH   6

Basic Rules of Grammar – Parts of Speech – Tenses – Verbs – Sentences construction – Vocabulary – idioms & phrases – Synonyms – Antonyms – Dialogues and conversation – Exercise (Speaking).

UNIT V   WRITTEN COMMUNICATION – PART 1   6

Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition – Change of Voice – Change of Speech.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. R S Aggarwal, "Quantitative Aptitude", Revised Edition, S Chand & Co Ltd., 2017.

2. R S Aggarwal, "A Modern Approach to Verbal and Non-verbal Reasoning", S Chand & Co Ltd., 2018.

REFERENCES:

1. Abhijit Guha, "Quantitative Aptitude", 3rd Edition, Tata McGraw Hill, 2009.

2. Raj N Bakshmi, "English Grammar Practice," 1st Edition, Orient Black Swan, 2009.

3. M Ashra Rizvi, "Effective Technical Communication," 2nd Edition, Tata McGraw Hill, 2017.

4. Norman Lewis, "Word Power Made Easy", W.R. Goyal Publishers, 2020.

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MACHINE LEARNING TECHNIQUES   L T P C
                                                          3 0 2 4

Prerequisites : Problem Solving and Python Programming
COURSE OBJECTIVES:
- To explore uninformed and heuristic search techniques.
- To acquire knowledge in reasoning under uncertainty.
- To introduce supervised learning algorithms and delve into Machine Learning.

UNIT I   **PROBLEM SOLVING**   9

Introduction to AI - AI Applications - Problem solving agents – search algorithms uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search– constraint satisfaction problems (CSP).

UNIT II   **PROBABILISTIC REASONING**   9

Acting under uncertainty – Bayesian inference – naïve bayes models. Probabilistic reasoning Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.

UNIT III   **SUPERVISED LEARNING**   9

Introduction to machine learning – Linear Regression Models: Least squares, single & multiple variables, Linear Classification Models: Discriminant function -Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier, Decision Trees: ID3, Classification and Regression Trees (CART), Support vector machines.

UNIT IV   **ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING**   9

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.

UNIT V   **ARTIFICIAL NEURAL NETWORKS**   9
Neural Network Representation – Problems – Perceptrons, Activation Functions, Artificial Neural Networks (ANN) , Back Propagation Algorithm -Convolutional Neural Networks - Convolution and Pooling layers, Recurrent Neural Networks (RNN).

45 PERIODS

PRACTICAL EXERCISES:
1   Implementation of Uninformed search algorithms (BFS, DFS).
2   Implementation of Informed search algorithms (A*, memory-bounded A*).
3   Implement naïve Bayes models.
4   Implement Bayesian Networks.
5   Build Regression models.

6   Build decision trees and random forests.

7   Build simple NN models.

30 PERIODS
TOTAL: 75 PERIODS

TEXT BOOKS:

1   Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", 4th Edition, Pearson Education, 2021.

2   Ethem Alpaydin, "Introduction to Machine Learning", 4th Edition, MIT Press, 2020.

REFERENCES:

1   Dan W Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2020.

2   Kevin Night, Elaine Rich, Nair B, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2019.

3   Kevin P Murphy, "Probabilistic Machine Learning: An Introduction", MIT Press, 2022.

ONLINE RESOURCES

1   https://towardsdatascience.com/machine-learning-probability-statistics-f830f8c09326

2   https://nptel.ac.in/courses/106/105/106105152/

3   https://nptel.ac.in/courses/117105084

COURSE OUTCOMES:

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

CO1 Apply search-based problem-solving methods for AI applications.

CO2 Apply the Bayesian concepts to machine learning problems.

CO3 Apply the concept of Supervised learning models.

CO4 Analyze the strategy for ensembling and unsupervised learning.

CO5 Summarize the significant features of neural networks.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	1	-	-	1	2	2	-	-	3	3
CO2	3	2	1	2	1	-	-	1	2	2	-	-	3	3
CO3	3	2	1	2	1	-	-	1	2	2	-	1	3	3
CO4	3	3	2	2	1	-	-	1	2	2	-	-	3	3
CO5	2	2	1	1	1	-	-	1	2	2	-	-	3	2

U23CS402	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	2	4

Prerequisites: Data Structures

COURSE OBJECTIVES:

- To understand and apply the algorithm analysis techniques.
- To understand efficiency and design techniques of different algorithm.
- To understand the basic concepts of NP completeness and approximation algorithm.

UNIT I	INTRODUCTION	9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.

UNIT II	GRAPH ALGORITHMS	9

Graph algorithms: Representations of graphs – Graph traversal: DFS – BFS - applications – Connectivity, strong connectivity, bi-connectivity – Minimum spanning tree: Kruskal's and Prim's algorithm- Shortest path: Bellman-Ford algorithm – Dijkstra's algorithm – Floyd-Warshall algorithm Network flow: Flow networks - Ford-Fulkerson method – Matching: Maximum bipartite matching.

UNIT III	ALGORITHM DESIGN TECHNIQUES	9

Divide and Conquer methodology: Finding maximum and minimum – Merge sort – Quick sort Dynamic programming: Elements of dynamic programming – Matrix-chain multiplication – Multi stage graph – Optimal Binary Search Trees, Greedy Technique: Elements of the greedy strategy – Activity – selection problem – Optimal Merge pattern – Huffman Trees.

UNIT IV	STATE SPACE SEARCH ALGORITHMS	9

Backtracking: n-Queens problem - Hamiltonian Circuit Problem – Subset Sum Problem – Graph colouring problem Branch and Bound: Solving 15-Puzzle problem – Assignment problem – Knapsack Problem – Travelling Salesman Problem.

UNIT V	NP-COMPLETE AND APPROXIMATION ALGORITHM	9

Lower – Bound Arguments – P, NP NP – Complete and NP Hard Problems, Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.

45 PERIODS

PRACTICAL EXERCISES:

1 Implement Linear Search. Determine the time required to search for an element.

2 Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.

3 Implement recursive Binary Search. Determine the time required to search an element.

4 Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.

5 Given a text txt [0...n-1] and a pattern pat [0...m-1], write a function search (char pat [ ], char

txt [ ]) that prints all occurrences of pat [ ] in txt [ ]. You may assume that n > m.

6   Develop a program to implement graph traversal using Breadth First Search.
7   Develop a program to implement graph traversal using Depth First Search.

30 PERIODS
TOTAL: 75 PERIODS

TEXT BOOKS:
1   S Sridhar, "Design and Analysis of Algorithms", 2nd Edition, Oxford University Press, 2023.
2   Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", 4 th Edition, MIT Press, 2022.

REFERENCES:
1   Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2018.
2   Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of computer Algorithms", 2nd Edition, Universities Press, 2018.
3   Ethem Alpaydin, "Introduction to Algorithms", 4 th Edition, MIT Press, 2020.

ONLINE RESOURCES
1   http://nptel.ac.in/courses/106106131
2   http://nptel.ac.in/courses/106101059
3   https://www.coursera.org/learn/advanced-algorithms-and-complexity

COURSE OUTCOMES:

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

CO1   Analyze search, sort and string matching algorithms to compute their efficiency.
CO2   Apply graph algorithms to solve problems and analyze their efficiency.
CO3   Apply algorithm design techniques like divide & conquer, dynamic programming and greedy techniques to solve problems.
CO4   Apply the state space tree method for solving problems.
CO5   Solve problems using approximation algorithms and NP-Complete.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2
CO1	3	3	2	2	1	-	-	1	1	2	-	-	2	2
CO2	3	2	1	2	1	-	-	1	1	2	-	-	2	2
CO3	3	2	1	2	1	-	-	1	1	2	-	-	2	2
CO4	3	2	1	2	1	-	-	1	1	2	-	-	2	2
CO5	3	2	1	2	1	-	-	1	1	2	-	-	2	2

U23CS404	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

Prerequisites: Nil

COURSE OBJECTIVES:

- To analyze various Memory Management schemes and understand I/O management and File Systems.
- To understand the basic concepts, functions of Operating Systems, Processes and Threads.
- To analyze Scheduling algorithm and understand the concept of Deadlock.

UNIT I   OPERATING SYSTEM OVERVIEW   9

Computer System Overview-Basic Elements - Instruction Execution - Interrupts - Memory Hierarchy - Cache Memory - Direct Memory Access - Multiprocessor and Multicore Organization - Operating System Overview- Objectives and Functions - Evolution of Operating System - Computer System Organization Operating System Structure and Operations - System Calls - System Programs - OS Generation and System Boot.

UNIT II   PROCESS MANAGEMENT   9

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication - CPU Scheduling - Scheduling Criteria - Scheduling Algorithms- Multiple - Processor Scheduling - Real Time Scheduling - Threads - Overview - Multithreading Models - Threading Issues - Process Synchronization - The Critical - Section Problem - Synchronization Hardware - Mutex Locks - Semaphores - Classic Problems of Synchronization - Critical Regions - Monitors - Deadlock – System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock

UNIT III   STORAGE MANAGEMENT   9

Main Memory – Background, Swapping, Contiguous Memory Allocation - Paging - Segmentation - Segmentation with Paging - 32 and 64 Bit Architecture Examples - Virtual Memory – Background - Demand Paging - Page Replacement - Allocation - Thrashing - Allocating Kernel Memory - OS Examples.

UNIT IV   FILE SYSTEMS AND I/O SYSTEMS   9

Mass Storage System – Overview of Mass Storage Structure - Disk Structure - Disk Scheduling and Management - Swap Space Management - File-System Interface - File Concept - Access Methods - Directory Structure - Directory Organization - File System Mounting - File Sharing and Protection - File System Implementation- File System Structure - Directory Implementation - Allocation Methods - Free Space Management - Efficiency and Performance Recovery - I/O Systems – I/O Hardware - Application I/O Interface - Kernel I/O Subsystem - Streams - Performance.

UNIT V   CASE STUDY   9

Linux System - Design Principles - Kernel Modules - Process Management - Scheduling Memory Management - Input-Output Management - File System - Inter-Process Communication - Mobile OS - iOS and Android - Architecture and SDK Framework - Media

Layer - Services Layer - Core OS Layer - File System.

TEXT BOOKS:

1   Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley & Sons, 2021.
2   William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Prentice Hall of India, 2019.

REFERENCES:

1   AchyutS. Godbole, Atul Kahate, "Operating Systems", Tata McGraw Hill, 2018.
2   Andrew S Tanenbaum, "Modern Operating Systems", 5th Edition, Pearson Education, 2022.

ONLINE RESOURCES:

1   https://archive.nptel.ac.in/courses/106/105/106105214/
2   https://onlinecourses.nptel.ac.in/noc20_cs04/preview
3   https://www.youtube.com/watch?v=3Qfx4geYN9I

COURSE OUTCOMES:

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

CO1   Comprehend the basic concepts and functions of operating systems.

CO2   Apply various CPU scheduling algorithms, Synchronization primitives and deadlock, handling methods.

CO3   Apply the Various memory management schemes and page replacement algorithms.

CO4   Apply the various disk scheduling algorithms, file system implementation and Security mechanism.

CO5   Describe the basics of Linux System and Mobile OS like iOS and Android.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	1	-	-	-	1	2	2
CO2	3	2	1	2	-	-	-	1	-	-	-	1	2	2
CO3	3	2	1	2	-	-	-	1	-	-	-	1	2	2
CO4	3	2	1	2	-	-	-	1	-	-	-	1	2	2
CO5	2	2	1	1	-	-	-	1	-	-	-	1	2	2

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U23CS405	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Prerequisites : Nil

COURSE OBJECTIVES:

- To understand the concept of layering in networks and to know the functions of protocols of each layer.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the transport layer.

UNIT I   **INTRODUCTION AND APPLICATION LAYER**   **9**

Data Communication – Networks – Network Types – Protocol Layering – TCP/IP Protocol suite –OSI Model – Introduction to Sockets – Application Layer protocols: HTTP – FTP – Email protocols (SMTP – POP3 – IMAP – MIME) – DNS – SNMP.

UNIT II   **TRANSPORT LAYER**   **9**

Introduction – Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control –Congestion Control – Congestion avoidance (DECbit, RED) – SCTP – Quality of Service.

UNIT III   **NETWORK LAYER**   **9**

Switching : Packet Switching – Internet protocol – IPV4 – IP Addressing – Subnetting – IPV6, ARP, RARP, ICMP, DHCP.

UNIT IV   **ROUTING**   **9**

Routing and protocols: Unicast routing – Distance Vector Routing – RIP – Link State Routing– OSPF– Path-vector routing – BGP – Multicast Routing: DVMRP – PIM.

UNIT V   **DATA LINK AND PHYSICAL LAYERS**   **9**

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC –PPP – Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11)–Physical Layer: Data and Signals – Performance – Transmission media- Switching – Circuit Switching.

TOTAL: 45 PERIODS

TEXT BOOKS:

1 James F Kurose, Keith W Ross, "Computer Networking A Top-Down Approach Featuring the Internet", 8th Edition, Pearson Education, 2021.
2 Behrouz A Forouzan, "Data Communications and Networking with TCP/IP Protocol Suite", 6th Edition, Tata McGraw Hill, 2022.

REFERENCES:

1 Larry L Peterson, Bruce S Davie, "Computer Networks A Systems Approach", 5th Edition, Morgan Kaufmann Publishers, 2018.
2 William Stallings, "Data and Computer Communications", 10th Edition, Pearson Education, 2019.
3 Nader F Mir, "Computer and Communication Networks", 2nd Edition, Prentice Hall, 2018.

ONLINE RESOURCES:

1 https://archive.nptel.ac.in/courses/106/105/106105183.
2 https://archive.nptel.ac.in/courses/106/105/106105154/
3 https://archive.nptel.ac.in/courses/106/106/106106168/

COURSE OUTCOMES:

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

CO1 Summarize the basic layers and various application layer protocols.

CO2 Comprehend the transport layer protocols, congestion control and avoidance techniques.

CO3 Describe the switching techniques and various protocols on the network layer.

CO4 Analyze various routing algorithms and protocols.

CO5 Comprehend the data flow in data link layer and physical layer.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	1	--	-	-	-	2	2
CO2	2	2	1	1	-	-	-	1	1	-	-	1	3	3
CO3	2	2	1	1	-	-	-	1	--	-	-	-	2	3
CO4	1	2	3	2	2	-	-	1	1	-	-	1	3	3
CO5	2	2	1	1	-	-	-	1	--	-	-	-	2	2

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U23AI401	STATISTICAL INFERENCE	L	T	P	C
		3	0	0	3

Pre requisites : Probability and Statistics

COURSE OBJECTIVES:

- To understand the techniques and processes of data science
- To apply descriptive data analytics
- To visualize data for various applications

UNIT I	INTRODUCTION TO DATA SCIENCE	8

Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

UNIT II	PREDICTIVE ANALYTICS	10

Frequency distributions – Outliers –interpreting distributions – graphs – averages describing variability – interquartile range – variability for qualitative and ranked data - Normal distributions – z scores –correlation – scatter plots – regression – regression line – least squares regression line –standard error of estimate – interpretation of r2 – multiple regression equations – regression toward the mean.

UNIT III	INFERENTIAL STATISTICS AND ESTIMATION	9

Populations – samples – random sampling – Sampling distribution- standard error of the mean - Hypothesis testing – z-test – z-test procedure –decision rule – calculations – decisions –interpretations - one-tailed and two-tailed tests – Estimation – point estimate – confidence effect of sample size.

UNIT IV	ANALYSIS OF VARIANCE	9

T-test for one sample – sampling distribution of t – t-test procedure – t-test for two independent samples – p-value – statistical significance – t-test for two related samples.
F- test – ANOVA –Two-factor experiments – three f-tests – two-factor ANOVA –Introduction to chi-square tests.

UNIT V	PREDICTIVE ANALYTICS	9

Linear least squares – implementation – goodness of fit – testing a linear model – weighted resampling. Regression using Stats Models – multiple regression – nonlinear relationships logistic regression – estimating parameters – Time series analysis – moving averages missing values –serial correlation – autocorrelation. Introduction to survival analysis.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. David Cielen, Arno D B Meysman, Mohamed Ali, "Introducing Data Science", 1st Edition, Manning Publications, 2018.
2. Robert S Witte, John S Witte, "Statistics", 11th Edition, John Wiley & Sons, 2019.

REFERENCES:

1 Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", 2nd Edition, Green Tea Press, 2018.
2 Sanjeev J Wagh, Manisha S Bhende, Anuradha D Thakare, "Fundamentals of Data Science", 1st Edition, CRC Press, 2022.

ONLINE RESOURCES:

1 https://warwick.ac.uk/fac/sci/statistics/apts/students/resources-1415/apts_si.pdf
2 https://onlinecourses.nptel.ac.in/noc23_ma28/preview
3 https://onlinecourses.nptel.ac.in/noc20_ma19/preview

COURSE OUTCOMES:

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

CO1 Explain the data analytics pipeline

CO2 Analyze visualize data

CO3 Summarize statistical inferences from data

CO4 Analyze the concepts of design of experiments using ANOVA

CO5 Analyze models for predictive analytics

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	1	-	-	-	-	3	3
CO2	2	2	1	1	-	-	-	1	-	-	-	-	3	3
CO3	2	2	1	1	-	-	-	1	-	-	-	-	3	3
CO4	3	3	2	3	2	-	-	1	-	-	-	-	2	2
CO5	2	2	1	1	-	-	-	1	-	-	-	-	2	3

U23MX01   **PERSONAL VALUES**   L   T   P   C
Prerequisites: Nil   2   0   0   0

COURSE OBJECTIVES:

- To understand the values through practical activities.
- To understand about physical and mental well-being.
- To know about meditation methods.

UNIT I   **SELF CONCEPT**   6

Understanding self-Concept – Identify Yourself – Who am I – an individual, Engineer, citizen – Attitude – Measuring Behaviour – Change of Behaviour – Personality – Characteristics in personal, professional life.

UNIT II   **INDIVIDUAL VALUES**   6

Personal Values – Attributes –Courage – Creativity, Honesty, Perfection, Simplicity, and Responsibility – Measuring personal values.

UNIT III   **MORAL VALUES**   6

Understanding self-Concept – Identify Yourself – Who am I – an individual, engineer, and citizen – Attitude – Measuring Behaviour – Change of Behaviour – Personality – Characteristics in personal, professional life. Personal Values – Attributes –Courage – Creativity, Honesty, Perfection, Simplicity, Responsibility – Measuring personal values
Moral – Understanding right and wrong – Positive thoughts – Respect to others – Doing good to society.

UNIT IV   **PHYSICAL AND MENTAL WELL-BEING**   6

Health – Physical fitness –Mental vigour – Diet management – Yoga – Meditation – Peaceful life – Happiness in life Goal Setting – Decision making skill – Overcome of Barriers – Success – Mental strength and weakness.

UNIT V   **DECISION MAKING**   6

Goal Setting – Decision making skill – Overcome of Barriers – Success – Mental strength and weakness.

                                                              TOTAL: 30 PERIODS

REFERENCES:

1   Barun K. Mitra, "Personality Development and Soft Skills", Oxford University Press, 2016.
2   B. N. Ghosh, "Managing Soft Skills for Personality Development", Tata McGraw Hill, 2012.

COURSE OUTCOMES:

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

CO1   Become an individual in knowing the self.

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	CO2	Acquire and express Personal Values, Spiritual values and fitness.

CO2 Acquire and express Personal Values, Spiritual values and fitness.

CO3 Practice simple physical exercise and breathing techniques.

CO4 Practice Yoga asana which will enhance the quality of life.

CO5 Practice Meditation and get benefitted.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	-	-	-	1
CO2	-	-	-	-	-	-	-	1	-	-	-	1
CO3	-	-	-	-	-	-	-	1	-	-	-	1
CO4	-	-	-	-	-	-	-	1	-	-	-	1
CO5	-	-	-	-	-	-	-	1	-	-	-	1

U23CS407	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1.5

Prerequisites: Programming in C

COURSE OBJECTIVES:

- To install windows operating systems.
- To understand the basics of Unix command and shell programming.
- To implement various CPU scheduling algorithms.

PRACTICAL EXERCISES

1. Installation of windows operating system
2. Illustrate UNIX commands and Shell Programming
3. Process Management using System Calls : Fork, Exit, Getpid, Wait, Close
4. Write C programs to implement the various CPU Scheduling Algorithms
5. Illustrate the inter process communication strategy
6. Implement mutual exclusion by Semaphore
7. Write C programs to avoid Deadlock using Banker's Algorithm
8. Write a C program to Implement Deadlock Detection Algorithm
9. Write C program to implement Threading
10. Implement the paging Technique using C program
11. Write C programs to implement the following Memory Allocation Methods
    a. First Fit b. Worst Fit c. Best Fit
12. Write C programs to implement the various Page Replacement Algorithms

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1   Design and implement UNIX Commands.
CO2   Solve the performance of various CPU Scheduling Algorithms.
CO3   Analyse various Memory Allocation Methods.
CO4   Summarize File Organization and File Allocation Strategies.
CO5   Implement various Disk Scheduling Algorithms.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	1	1	-	-	2	1
CO2	3	3	3	3	-	-	-	1	1	1	-	1	1	1
CO3	3	3	3	3	-	-	-	1	1	1	-	-	1	1
CO4	3	3	3	3	2	-	-	1	1	1	-	1	2	1
CO5	3	3	3	3	1	-	-	1	1	1	-	1	2	2

U23CS407	COMPUTER NETWORKS LABORATORY	L	T	P	C
Prerequisites:	Data Base Management Systems Laboratory	0	0	3	1.5

COURSE OBJECTIVES:
- To understand socket programming.
- To learn various networking protocols.
- To understand various routing algorithms and congestion control algorithms.

LIST OF EXPERIMENTS:
1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and trace route Capturing and trace route PDUs using a network protocol analyzer and examine.
2. Applications using TCP Sockets like a) Echo client and echo server, b) Chat
3. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
4. Write a HTTP web client program to download a web page using TCP sockets.
5. Implementation of Remote Command Execution.
6. Simulation of DNS using UDP sockets.
7. Implementation of Remote Method Invocation
8. Write a code simulating ARP /RARP protocols.
9. Implementation of Subnetting.
10. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
11. Simulation of Distance Vector/ Link State Routing algorithm.
12. Simulation of an error correction code (like CRC).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Write commands and program for packets capturing and traceroute.
CO2 Create applications using TCP and UDP Sockets.
CO3 Write program for simulating ARP/RARP protocols.
CO4 Write program for Subnetting.
CO5 Write commands and program for packets capturing and traceroute.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	1	1	-	-	2	3
CO2	3	3	3	3	-	-	-	1	1	1	-	1	3	3
CO3	3	3	3	3	-	-	-	1	1	1	-	-	3	2
CO4	3	3	3	3	2	-	-	1	1	1	-	1	3	2
CO5	3	3	3	3	1	-	-	1	1	1	-	1	3	3

U23EEC401	EMPLOYABILITY SKILLS – II	L	T	P	C
Prerequisites: Nil		0	0	2	1

COURSE OBJECTIVES:

- To educate and enrich the students on quantitative aptitude, logical reasoning and written communication.

UNIT I	QUANTITATIVE APTITUDE PART – 3	6

Percentages – Profit and Loss – Simple Interest & Compound Interest – logarithms.

UNIT II	QUANTITATIVE APTITUDE PART – 4	6

Algebra – Linear Equation – Quadratic equation – Polynomials – Time and Distance – Problems on train – Time and Work.

UNIT III	LOGICAL REASONING PART – 2	6

Coding and Decoding – Data Sufficiency – Seating Arrangement – syllogism.

UNIT IV	WRITTEN COMMUNICATION PART – 2	6

Sentences Formation – Sentence Completion - Sentence Correction – Jumbled Sentences – Letter Drafting – Reading Comprehension – Contextual Usage.

UNIT V	WRITTEN COMMUNICATION PART – 3	6

Practices: Sentence Completion – Sentence Correction – Jumbled Sentences – Synonyms and Antonyms – Using the same word as different parts of speech – Interpretation of Pictorial Representations – Editing.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. R S Aggarwal, "Quantitative Aptitude", Revised Edition, S Chand & Co Ltd., 2017.

2. R S Aggarwal, "A Modern Approach to Verbal and Non-verbal Reasoning", S Chand & Co Ltd., 2018.

REFERENCES:

1. Abhijit Guha, "Quantitative Aptitude", 3rd Edition, Tata McGraw Hill, 2009.

2. Raj N Bakshmi, "English Grammar Practice," 1st Edition, Orient Black Swan, 2009.

3. M Ashra Rizvi, "Effective Technical Communication," 2nd Edition, Tata McGraw Hill, 2017.

4. Norman Lewis, "Word Power Made Easy", W.R. Goyal Publishers, 2020.

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