

**24EN101**

**PROFESSIONAL ENGLISH**

**L T P C**

**2 0 2 3**

**Course Objectives:**

- To develop advanced communication skills through analysis, collaboration, and creative expression across various modes such as listening, speaking, reading, writing, and vocabulary usage.
- To enhance descriptive and analytical abilities by evaluating and synthesizing information from diverse sources to create coherent narratives, comparisons, and evaluations.
- To foster critical thinking and problem-solving skills through the evaluation of complex texts, discussions, and scenarios, leading to informed decision-making and effective negotiation strategies.
- To cultivate effective presentation skills by interpreting and delivering information persuasively through written recommendations, presentations, and multimedia tools.
- To promote lifelong learning and professional development by applying advanced language skills and critical thinking techniques to navigate real-world challenges and opportunities.

**UNIT I: COMMUNICATION**

**Listening:** Listening to audio text and answering questions - Listening to Instructions

**Speaking:** Pair work and small group work.

**Reading:** Comprehension passages –Differentiate between facts and opinion

**Writing:** Developing a story with pictures.

**Vocabulary:** Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

**Grammar:** Parts of speech.

**UNIT II: DESCRIPTION**

**Listening:** Listening to process description.-Drawing a flow chart.

**Speaking:** Role play (formal context) Reading: Skimming/Scanning Reading passages on products, equipment and gadgets.

**Writing:** Process Description –Compare and Contrast Paragraph-Sentence Definition and Extended definition, Free Writing.

**Vocabulary:** Synonyms and Antonyms.

**Grammar :** Regular/ Irregular Verbs, Numerical Expressions

**UNIT III: NEGOTIATION STRATEGIES**

**Listening:** Listening to interviews of specialists / Inventors in fields (Subject specific)

**Speaking:** Brainstorming. (Mind mapping). Small group discussions (Subject- Specific)

**Reading:** Longer Reading text. Writing: Essay Writing (250 words)

**Vocabulary:** Word Building- Compound Words.

**Grammar:** Phrasal Verbs, Question tags.

#### **UNIT IV: PRESENTATION SKILLS**

**Listening:** Listening to lectures.

**Speaking:** Short talks.

**Reading:** Reading Comprehension passages

**Writing:** Writing Recommendations Interpreting Visuals inputs

**Vocabulary:** Standard Abbreviations in English

**Grammar:** If conditionals, Modal Verbs.

#### **UNIT V: CRITICAL THINKING SKILLS**

**Listening:** Listening comprehension- Listening for information.

**Speaking:** Making presentations (with PPT- practice).

**Reading :** Comprehension passages –Note making. Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

**Writing:** Problem and Solution essay– Creative writing –Summary writing

**Vocabulary:** Technical Vocabulary and their usage

**Grammar:** Common Errors in English, Punctuations.

#### **Course Outcomes:**

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

1. Apply advanced communication skills effectively across diverse contexts.
2. Synthesize information to create coherent narratives and evaluations.
3. Evaluate complex texts critically to develop advanced problem-solving abilities.
4. Deliver persuasive presentations using multimedia tools effectively.
5. Demonstrate lifelong learning skills for professional advancement.

#### **Text Books :**

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena

3. Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes
4. Joevani, Department of English, Anna University.

**References:**

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, McGraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhushan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

**24MA201**

**MATRICES AND CALCULUS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Objective:**

1. To develop the use of matrix algebra techniques
2. To impart knowledge on applications of differential calculus.
3. To familiarize the student with functions of several variables.
4. To learn the various analytical methods of finding the solutions of ordinary differential equations.
5. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

**Unit I**

**MATRICES**

**9+3**

Eigen values and Eigenvectors of a real matrix – Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms. Applications: Stretching of an elastic membrane.

**Unit II**

**DIFFERENTIAL CALCULUS**

**9+3**

Representation of functions – Limit of a function – Continuity – Derivatives – Applications : Maxima and Minima of functions of one variable.

**Unit III**

**MULTI VARIABLE CALCULUS**

**9+3**

Total derivative - Partial derivatives – Jacobians – Applications: Maxima and Minima of function of two variables and Lagrange's method of undetermined multipliers.

<b>Unit IV</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS</b>	<b>9+3</b>
	Higher order linear differential equations with constant coefficients – Method of variation of parameters – Homogenous equation of Euler’s and Legendre’s type- Applications of ODE’s- Newton’s law of cooling.	

<b>Unit V</b>	<b>INTEGRAL CALCULUS</b>	<b>9+3</b>
	Double integrals – Cartesian form– Change of order of integration – Area enclosed by plane curves – Triple integrals – Volume of solids.	

**Total : 60 Periods**

### **Course Outcomes:**

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

- CO1 Apply matrix algebra technique for solving practical problems.
- CO2 Apply differential calculus tools in solving various application problems.
- CO3 Solve the extreme values of functions of two variables with/ without constraints.
- CO4 Evaluate the multiple integrals and apply the concept to find areas, volumes.
- CO5 Apply various techniques in solving differential equations.

### **Text Books:**

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43<sup>rd</sup> Edition, 2014.
2. Veerarajan T., “Engineering Mathematics”, Tata McGraw Hill Education Pvt. Ltd., 2017.
3. Kreyszig Erwin, “Advanced Engineering Mathematics”, John Wiley and Sons,
4. 10<sup>th</sup> Edition, New Delhi, 2016.

### **References:**

1. Anton H., Bivens I. and Davis S., “Calculus”, Wiley, 10th Edition, 2016.
2. Narayanan S. and Manicavachagom Pillai T.K., “Calculus” - Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
3. Srimantha Pal and Bhunia S.C, “Engineering Mathematics”, Oxford University Press, 2015.
4. Weir M.D. and Joel Hass, “Thomas’ Calculus”, 12th Edition, Pearson India, 2016.
5. James Stewart, “Calculus: Early Transcendentals”, Cengage Learning, 7th Edition, New Delhi, 2015.

**Web References:**

1. <http://www.digimat.in/nptel/courses/video/111105035/L06.html>
2. <https://nptel.ac.in/courses/111/104/111104085/>
3. <https://www.youtube.com/watch?v=qN-klLYVeu4>

**24PH201****ENGINEERING PHYSICS****L T P C**  
**3 0 0 3****Course Objective:**

- To enhance the fundamental knowledge in physics and its applications relevant to various streams of engineering and technology.

**Unit I****LASERS****9**

Introduction to Lasers - Absorption and emission - Spontaneous emission - Stimulated Emission - Population inversion - Sources of excitation – Active medium - Resonant cavity - Einstein's theory of stimulated emission – Nd-YAG laser - CO<sub>2</sub> laser - Semiconductor laser homojunction and heterojunction - Applications - 3D profiling, laser drilling and laser welding.

**Unit II****FIBRE OPTICS****9**

Optical fiber - Advantages of optical fiber as wave guide and propagation of light in optical fibers - Numerical aperture and acceptance angle - Structure of optical fiber - Fiber optical materials - Types of optical fibers - Single and multimode fibers -Step index and graded index fibers - Applications - Fiber optic communication system, Fiber endoscope.

**Unit III****ULTRASONICS****9**

Introduction – Properties of ultrasonics – Production: Magnetostriction generator – Piezoelectric generator – Properties – Detection – Thermal and Piezoelectric methods, Determination of velocity of ultrasonic waves in liquids using acoustic grating – applications – SONAR – Non-destructive testing.

**Unit IV****QUANTUM PHYSICS****9**

Limitations of classical Physics – Introduction to Quantum Theory - Wave particle duality – Properties of matter waves – De-Broglie wavelength in terms of voltage, energy and temperature - Concept of wave function and its physical significance – Schrödinger's wave equation – Time independent and time dependent equation – Particle in a one-dimensional box – Scanning Electron Microscope.

Space lattice – Unit cell – Bravais lattice - Miller indices - Interplanar spacing in cubic lattice - Atomic radius, Coordination number and Packing factor for simple cubic, body centered cubic, face centered cubic and Hexagonal close packed crystal structures – Crystal imperfections – Point and line defects.

**Total : 45 Periods**

**Course Outcomes:**

CO1 To have adequate knowledge on the concepts of Laser and their applications

CO2 Acquire knowledge on the basics of fiber optics and its applications

CO3 To acquire knowledge on the concepts of ultrasonics and their applications

CO4 To get knowledge on advanced physics concepts of quantum theory and its applications

CO5 To understand knowledge on the concepts of the types and importance of crystal systems.

**24CY201****ENGINEERING CHEMISTRY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

1. To make the students conversant with water quality parameters, related problems and water treatment techniques.
2. Develop knowledge on the basic principles of electrochemistry and understand the need for future energy requirements.
3. To categorize different fuels and to understand its calorific value.
4. To develop an understanding of basic concepts of phase rule and the purpose of making alloys.
5. To develop fundamental knowledge in the area of common chemicals used in day to day life.

Introduction - Water quality parameters: Definition and significance of pH , alkalinity, TDS, COD, BOD . Types of water Hardness of water -types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water -Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf by Poggendorff's compensation principle. Single electrode potential – Nernst equation – reference electrodes -types– Calomel electrode - electrolysis of water. Batteries and fuel cells: Types of batteries- Alkaline Battery -lead acid battery- lithium battery, Lithium Sulphur Battery. Fuel cell H<sub>2</sub>-O<sub>2</sub> fuel cell applications.

**Unit III PHASE RULE AND ALLOYS**

Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead- silver system. Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Ferrous and non-ferrous alloys – heat treatment of steel.

**Unit IV FUELS AND COMBUSTION**

Fuel Introduction- classification of fuels-analysis of coal - proximate and ultimate (determination of carbon and hydrogen)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) - petroleum- manufacture of synthetic petrol (Bergius process)- knocking-octane number - diesel oil- cetane number - natural gas- compressed natural gas (CNG)- liquefied petroleum gases(LPG). Power alcohol and bio diesel. Combustion of fuels: introduction- calorific value - flue gas analysis (ORSAT Method).

**Unit V: GREEN CHEMISTRY & ANALYTICAL METHODS**

Green Chemistry: Definition of Green Chemistry - goals of Green Chemistry towards a sustainable future -Green Chemistry v/s Environmental Chemistry- Twelve Principles of Green Chemistry – Planning a green synthesis. Analytical methods : Potentiometry : Principle - Potentiometric titrations - application in the estimation of iron -pH metry- glass electrode- pH metric titrations- Conductometry- Principle - Conductometric titrations ( strong acid and strong base).

**Total : 45 Periods**

**Course Outcomes:**

CO1: To understand the basic parameters of water, different water softening processes and effect of hard water in industries.

CO2: To develop an alternate energy source and to know the working of storage devices.

CO3: To understand industrial importance of phase rule and alloys

CO4: To summarize the various types of fuels and their real time applications in locomotives.

CO5: To move towards sustainable growth and development.

**Text Books**

- 1 Dr.Veeraiyan., “Engineering Chemistry”, VRB Publications Co , Chennai 2022.
- 2 Ravikrishnan A., “Engineering Chemistry”, Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2019.

## **References**

- 1 S. Bahl, G.D.Tuli and Arun Bahl “Essentials of Physical Chemistry”;S.Chand and Company Ltd,New Delhi, 2019.
- 2 Glasstone S., Electrochemistry, 5th edition, Maurice Press, USA, 2019.
- 3 P.C.Jain and Monica Jain, “Engineering Chemistry”, 15th Edition, DhanpatRai Publishing Company (P),Ltd,New Delhi, 2018.

## **Web References**

1. <http://www.chemistry.wustl.edu/~edudev/LabTutorials/Water/FreshWater/hardness.html>
2. [https://en.wikipedia.org/wiki/Electrochemical\\_cell](https://en.wikipedia.org/wiki/Electrochemical_cell)
3. [http://www.brainkart.com/article/Phase-Rule-and-Alloys\\_6793/](http://www.brainkart.com/article/Phase-Rule-and-Alloys_6793/)
4. <https://nptel.ac.in/courses/103/105/103105110/>

**24CS301**

**PROGRAMMING FOR PROBLEM SOLVING IN C**

**L T P C**  
**2 0 2 3**

### **COURSE OBJECTIVES:**

- To understand the constructs of C Language.
- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop modular applications in C using functions

### **UNIT I      BASICS OF C PROGRAMMING**

**6**

Problem Solving- Algorithms- Flowchart-Pseudo code- 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 – Storage classes - Preprocessor directives –Compilation process – Energy Efficient code.

### **UNIT II      PROGRAMMING CONSTRUCTS**

**12**

Decision making statements – Switch statement – Looping statements –Jumps in Loops - Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays –Example programs - Selection sort, linear and binary search, Matrix operations – Character Arrays and Strings: Declaring and Initializing String Variables, Reading and Writing Strings, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions).

### **UNIT III      FUNCTIONS**

**12**

Modular programming – Definition of Functions , Need for functions - Built-in functions(math functions) – Elements of User-defined Functions, Return Values and their Types, Function Calls, Function Declaration, Category of

Functions - No Arguments and no Return Values, With Arguments but no Return values, With Arguments with Return Values, No Arguments with Returns Value, Recursion, The Scope, Visibility and Lifetime of variables – Command Line arguments.

**Total : 30 Hours**

### **LIST OF EXPERIMENTS:**

**Note:** The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

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

**Practical : 30 Hours**

**Total : 60 Hours**

### **COURSE OUTCOMES:**

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

CO1: Demonstrate knowledge on C Programming constructs

CO2: Develop simple applications in C using basic constructs

CO3: Design and implement applications using arrays and strings

CO4: Develop and implement modular applications in C using function

### **TEXT BOOKS:**

1. Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie, D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.

### **REFERENCES:**

1. Paul Deitel and Harvey Deitel, “C How to Program with an Introduction to C++”, Eighth edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, “Schaum’s Outline of Theory and Problems of Programming with C”, McGraw-Hill Education, 1996.
4. Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press, 2013.
5. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, 1st Edition, Pearson Education, 2013.

24MC801

HERITAGE OF TAMIL

L T P C

1 0 0 1

**UNIT I LANGUAGE AND LITERATURE**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyan and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

### **UNIT III FOLK AND MARTIAL ARTS**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

## **UNIT IV                    THINAI CONCEPT OF TAMIL**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

## **UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

Total : 15 Hours

## **Text-Cum-Reference Books**

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
  2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
  3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
  5. Keeladi - „Sangam City Civilization on the banks of river Vaigai“

**24TP701**                   **SOFT SKILLS & APTITUDE – I**                   **L T P C**  
**0 0 2 1**

## **Course Objective:**

1. Introduce students to building blocks of Logical reasoning and Quantitative Aptitude
  2. Train students on essential grammar for placements
  3. Introduce students on scientific techniques to pick up skills
  4. Provide an orientation for recruiter expectation in terms of non-verbal skills, and for how to build one's career with placements in mind

# **Unit I LESSONS ON EXCELLENCE**

2

Skill introspection, Skill acquisition, consistent practice

## **Unit II      LOGICAL REASONING**

11

Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning – Sudoku - puzzles - Attention to detail

### **Unit III QUANTITATIVE APTITUDE**

11

Addition and Subtraction of bigger numbers - Square and square roots - Cubes and cube roots - Vedic maths techniques - Multiplication Shortcuts - Multiplication of 3 and higher digit numbers – Simplifications – Comparing fractions - Shortcuts to find HCF and LCM - Divisibility tests shortcuts - Algebra and functions.

## **Unit IV RECRUITMENT ESSENTIALS**

2

## Resume Building - Impression Management

## **Unit V VERBAL ABILITY**

4

Nouns and Pronouns – Verbs - Subject - Verb Agreement - Pronoun - Antecedent – Agreement – Punctuations.

## Total : 30 Periods

## **COURSE OUTCOMES:**

CO1: Students will analyze interpersonal communication skills, public speaking skills.

CO2: Students will exemplify tautology, contradiction and contingency by logical

thinking. CO3: Students will be able to develop an appropriate integral form to solve

all sorts of quantitative problems.

CO4: Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.

CO5: Students will be developed to acquire the ability to use English language with an error while making optimum use of grammar.

### **REFERENCE BOOKS:**

1. Quantitative Aptitude – Dr. R S Agarwal
2. Speed Mathematics: Secret Skills for Quick Calculation - Bill Handley
3. Verbal and Non – Verbal Reasoning – Dr. R S Agarwal
4. R4: Objective General English – S.P.Bakshi

**24PC201**

**PHYSICS AND CHEMISTRY LABORATORY**

**L T P C**  
**0 0 4 2**

### **PHYSICS LABORATORY**

#### **Course Objectives:**

1. To learn the proper use of various kinds of physics laboratory equipment.
2. To learn how data can be collected, presented and interpreted in a clear and concise manner.
3. To learn problem solving skills related to physics principles and interpretation of experimental data.
4. To determine error in experimental measurements and techniques used to minimize such error.
5. To make the student as an active participant in each part of all lab exercises.

#### **Course Outcomes:**

1. Understand the functioning of various physics laboratory equipment.
2. Use graphical models to analyze laboratory data.
3. Use mathematical models as a medium for quantitative reasoning and describing physical reality.
4. Access, process and analyze scientific information.
5. Solve problems individually and collaboratively.

### **LIST OF EXPERIMENTS (Any FIVE Experiments)**

1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young's modulus by non-uniform bending method

3. Determination of Young's modulus by uniform bending method
4. (a) Determination of wavelength, and particle size using Laser (b) Determination of acceptance angle in an optical fiber.
5. Determination of viscosity of liquid – Poiseuille's method.
6. Determination of wavelength of mercury spectrum – spectrometer grating
7. Determination of band gap of a semiconductor
8. Determination of thickness of a thin wire – Air wedge method

## **CHEMISTRY LABORATORY**

### **Course Objectives:**

1. To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
2. To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.

### **Course Outcomes:**

1. To analyse the quality of water samples with respect to their acidity, alkalinity.
2. To determine the amount of metal ions through analytical techniques.
3. Analyze water sample for hardness and to estimate other impurities present in water.
4. Gain knowledge in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
5. To quantitatively and qualitatively analyse the given samples.

### **LIST OF EXPERIMENTS (Any FIVE Experiments)**

1. Determination of chloride content of water sample by argentometric method.
2. Determination of strength of acids in a mixture using conductivity meter.
3. Conductometric titration of strong acid vs strong base.
4. Determination of alkalinity in water sample.
5. Determination of total, temporary & permanent hardness of water by EDTA method
6. Estimation of iron content of the given solution using potentiometer.
7. Conductometric precipitation titration using  $\text{BaCl}_2$  and  $\text{Na}_2\text{SO}_4$ .

**References:**

1. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New York 2001
2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of Practical organic chemistry", LBS Singapore 1994.
2. Jeffery G.H., Bassett J., Mendham J. and Denny Vogel's R.C, "Text book of quantitative Analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
3. Kolthoff I.M. Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras, 1980.

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

1. Iodine flask - 30 Nos
2. pH meter - 5 Nos
3. Conductivity meter - 5 Nos
4. Common Apparatus: Pipette, Burette, conical flask, porcelain tile, dropper (each 30 Nos.)

<b>24UH102</b>	<b>UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- To understand the synergy between values and skills for sustained happiness and prosperity.
- To foster a holistic perspective on life, profession, happiness, and prosperity through universal values.
- To emphasize ethical conduct, trust, and harmonious interaction with society and nature.
- To appreciate harmony within oneself, family, society, and nature.
- To enhance competence in professional ethics for eco-friendly and socially responsible practices.

**UNIT I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration—what is it? - its content and process; „Natural Acceptance“ and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

## **UNIT II: Understanding Harmony in the Human Being - Harmony in Myself**

7. Understanding human being as a co-existence of the sentient „I“ and the material „Body“
8. Understanding the needs of Self („I“) and „Body“ - Sukh and Suvidha
9. Understanding the Body as an instrument of „I“ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of „I“ and harmony in „I“
11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Swasthya
13. Practice Exercises and Case Studies will be taken up in Practice Sessions

## **UNIT III: Understanding Harmony in the Family and Society- Harmony in Human, Human Relationship**

14. Understanding Harmony in the family – the basic unit of human interaction
15. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
16. Understanding the meaning of Vishwas; Difference between intention and competence
17. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship.
18. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (Akhan Samaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family! Practice Exercises and Case Studies will be taken up in Practice Sessions.

## **UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence**

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all pervasive space
22. Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions.

**UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics**

23.Natural acceptance of human values

24.Definitiveness of Ethical Human Conduct

25.Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

26.Competence in professional ethics:

a)Ability to utilize the professional competence for augmenting universal human order

b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems,

c)Ability to identify and develop appropriate technologies and management patterns for above production systems.

27.Case studies of typical holistic technologies, management models and production systems

28.Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations

**Course Outcomes:**

- Enhanced understanding of the interplay between values and skills for fostering sustained happiness and prosperity.
- Developed holistic perspective integrating life, profession, happiness, and prosperity through universal values.
- Strengthened ethical conduct, trust, and harmonious interaction with society and nature.
- Appreciation of harmony within oneself, family, society, and nature, recognizing interconnectedness and mutual fulfillment.
- Improved competence in professional ethics for implementing eco-friendly and socially responsible practices.

**Text Books**

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
2. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010.

## **Reference Books**

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow.  
Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins,  
USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972,  
limits to Growth, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra  
Shodh, Amravati.
7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond  
& Briggs, Britain.
9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

**24EN102**

**DESIGN THINKING**

**L T P C**  
**1 0 2 2**

### **Course Objectives:**

- To analyze traditional problem-solving versus design thinking methods to understand their effectiveness in addressing complex issues.
- To apply empathy tools to understand users' needs and emotions for effective problem-solving.
- To synthesize problem statements and generate innovative design directions through brainstorming and idea generation activities.
- To evaluate and refine ideas using various design approaches to develop practical solutions.
- To design and execute experiments to test and refine innovative product design ideas, fostering creativity and innovation.

### **UNIT I: Introduction to Design Thinking:**

Introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, design mindset. Introduction to elements and principles of design, Examples of Great Design, Design Approaches across the world.

### **UNIT II : Empathy**

Empathy tools- Interviews, empathy maps, emotional mapping, immersion and observations, customer journey maps, Step into customer's shoes, and brainstorming, Do's & Don'ts for Brainstorming, Individual

activity- „Moccasin walk“, Ethical behavior: effects on self, society, understanding core values and feelings, negative sentiments and how to overcome them.

### **UNIT III : Defining the Problem**

Defining the problem statement, creating personas, Point of View (POV) statements. Idea Generation basic design directions, Themes of Thinking, inspirations and references, brainstorming, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W“s, 5 why“s, “How Might We”, Mind-Map, ideation activity games - six thinking hats, million-dollar idea.

### **LIST OF EXPERIMENTS**

1. ROLE PLAY
2. BRAINSTORMING
3. PRESENTATION – SUCCESS STORY OF A COMPANY
4. GROUP DISCUSSION
5. MOCK INTERVIEW
6. CASE STUDY
7. PROTOTYPING
8. INNOVATIVE PRODUCT DESIGN IDEAS
9. EMPATHY MAPPING
10. CUSTOMER JOURNEY MAPS

### **Course Outcomes:**

CO1: Analyze the effectiveness of design thinking compared to traditional problem-solving methods in addressing complex issues.

CO2: Develop empathy skills to enhance problem-solving and solution development.

CO3: Synthesize problem statements and generate innovative design directions through collaborative brainstorming and idea generation activities.

CO4: Evaluate and refine ideas using diverse design approaches to develop practical solutions.

CO5: Apply creativity and innovation skills in designing and executing experiments to refine and implement innovative product design ideas.

### **Textbooks:**

1. "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School" by Idris Mootee (Publisher: Wiley, Publication Date: 2017)
2. "Design Thinking: Understanding How Designers Think and Work" by Nigel Cross (Publisher: Bloomsbury Academic, Publication Date: 2019)

3. "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value" by Thomas Lockwood (Publisher: Allworth Press, Publication Date: 2018)

### **References:**

1. "Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days" by Jake Knapp, John Zeratsky, and Braden Kowitz (Publisher: Simon & Schuster, Publication Date: 2016)
2. "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail" by Clayton M. Christensen (Publisher: Harvard Business Review Press, Publication Date: 2016)

<b>24MA202</b>	<b>NUMERICAL METHODS AND STATISTICS</b>	<b>L T P C</b>
		<b>3 1 0 4</b>

### **Course Objective:**

1. To introduce the numerical solution of equations and Eigen value problems.
2. To learn the techniques of interpolation and numerical solutions of calculus.
3. To acquaint the knowledge of various methods of solving ordinary differential equations.
4. To learn the necessary and basic concepts of a statistical hypothesis testing for large and small samples.
5. To acquaint the knowledge of significance of Analysis of Variance.

<b>Unit I</b>	<b>NUMERICAL SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS</b>	<b>9+3</b>
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Solution of algebraic and transcendental equations – Fixed point iteration method – Newton- Raphson method – Solution of linear system of equations: Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

<b>Unit II</b>	<b>INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION</b>	<b>9+3</b>
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Lagrange's method of interpolation – Newton's forward and backward difference interpolation – Cubic Splines - Approximation of derivative using Newton's forward and backward differences – Single integration using Trapezoidal and Simpson's 1/3 rule- Double integration using Trapezoidal rule.

<b>Unit III</b>	<b>NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS</b>	<b>9+3</b>
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Single step methods: Taylor's series method – Euler's method – Fourth order Runge-Kutta method for solving first order differential equations – Multi step methods: Milne's and Adams-Bash forth predictor corrector methods for solving first order differential equations.

<b>Unit IV</b>	<b>STATISTICAL INFERENCES</b>	<b>9+3</b>
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Statistical hypothesis – Large sample tests for single mean and difference of means – Small sample test: *t*-test for mean and F-test for variance – Chi square test for goodness of fit – Independence of attributes.

**Unit V      DESIGN OF EXPERIMENTS****9+3**

Analysis of variance - One way and two way classifications – Completely randomized design – Randomized block design – Latin square design.

**Total : 60 Periods****Course Outcomes:**

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

CO1 Solve linear and algebraic equations using numerical techniques.

CO2 Solve the differentiation and integration using numerical techniques.

CO3 Solve the differential equations with initial and boundary conditions using numerical methods.

CO4 Analyze the hypothesis for small and large samples.

CO5 Apply the concepts of Analysis of Variance.

**Text Books:**

- 1 Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science", 10<sup>th</sup> Edition, Khanna Publishers, New Delhi, 2015.
- 2 Johnson R.A., Miller I. and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education - Asia, 8<sup>th</sup> Edition, 2015.
- 3 Douglas C. Montgomery, "Applied Statistics and Probability for Engineers", 3<sup>rd</sup> Edition, 2003.

**References:**

- 1 Burden R.L. and Faires J.D., "Numerical Analysis", 9<sup>th</sup> Edition, Cengage Learning, 2016.
- 2 Devore. J.L., "Probability and Statistics for Engineering and Sciences", Cengage Learning, New Delhi, 8<sup>th</sup> Edition, 2014.
- 3 Gerald. C.F. and Wheatley P.O. "Applied Numerical Analysis", Pearson Education - Asia, New Delhi, 2006.
- 4 Spiegel M.R., Schiller J. and Srinivasan R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 2004.
- 5 Walpole R.E., Myers R.H., Myers S.L. and Ye K., "Probability and Statistics for Engineers & Scientists", 8<sup>th</sup> Edition, Pearson Education - Asia, 2007.

**Web References:**

1. <https://nptel.ac.in/courses/103/106/103106120/>
2. [https://drive.google.com/file/d/1QcFow6UwcS\\_yvGKCAhB07EGXFOj54jWO/view](https://drive.google.com/file/d/1QcFow6UwcS_yvGKCAhB07EGXFOj54jWO/view)
3. <https://www.youtube.com/watch?v=QQFIWwDA9NM>

**24PH203**

**PHYSICS FOR INFORMATION SCIENCE**

**L T P C  
3 0 0 3**

**Course Objectives:**

- To understand the essential principles of physics of semiconductor device and electron transport properties. Become proficient in magnetic and optical properties of materials and Smart materials.

**UNIT I                    INTRINSIC AND EXTRINSIC SEMICONDUCTORS                    9**

Intrinsic Semiconductor – Energy band diagram – Carrier concentration – Electrical Conductivity – Band gap determination - Extrinsic semiconductor: n-type doping – p-type doping- Carrier concentration derivation in N-type & P-type semiconductor (no derivation) – temperature dependence of conductivity - Hall effect – determination of Hall coefficient - applications.

**UNIT II                    SUPERCONDUCTING MATERIALS                    9**

Introduction – Superconducting phenomena – Properties of superconductors – Meissner effect - Isotope effect – Type I and Type II superconductor, High TC superconductor – Applications of superconductor – Magnetic levitation and SQUIDS – Superconducting computing – Quantum computing (Qualitative concepts).

**UNIT III                    MAGNETIC PROPERTIES OF MATERIALS                    9**

Magnetism in materials – Magnetic field and Induction – Magnetization - Magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – Antiferromagnetism – Ferromagnetism: origin and exchange interaction – Domain Theory - M versus H behaviour – Hard and soft magnetic materials – Magnetic storage devices: Magnetic tape, Magnetic hard disk – Magnetic hard disk drive with GMR.

**UNIT IV                    OPTICAL PROPERTIES OF MATERIALS                    9**

Classification of optical materials – Carrier generation and recombination processes – Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) – Photo current in a P-N diode - Solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

**UNIT V                    SMART MATERIALS                    9**

Introduction – Metallic glass: properties, preparation and applications – Shape memory alloys (SMA): Characteristics, properties of Ni-Ti alloy and applications - Nano materials and its properties – Synthesis – Physical vapour deposition – Chemical vapour deposition techniques – Carbon nanotubes: Properties and applications.

**Total : 45 Periods**

**Course Outcomes:**

**At the end of the course, the students will able to**

- Acquire knowledge on basics of semiconductor physics and its applications in various devices
- Gain knowledge on superconducting materials and its applications
- Get knowledge on magnetic properties of materials and their applications in data storage

- Have the necessary understanding on the functioning of optical materials
- Understand the basics of smart materials and its applications

### **Text Books:**

1. Jasprit Singh, —Semiconductor Devices: Basic Principles, Wiley 2012.
2. Kasap S.O. —Principles of Electronic Materials and Devices, McGraw-Hill Education, 2007.
3. Kittel C. —Introduction to Solid State Physics. Wiley, 2005.

### **References**

1. Garcia, N. & Damask, A. —Physics for Computer Science Students. Springer-Verlag, 2012.
2. Hanson, G.W. —Fundamentals of Nanoelectronics. Pearson Education, 2009.
3. Rogers B, Adams, J. & Pennathur S. —Nanotechnology: Understanding Small Systems. CRC Press, 2014.
4. Dr. G. Senthil Kumar and Dr. S. Murugavel —Physics for Information Science, VRB Publishers, 2020.

<b>24CS303</b>	<b>ADVANCED C PROGRAMMING AND DATA STRUCTURES I</b>	<b>L T P C</b>
		<b>3 0 2 4</b>

### **COURSE OBJECTIVES:**

- Understand about user defined data types in C
- Gain knowledge about the principles of Pointers and their usage in programming
- Learn about various I/O operations in C
- Understand about various insights about data structures.
- Discuss about linked list and its types and application.

### **Unit – I STRUCTURES AND UNIONS 9**

Structure – Need for structures – Defining and Declaration a structures – Accessing the structure members – Array of structures – Nested structures – passing structures to functions as value returning structures from functions- Union - Structures vs union.

### **Unit II – POINTERS AND MEMORY MANAGEMENT 9**

Pointers - Pointer operators – Pointer arithmetic – Array of pointers – Functions – Pass by value and Pass by reference- structure pointer – self-referential structures - Dynamic Memory allocation- Resource optimization.

**UNIT III – FILE HANDLING AND PRE-PROCESSOR DIRECTIVES****9**

File Handling – Types of file – File modes -file handling functions – reading and writing text and binary file - Sequential access and random access – Case study – Banking system using structures and file handling – Code Reusability.

**UNIT IV – INTRODUCTION TO DATA STRUCTURES****9**

Basic terminology – classification of data structures - operations – Abstract Data Types (ADT) – Running time analysis - Linear Array – Arrays as ADT Representation -sparse matrix and its representation- Applications of arrays - Searching: Sequential (linear) search and Binary Search

**UNIT V – LINEAR DATA STRUCTURES****9**

List ADT – Array-based implementation – Linked list implementation – singly linked list implementation, insertion, deletion and searching operations on linear list, circularly linked lists- Operations for Circularly linked lists, doubly linked list implementation, insertion, deletion and searching operations, applications of linked lists.

**Theory: 45 Hours****Lab Experiments:**

**Note:** The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

- Programs using simple structures, array of structures.
- Programs using pointers and passing reference as arguments to functions
- Programs using file handling – Sequential access and random access.
- Applications of array
- Singly linked list implementation
- Application of linked list
- Programs using various types of linked list.

**Practical : 30 Hours****Total : 75 Hours****COURSE OUTCOMES:**

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

- CO1: Apply the concept of structures for complex problems.
- CO2: Experiment the applications with pointers.
- CO3: Develop applications that make use of inputs from various means.
- CO4: Discuss about Linear Arrays and their representation as Abstract Data Types and their significance in programming.
- CO5: Implement the types of linear data structures.

**Text Books:**

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education India; 2nd edition, 2002.

**Reference Books:**

1. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
2. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1<sup>st</sup> Edition, Pearson Education, 2013.
3. langsam, Augenstein and Tanenbaum, " Data Structures using C and C++" , 2<sup>nd</sup> Edition, Pearson Education 2005.
4. Alfred V.Aho, Jeffrey D.Ullman, John E.Hopcroft, " Data Structures and Algorithm", 1<sup>st</sup> Edition, Pearson 2002.

**24TP702****Soft Skill and Aptitude II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Objectives:**

1. Solve Logical Reasoning questions of easy to intermediate level
2. Solve Quantitative Aptitude questions of easy to intermediate level
3. Solve Verbal Ability questions of easy to intermediate level

**Unit I Logical Reasoning****8**

Word group categorization questions - Cryptarithmetic - Data arrangements – Blood relations.

**Unit II Quantitative Aptitude****12**

Ratio and Proportion: Ratio, Proportion, Variation, Simple equations, Problems on Ages, Mixtures and alligations - Percentages, Simple and Compound Interest: Percentages as Fractions and Decimals, Percentage Increase / Decrease, Simple Interest, Compound Interest, Relation Between Simple and Compound Interest - Number System.

**Unit III Verbal Ability****10**

Essential grammar for placements: Prepositions, Adjectives and Adverbs, Tenses, Forms and Speech and Voice, Idioms and Phrasal Verbs, Collocations, Gerund and Infinitives – Reading Comprehension for placements: Types of questions, Comprehension strategies - Articles, Prepositions and Interrogatives: Definite and Indefinite Articles, Omission of Articles, Prepositions, Compound

Prepositions and Prepositional Phrases, Interrogatives - Vocabulary for placements: Exposure to solving questions of Synonyms, Antonyms, Analogy, Confusing words and Spelling correctness

**Total:30 Hours**

**Course Outcome:**

CO1: Students will analyze and critique logical reasoning, including situations for which the student will recognize underlying assumptions and make reasonable assumptions.

CO2: Students will be able to make decisions with mathematical, statistical, and quantitative information.

CO3: Students would have obtained a multitude of opportunities resulting in the refinement of his/her language skills and the ability to use the skills for effective communication.

**REFERENCE BOOKS:**

R1: How to Prepare for Quantitative Aptitude for the CAT- Arun Sharma

R2: How to Prepare for Logical Reasoning for CAT

R3: Objective General English – S.P.Bakshi

**24MC802**

**TAMILS AND TECHNOLOGY**

**L T P C**  
**1 0 0 1**

**UNIT I WEAVING AND CERAMIC TECHNOLOGY**

**3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY**

**3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

**UNIT III MANUFACTURING TECHNOLOGY**

**3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

**UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY****3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

**UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING****3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

**TOTAL : 15 PERIODS****TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு - மக்களும் பண்பாடும்- கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி- வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருநை- ஆற்றங்கரை நாகரிகம். (தொல்லியல்துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - „Sangam City Civilization on the banks of river Vaigai“ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

**24MA204****DISCRETE MATHEMATICS**  
**(Common to CSE, IT & AIDS)****L T P C**  
**3 0 0 3****Course Objectives:**

- To learn the mathematical logic and reasoning.
- To acquaint the basic Knowledge of logical proofs.
- To acquaint the knowledge of applying graph theory to solve real-world problems.
- To familiarize the fundamental concepts of groups.
- To understand the concepts and significance of lattices and Boolean algebra which are used in engineering fields.

**Unit – I MATHEMATICAL LOGIC 9**

Propositional logic – Propositional equivalences – Tautological Implication- Normal forms- Rules of inference.

**Unit – II PROOF TECHNIQUES 9**

Direct proofs – Indirect Method of Proofs- Predicates and quantifiers - Mathematical induction- Inclusion-Exclusion .

**Unit III – GRAPH THEORY 9**

Basic Definitions – Some Special Graphs – Matrix Representation of Graphs – Graph isomorphism - Eulerian and Hamiltonian Graphs.

**Unit IV - GROUP THEORY 9**

Semi groups and monoids - Groups – Subgroups – Homomorphism –Normal subgroup and cosets – Lagrange’s theorem.

**Unit V- LATTICES AND BOOLEAN ALGEBRA 9**

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices — Some special lattices – Boolean algebra.

**Theory : 45 Hours****Course Outcomes:**

- CO1: Apply the concepts of logical thinking on engineering fields
- CO2: Analyze various proof Techniques.
- CO3: Analyze various types of Graphs and its applications.
- CO4: Understand the various concepts of Group Theory
- CO5: Analyze the concepts of lattices and Boolean algebra.

**Text Books:**

1. Kenneth H Rosen , "Discrete Mathematics and its Applications", Tata McGraw Hill, New Delhi, 2016.
2. Tremblay J.P. and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30<sup>th</sup> Reprint, 2011.

**Reference Books:**

1. Bernard Kolman, Robert C Busby, Sharon Cutler Ross , "Discrete Mathematical Structures", Prentice Hall, New Delhi, 2015.
2. Lipschutz S. and Mark Lipson., "Discrete Mathematics - Schaum,,s Outlines", Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3. Koshy T., "Discrete Mathematics with Applications", Elsevier Publications, 2006.

**Web References:**

1. <https://nptel.ac.in/courses/111/107/111107058/>
2. <https://nptel.ac.in/courses/106/102/106102064/>
3. <http://www.infocobuild.com/education/audio-video-courses/mathematics/DiscreteMathematics-CMI/lecture-38.html>
4. <http://www.infocobuild.com/education/audio-video-courses/mathematics/DiscreteMathematics-CMI/lecture-44.html>

**24EC303****DIGITAL PRINCIPLES AND COMPUTER  
ORGANIZATION  
(COMMON TO CSE&IT)****L T P C****3 0 2 4****Course Objectives:**

- To understand the fundamental concept of Digital System
- To apply Boolean algebra and Karnaugh maps for the simplification and design of Combinational circuits.
- To analyze sequential circuits to design synchronous sequential circuits
- To evaluate the architecture and functionality of digital computers.
- To Design efficient data paths, memory and I/O

**Unit I - BASIC CONCEPTS OF DIGITAL SYSTEMS****9**

Review of Number systems, Logic gates, Boolean algebra, Boolean postulates and laws - De-Morgan's Theorem - Principle of Duality, Simplification using Boolean algebra, Canonical forms - Sum of product and Product of sum - Minimization using Karnaugh map and Tabulation method (2,3 and 4 variables only)

**Unit – II COMBINATIONAL CIRCUITS****9**

Realization of combinational logic using gates, Design of combinational circuits: Adder, Subtractor, Parallel adder / Subtractor, BCD Adder, Magnitude Comparator, Multiplexer, Demultiplexer - Function realization using Multiplexer, Code converters.

**Unit III – SEQUENTIAL CIRCUITS****9**

Latches and Flip flops: SR, JK, T, D and Conversion of Flip flop, Analysis and design of Clocked sequential circuits –Moore/Mealy models, State Reduction, State assignment, Shift registers, Synchronous Counter, Ring Counter, Johnson Counter, Design of synchronous Counters (Synchronous Counter only)

**Unit IV - COMPUTER FUNDAMENTALS****9**

Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language.

**Unit V- PROCESSOR, MEMORY AND I/O****9**

Instruction Execution–Building a Data Path–Designing a Control Unit–Hardwired Control, Micro programmed Control–Pipelining–Data Hazard–Control Hazard. Memory Concepts and Hierarchy–Memory Management, DMA–I/O–Accessing I/O: Parallel and Serial Interface–Interconnection Standards: USB, SATA

**Theory: 45 Hours**

## **List of Experiments:**

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions,
3. Code Converters.
4. Design and implement Half/Full Adder and Subtractor.
5. Design and implement combinational circuits using MSI devices:
6. 4 – bit binary Adder / Subtractor
7. Magnitude Comparator
8. Multiplexer and Demultiplexer
9. Design and implement shift-registers.
10. Design and implement synchronous counters

**Practical : 30 Hours**  
**Total : 75 Hours**

## **Course Outcomes:**

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

- CO1: Explain the principles of digital systems.
- CO2: Demonstrate the design of combinational circuits.
- CO3: Analyze different types of sequential circuits and their operation in real- world applications.
- CO4: Differentiate between various computer architectures and instruction Sequencing techniques.
- CO5: Develop optimized processor control units, memory systems and I/O interfaces for digital computing.

## **Text Books:**

1. David A. Patterson, John L. Hennessy, “Computer Organization and Design, The Hardware/Software Interface”, Sixth Edition, Morgan Kaufmann/Elsevier, 2020
2. M. Morris Mano and Michael D. Ciletti ‘Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog’, Pearson Education, 6<sup>th</sup> Edition, 2018.
3. William Stallings “ Computer Organization and Architecture-Designing for Performance” Eleventh Edition, Pearson Education,2022
4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw-Hill, 2023.

## **Reference Books:**

1. Donald D.Givone, ‘Digital Principles and Design’, Tata McGraw Hill,1st Edition, 2003
2. Thomas L Floyd, ‘Digital fundamentals’, Pearson Education Limited, 11th Edition, 2018
3. John P Hayes, Computer Architecture and Organization, Tata McGraw Hill,3<sup>rd</sup> Edition, 2017

**Course Objectives:**

- To understand Object Oriented Programming concepts and basic programming features of Java
- To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms
- To know the principles of packages, inheritance and interfaces.
- To develop a java application with threads and generics classes.
- To define exceptions and use I/O streams and database connectivity.

**Unit I - INTRODUCTION TO 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, INTERFACES AND PACKAGES**

9

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

**Unit III – THREADS AND EXCEPTION HANDLING**

9

Thread - Thread life cycle and methods, Runnable interface- Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multi-threading - Exception handling with try-catch-finally – Nested try-catch – User defined Exception

**Unit IV - I/O, GENERICS, STRING HANDLING**

9

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

**Unit V- COLLECTIONS, JDBC**

9

Collection framework – List – Set – Map – Comparing and Sorting- Regex – JDBC – The need – JDBC API – JDBC Driver – Database Connection – Database Operations – Processing Results- Memory Management and Garbage Collection.

**Theory : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Apply the concepts of classes and objects to solve simple problems.
- CO2: Develop applications using various OOP Concepts.
- CO3: Apply exception handling mechanisms and multithreaded model to solve real world Problems
- CO4: Build Java applications with I/O packages, string classes, Collections and generics concepts.
- CO5: Integrate the java concepts to build application using back end.

**Text Books:**

1. Herbert Schildt, “Java: The Complete Reference”, 11<sup>th</sup> Edition, McGraw Hill Education, New Delhi, 2021.
2. Cay S. Horstmann, “Core Java Fundamentals”, Volume 1, 11<sup>th</sup> Edition, Prentice Hall, 2018.

**Reference Books:**

1. KEN ARNOLD, Java Programming Language, Addison Wesely, 2022.
2. John R Hubbard, Programming with Java, Tata Mcgraw Hill, 2020.

**Web References:**

1. [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_013193384540020736264\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013193384540020736264_shared/overview).
2. [https://onlinecourses-archive.nptel.ac.in/noc19\\_cs07](https://onlinecourses-archive.nptel.ac.in/noc19_cs07).
3. <https://trainings.internshala.com/java-traininghttps://dzone.com/articles/top-5-java-online-courses-for-beginners>.

**Course Objectives:**

1. To introduce fundamental linear data structures like stacks and queues and their applications in problem-solving.
  2. To explore non-linear data structures, including binary trees, heaps, and balanced trees, for efficient data management.
  3. To understand graph representations and algorithms for solving real-world problems in networking and optimization.
  4. To analyze different hashing techniques and their role in fast data retrieval and storage efficiency.
- To compare and implement various sorting algorithms for optimized data processing in large-scale applications.

**Unit I - LINEAR DATA STRUCTURE****9**

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

**Unit – II NON LINEAR DATA STRUCTURE – TREES –I****9**

Tree – Binary Tree – Properties – Representation – Binary Search Tree – Operation – Traversal – Threaded Binary Tree – Heap – Priority Queue implementation with Heap

**Unit III – NON LINEAR DATA STRUCTURE – TREES –II****9**

Balanced Tree – AVL Tree – Red Black Tree – Multi-way Search Tree – B-Tree, B+Tree – Binary Trie – Multi-way Trie – Suffix tree.

**Unit IV - NON LINEAR DATA STRUCTURE – GRAPHS****9**

Introduction – Terminology – Representation - Graphs Traversal - Breadth first search- Depth first search – Topological sort - Shortest-path algorithm- Dijkstra's Algorithm – Minimum spanning trees – Prim's and Kruskal's algorithms

**Unit V- HASHING AND SORTING****9**

Hashing- Separate Chaining - Open Addressing –Double Hashing - Rehashing – Extendible Hashing - Sorting – Bubble Sort – Insertion Sort - Selection Sort – Quick Sort – Merge Sort – Heap Sort – Radix Sort – Shell Sort

**Theory : 45 Hours**

### **List of experiments:**

1. Array implementation of Stack, Queue ADTs
2. Linked list implementation of Stack and Queue ADTs
3. Applications of Stack and Queue ADTs.
4. Implementation of Binary Trees, Traversal operations
5. Implementation of Heap structure
6. Implementation of balanced BST
7. Implementing Graph based search algorithms
8. Implementation of spanning tree algorithms
9. Implementation of Sorting and searching algorithms
10. Implementation of hashing techniques

**Practical : 30 Hours**

**Total : 75 Hours**

### **Course Outcomes:**

- CO1: Implement stacks and queues to solve problems like expression evaluation and function calls.
- CO2: Utilize binary trees, BST, and heaps for efficient searching and storage.
- CO3: Construct balanced trees for fast data retrieval.
- CO4: Analyze graph algorithms for networking and AI applications.
- CO5: Apply hashing and sorting techniques for optimized data organization and retrieval.

### **Text Books:**

1. Ellis Horowitz and Sartaj Sahni, Anderson Freed “Fundamentals of Data Structures in C”, Universities Press, Second Edition, 2008.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, second Edition, Pearson Education, 2002.

### **Reference Books:**

1. Yashavant Kanetkar, “Data Structures through C”, BPB press, 4th edition, 2022.
2. Jean– Paul Tremblay and Paul G Sorenson, “An Introduction to Data Structures with Applications”, Second Edition, Tata McGrawHill, 2017.
3. Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Third Edition, Prentice Hall of India, 2009.
4. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, “Fundamental of Computer Algorithms”, Second Edition, Universities Press, 2008.

**24AD401****CLEAN CODING AND DEVOPS****L T P C****3 0 0 3****Course Objectives:**

- Understand about the clean code and best programming practices.
- Understand the importance of comments in the applications
- Understand & install different tools used in DevOps stack
- Explain the benefits of DevOps and how various industries are benefitting
- Explain how to automatically rollback a release if it is failed

**Unit - I INTRODUCTION TO CLEAN CODING****10**

Coding principles introduction-Bad and Good code-marshalling and unmarshalling-Names and Functions-distinct names-Defining meaningful context-Usage of domain and function names- Usage of exceptions and its error code names/descriptions. Right comments and types of formatting- Clean and bad comments-Vertical and horizontal formatting-Objects and data structures-Data abstractionData and object antisymmetric-Data transfer objects . Introduction to Python tools - PEP 8 and its significance in clean coding

**Unit – II INTRODUCTION TO DEV-OPS****10**

An overview about DevOps,-Why it is needed? how it is different from traditional IT & Agile - DevOps Principles,- DevOps Lifecycle - An overview about CI/CD pipeline and various tools- setup a complete CI/CD pipeline from scratch using DevOps tools - How DevOps is used in various technologies/industries. Introduction to Jenkins tools - Basics of Observability - Open Service deployed topics.

**Unit – III ADVANCED DEV-OPS****10**

An overview of advanced DevOps concepts - Automatic Rollback & Provisioning, Scalability, Clustering & Infrastructure as Code An overview of Cloud computing - -Why DevOps on cloud - Cloud services - Setup a CI/CD pipeline in Cloud – Dockers. Different types of deployments - Scalability - Availability - Resilience - Fault tolerance in DevOps

**Theory : 30 Hours**

### **List of experiments:**

1. Implementation of Velocity & The Jobs of Delivery
2. Testing Stack
3. Execution of Feature Flags and the Blue/Green Pattern
4. The Medium/Integration Test
5. Creating a Culture of Experimentation
6. CI/CD Pipeline Implementation using Jenkins
7. DevOps Automation with Docker and Kubernetes
8. Secure Deployment Practices with DevSecOps

**Practical : 30 Hours**

**Total : 60 Hours**

### **Course Outcomes:**

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

- CO1: Understand the importance of good code and bad code practice
- CO2: Compare the traditional IT methodology and agile methodology
- CO3: Experiment with the Integration tools to setup a CI/CD pipeline
- CO4: Apply the devops methodology to create a modern application
- CO5: Demonstrate the resource allocation and provisioning in cloud environment

### **Text Books:**

- 1.DevOps: A Software Architect's Perspective by Ingo M. Weber, Len Bass, and Liming Zhu

**24MC804****ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE****L T P C****2 0 0 0****Course Objectives:**

1. Understand the concept of Traditional knowledge and its importance.
2. Know the need and importance of protecting traditional knowledge.
3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditional knowledge.

**Unit I - INTRODUCTION TO TRADITIONAL KNOWLEDGE****9**

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

**Unit – II PROTECTION OF TRADITIONAL KNOWLEDGE****9**

Protection of traditional knowledge: The need for protecting traditional knowledge Significanceof TK Protection, value of TK in global economy, Role of Government to harness TK.

**Unit III – LEGAL FRAME WORK AND TK****9**

A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

**Unit IV - TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY****9**

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

**Unit V- TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS****9**

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK. 139.

**Theory : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

CO1: Able to understand the concept of Traditional knowledge and its importance

CO2: Enable to know significance of protecting traditional knowledge

CO3: Enable to identify the various enactments related to the protection of traditional knowledge

CO4: Understand the concepts of Intellectual property to protect the traditional knowledge

**Text Books:**

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.

**Reference Books:**

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2

**Web References:**

1. [http://nbaindia.org/uploaded/docs/traditionalknowledge\\_190707.pdf](http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf)
2. <https://www.springer.com/gp/book/9788132239215>

**24IT402**

**JAVA PROGRAMMING LAB**

**L T P C**  
**0 0 4 2**

**Course Objectives:**

- To design and implement Java programs using classes, methods, and basic object-oriented principles such as inheritance, interfaces, and abstract classes.
- To apply advanced Java features, including generic collections, IO streams, and user-defined exceptions, to create robust and flexible applications.
- To develop multi-threaded applications in Java, leveraging concurrency to enhance performance and efficiency.
- To use the Java Collection Framework to manage and manipulate data using various collection classes and interfaces.
- To integrate Java applications with databases, demonstrating skills in database connectivity, CRUD operations, and data management.

**Lab Experiments:**

**Note:** The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

**S. No Name of the Experiments**

1. Programs using class and methods using Java.
2. Implementation of Inheritance using Java.
3. Inheritance via Interface and Abstract class.
4. Programs on Package implementations.
5. Implementation of Java Applications using Generic collections.
6. Demonstration of IO Streams in Java.
7. Demonstration of User Defined Exception handling in Java.
8. Implementation of multi-threading in Java.
9. Programs using collection framework.
10. Mini Project using Database connectivity.

**Total : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

CO1: Design and implement Java programs using fundamental object-oriented concepts.

CO2: Demonstrate proficiency in using advanced Java features.

CO3: Develop multi-threaded Java applications, applying concurrency techniques.

CO4: Apply Java Collection Framework to handle and manipulate data, leveraging various collection classes and interfaces for efficient data management.

CO5: Apply database operations and manage data within real-world applications.

**24CS402**

**WEB PROGRAMMING I**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

- Understand fundamental web technologies and their applications.
- Develop static web pages using HTML and CSS.
- Implement interactive features using JavaScript.
- Apply responsive design principles using Bootstrap.

**Lab Experiments:**

1. Introduction to HTML - Create a simple webpage with headings, paragraphs, lists, and links.
2. HTML Forms and Tables - Design a registration form and display user data in a table.
3. CSS Styling and Layouts - Style a webpage using internal and external CSS.
4. CSS Flexbox and Grid - Implement responsive layouts using Flexbox and Grid.
5. JavaScript Basics - Write scripts for basic arithmetic operations.
6. Form Validation using JavaScript - Validate user input in HTML forms.
7. Interactive Web Page - Implement dropdown menus, modals, and animations.
8. JavaScript and Local Storage - Create a to-do list app using Local Storage.
9. Bootstrap for Responsive Web Design - Build a webpage with Bootstrap components.
10. Mini Project – Portfolio Website.

**Total : 30 Hours**

**Course Outcomes:**

CO1: Understand web technologies and HTML structure.

CO2: Develop static webpages using HTML and CSS.

CO3: Implement client-side scripting for dynamic functionalities.

CO4: Design responsive web applications using Bootstrap.

CO5: Utilize JavaScript and Local Storage to create interactive and data-persistent web applications.

**24TP703**

**SOFT SKILL AND APTITUDE III**

**L T P C**

**0 0 2 1**

**Course Objectives:**

- Solve Logical Reasoning questions of easy to intermediate level
- Solve Quantitative Aptitude questions of easy to intermediate level
- Solve Verbal Ability questions of easy to intermediate level
- Display good writing skills while dealing with essays.

**Unit I - LOGICAL REASONING**

**9**

Clocks - Calendars - Direction Sense - Cubes - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency

**Unit – II QUANTITATIVE APTITUDE**

**12**

Time and work: Work with different efficiencies, Pipes and cisterns, Work equivalence, Division of wages - Time, Speed and Distance: Basics of time, speed and distance, Relative speed, Problems based on trains, Problems based on boats and streams, Problems based on races - Profit and loss, Partnerships and averages: Basic terminologies in profit and loss - Partnership - Averages - Weighted average.

**Unit III – VERBAL ABILITY**

**7**

Sentence Correction: Subject-Verb Agreement, Modifiers, Parallelism, Pronoun-Antecedent Agreement, Verb Time Sequences, Comparisons, Prepositions, Determiners – Sentence Completion and Para-jumbles: Pro-active thinking, Reactive thinking (signpost words, root words, prefix suffix, sentence structure clues), Fixed jumbles, Anchored jumbles.

**Unit IV - I WRITING SKILLS FOR PLACEMENTS**

**2**

Essay writing: Idea generation for topics, Best practices, Practice and feedback

**Total : 30 Hours**

**Course Outcomes:**

- CO1: Students will avoid the various fallacies that can arise through the misuse of logic.
- CO2: Students would opt for alternate methods to solve the problems rather than conventional methods.
- CO3: Students will heighten their awareness of correct usage of English grammar in writing and speaking
- CO4: Students will be concise and clear, using professional language for placements.

**Reference Books:**

1. A New Approach To Reasoning Verbal & Non-Verbal By B.S. Sijwali R2: How to prepare for data interpretation for CAT by Arun Sharma.
2. How to Crack TEST OF REASONING in all competitive examinations by Jaikishan and Premkishan.
3. Quantitative Aptitude for Competitive Examinations - Dr. R.S. Aggarwal, S. Chand.
4. Word Power Made Easy by Norman Lewis.
5. Six weeks to words of power by Wilfred Funk.

**24NCC02****CAREER DEVELOPMENT AND AVIATION SKILLS****L T P C****1 0 0 1****Course Objectives:**

1. To understand the fundamentals of group discussions and interviews.
2. To educate the importance of water conservation and energy conservation in sustainable development.
3. To learn the fundamental commands, formations and sequences of arm drill movements.
4. To understand the basic principles of flight, including the forces acting on an aircraft.
5. To understand the fundamental principles behind aircraft control systems and their role in flight stability and maneuverability.

**Unit I - GROUP DISCUSSIONS AND INTERVIEW SKILLS****3**

Stress management techniques – Change your mindset – Time management – Principles of time management – Social skills – Interview skills – SSB procedure.

**Unit – II ENVIRONMENTAL AWARENESS****3**

Water conservation – Rain water harvesting – Energy conservation – Pollution – Types of pollution – Disaster and its classification – Waste management – Tree plantation.

**Unit III – ARM DRILL****3**

Arm Drill – Rifle ke sath savdhan, Vishram aur Aram se – Rifle ke saath Parade par aur Saj – Rifle ke saath Visarjan, Line Tod – Bhumi Shastra aur Uthao Shastra – Bagal Shastra aur Baju Shastra – Salami sasthra – Salute – General Salute – National Salute – Guard of Honour.

**Unit IV - PRINCIPLE OF FLIGHT****3**

Aircrafts of IAF – Parts of an aircraft – Introduction to principle of flight – Laws of motion – Bernoulli's principle and Venturi effect – Glossary of terms – Aerofoil – Forces acting on the aircraft.

**Unit V - AIRCRAFT CONTROLS AND FLIGHT INSTRUMENTS****3**

Basic air craft controls – Primary controls – Secondary controls – Types of wings and plane – Basic Flight Instruments – Air speed Indicator (ASI) – Altimeter – Artificial Horizon (AH).

**Total : 15 Hours**

**Course Outcomes:**

- CO1: Understand the principles, techniques, and expectations of group discussions and interviews.
- CO2: Understand the knowledge of environmental challenges and adopt sustainable practices to protect natural resources.
- CO3: Remember the fundamental commands, formations and movements involved in arm drill.
- CO4: Understand the fundamental forces of flight and their role in aircraft movement..
- CO5: Understand the primary, secondary flight control surfaces and flight instruments and their functions in aircraft maneuvering..

**Text Books :**

1. NCC cadet Handbook Common Subject SD/SW.
2. NCC cadet Handbook (Air Force) Specialised Subject SD/SW.
3. ANO Handbook (SD/SW) by DG NCC, Ministry of Defence, New Delhi.

**Reference :**

1. Digital Forum App 1.0 & 2.0, by DG NCC DG NCC, Ministry of Defence, New Delhi.

**24MA207**

**PROBABILITY AND QUEUEING THEORY**

( Common to CSE & IT)

**L T P C**

**3 0 0 3**

**Course Objectives:**

- To introduce the basic concepts of probability and discrete random variables.
- To learn the basic concepts of continuous random variables.
- To acquaint the knowledge of two dimensional random variable, correlation and regression coefficients.
- To acquaint the concept of random processes and classifications.
- To use the concept of queueing models in the field of engineering.

**Unit - I DISCRETE RANDOM VARIABLES**

**9**

Random Variables – Discrete random variable - Probability mass function – Moments – Moment generating functions - Cumulative Distribution Functions – Mean and Variance – Standard distributions: Binomial, Poisson, Geometric.

**Unit – II CONTINUOUS RANDOM VARIABLES**

**9**

Continuous random variables – Probability density functions – Cumulative Distribution Functions – Mean and Variance – Uniform, Exponential and Normal distributions.

**Unit - III TWO DIMENSIONAL RANDOM VARIABLES**

**9**

Two dimensional discrete and continuous random variables – Joint distributions – Marginal and conditional distributions – Covariance – Correlation – Regression – Estimation of Regression line.

**Unit - IV RANDOM PROCESSES**

**9**

Stochastic processes, Classification, Stationarity in random process, Wide sense and Strict sense stationary processes, Special processes: Poisson process, Markov process, Markov chain.

**Unit - V QUEUEING MODELS**

**9**

Introduction to Queueing Models, Characteristics of Queueing Models, Markovian queues – Birth and death processes –Single and multiple server queueing models –Little's formula.

**Theory : 45 Hours**

## **Course Outcomes:**

- CO1: Apply the concepts of discrete random variables and distributions.
- CO2: Apply the concepts of continuous random variables and distributions
- CO3: Analyze two dimensional random variables.
- CO4: Classify random processes, Markov chains and transition probabilities.
- CO5: Analyze various queueing models.

## **Text Books:**

- 1. Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistics", 11th revised Edition, Sultan Chand & Sons, 2007.
- 2. Veerarajan T., "Probability and Random Processes", Tata McGraw Hill, Third reprint 2009.

## **Reference Books:**

- 1. Roy D. Yates and David J Goodman, "Probability and Stochastic Processes-A friendly Introduction for Electrical and Computer Engineers", John Wiley & Sons, Inc., 2011.
- 2. Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, 2004.
- 3. Trivedi K.S, "Probability and Statistics with reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.
- 4. Gross D., Shortle J.F., Thompson J.M. and Harris C.M. "Fundamentals of Queuing Theory", Wiley, Student 4th Edition, 2014.
- 5. Siva Ramakrishna Dass, "Probability and Statistics", Viji Academy, 2014.
- 6. Douglas C. Montgomery, "Applied Statistics and Probability for Engineers", 3rd Edition, 2003.
- 7. H. A. Taha, Operations Research – An Introduction, 8th Edition, Pearson Prentice Hall, 2007.

## **Web References:**

- 1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-spring-2015/probability/tp12-1/vertical-1f097d8a0a33/bayes-theorem/>
- 2. <https://nptel.ac.in/courses/111/105/111105042/>
- 3. <https://www.youtube.com/watch?v=xGkpXk-AnWU>

**24IT404****DATABASE MANAGEMENT SYSTEMS****L T P C****3 0 0 3****Course Objectives:**

- To Understand the Basics of Database Systems.
- To Implement Relational Databases and SQL concepts.
- To Design and Normalize Relational Databases.
- To Implement Indexing and Manage Transactions.
- To Differentiate Advanced Database Technologies.

**Unit - I INTRODUCTION****9**

Database-System Applications - Purpose of Database Systems - View of Data: Data abstraction, Instances & Schemas, Data models –Database Engine – Database System Architecture – Database Users and Administrators, Database vault, Database firewalls - Storage Manager – the Query Processor.

**Unit – II RELATIONAL MODEL AND SQL****9**

Structure of Relational Databases -Database Schema- Keys- Schema Diagrams- Relational Query Languages-The Relational Algebra- SQL Overview - Structure of SQL Queries – Query Languages - Set Operations - Aggregate Functions - Nested Sub queries - Join Expressions-Views - Functions – Procedures - Triggers.

**Unit - III RELATIONAL DATABASE DESIGN****9**

The Entity-Relationship Model - Entities, Attributes and Relationship sets - Complex Attributes - Mapping Cardinalities - Integrity Constraints - Primary Key - Removing Redundant - Reducing E-R Diagrams to Relational Schemas- Features of Good Relational Designs- Decomposition Using Functional Dependencies - Normal Forms.

**Unit - IV INDEXING AND TRANSACTION MANAGEMENT****9**

RAID- Database Storage Architecture-File Organization-Organization of Records in Files- Indexing- Ordered Indices – B and B+ Tree Index Files - Hash Indices- Transactions - ACID Properties- Schedules – Serializability- Concurrency Control-Lock based protocols-Timestamp based protocols- Transaction Recovery - SQL Facilities for Concurrency and Recovery

**Unit V- ADVANCED DATABASES****9**

Distributed Databases - Multimedia Databases - Spatial Databases- XML Database - NOSQL Databases - MongoDB – Datatypes, Create, Update , Delete and Querying the database

**Total : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Understand the fundamental of database systems.
- CO2: Develop proficiency in relational databases with SQL Querying.
- CO3: Design ER and Relational model for performing database effectively.
- CO4: Apply Indexing principles in Database storage for transaction management.
- CO5: Summarize advanced database types and its usage.

**Text Books:**

1. Silberschatz Abraham, Korth Henry F. and Sudarshan S., "Database System Concepts", 7th Edition, McGraw Hill, New York, 2019.

**Reference Books:**

1. R. Elmasri and S. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2021.
2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, 3rd Edition, McGraw Hill, 2003.
3. Thomas M. Connolly and Carolyn E. Begg, "Database Systems - A Practical Approach to Design, Implementation and Management", Fifth edition, Pearson Education, 2010.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

**Web References:**

1. <http://www.db-book.com>
2. <http://www.iitg.ernet.in/awekar/teaching/cs344fall11/>
3. [www.w3schools.com/sql/](http://www.w3schools.com/sql/)
4. [https://onlinecourses.nptel.ac.in/noc22\\_cs91/preview](https://onlinecourses.nptel.ac.in/noc22_cs91/preview)
5. <https://www.geeksforgeeks.org/dbms/>

**Course Objectives:**

- To understand and apply the algorithm analysis techniques.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To understand different algorithm design techniques
- To apply appropriate method to solve a given problem.
- To understand the limitations of Algorithmic power.

**Unit I - INTRODUCTION TO ALGORITHM ANALYSIS**

9

Introduction to Algorithm Analysis – Notion of Time and Space Complexity – Algorithm efficiency – Asymptotic Notations – Recurrence Relations – Solving Recurrence equations - Iteration Method, Recurrence Tree Method and Master's Theorem - Mathematical analysis for Recursive and Non-recursive algorithms - Empirical analysis of algorithm - P, NP and NP- Complete Problems. Brute Force Approach: General Approach – Algorithm Analysis – String matching applications.

**Unit – II DIVIDE-AND-CONQUER & DECREASE-AND-CONQUER**

9

Divide And Conquer: General Strategy –Analysis of algorithm - Merge sort - Quick sort - Strassen's Matrix Multiplication – Multiplication of Large Integers – Convex Hull and Closest pair problem. Decrease and Conquer:Introduction - General Method – Analysis - Insertion sort - Topologicalsort – Binary Search – Fake-Coin Problem – Interpolation Search.

**Unit III – DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE**

9

Dynamic Programming: Introduction - Principle of Optimality – General Approach for problem solving - Analysis – Coin Changing Problem - Optimal Binary Search Trees - Warshall's and Floyd's Algorithm - Knapsack Problem and Memory functions. Greedy Technique: Greedy Approach Introduction - Analysis of algorithm - Examples: Container Loading Problem – Prim's and Kruskal's Algorithm - Dijkstra's Algorithm - Huffman Trees.

**Unit IV - ITERATIVE IMPROVEMENT**

9

The Simplex Method – The maximum Flow problem – Min Cut Max Flow Theorem and Proof – Maximum Matching in a Bipartite graph – Stable marriage Problem

**Unit V- BACKTRACKING & BRANCH AND BOUND**

9

Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem- Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Graph Coloring problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem.

**Total : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Explain algorithm efficiency, including time and space complexity, asymptotic notations, and empirical analysis..
- CO2: Apply fundamental algorithmic paradigms such as divide-and-conquer, dynamic programming, and greedy techniques to solve computational problems.
- CO3: Analyze various algorithms using methods like Iteration, Recurrence Tree, and Master's Theorem
- CO4: Apply problem-solving approaches using backtracking and branch-and-bound techniques For combinatorial and optimization problems.
- CO5: Classify problems into P, NP, and NP-complete categories and derive approximation algorithms for NP hard problems, focusing on achieving near-optimal solutions within reasonable time limits.

**Text Books:**

1. Anany Levitin "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education Limited, 2014
2. Parag H.Dave, Himanshu B.Dave, " Design and Analysis of Algorithms", Pearson Education,2008.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 2009
4. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.

**Reference Books:**

1. Sandeep Sen and Amit Kumar, "Design and Analysis of Algorithms – A Contemporary Perspective" , Cambridge University Press, 2019
2. S.K.Basu, "Design Methods and Analysis of Algorithms", Second Edition, PHI Learning Private India Limited, 2013
3. Harsh Bhasin, —Algorithms Design and Analysis||, Oxford university press, 2016  
John Kleinberg, Eva Tardos, "Algorithm Design", Pearson Education, 2009

**24AD402****FOUNDATIONS OF DATA SCIENCE****L T P C**  
**3 0 0 3****Course Objectives:**

- To understand AI, AI applications, use cases and how it is transforming our lives.
- To understand Machine Learning concepts and clustering.
- To understand AI agents and its applications.
- To impart knowledge about Data science.
- To give understanding of various data science processing techniques.

**Unit I - BASICS OF DATA SCIENCE****9**

Data Science Process – Data science related to other fields – Data science and information science – Computational thinking – Skills and tools needed to do data science – Storing data – Creating data sets – Identifying data problem – Understanding data sources – Exploring data models.

**Unit – II DATA HANDLING****9**

Structured and unstructured data – Challenges with unstructured data – Data collection: open data – multimodal data – Data preprocessing: Data cleaning – Data integration, Data transformation – Data reduction – Data Discretization.

**Unit III – 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 IV - FUNDAMENTALS OF AI****9**

Impact and Examples of AI - Applications of AI -Cognitive Computing -Issues and Concerns around AI - AI and Ethical Concerns - AI and Bias -The evolution and future of AI - AI Agents and Environment - Agent architectures - Properties of task environments.

**Unit V- BASICS OF MACHINE LEARNING****9**

Machine Learning Process – Supervised Learning – Classification – Binary Classification – SVM Naïve bayes - Regression – Linear regression – Logistic Regression – Cost Function – Gradient Descent – Unsupervised Learning – Introduction to Clustering techniques.

**Total : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Explain the differences between AI, human intelligence, and traditional information processing, and describe its future scope.
- CO2: Identify and compare different machine learning algorithms based on their applications.
- CO3: Implement intelligent agents to process real-time datasets.
- CO4: Describe various techniques used in the data science process.
- CO5: Apply data analysis techniques to solve business-related problems.

**Text Books:**

1. "Artificial Intelligence: A Modern Approach", by S.Russell and P.Norvig, Prentice Hall, Fourth Edition, 2021.
2. "Artificial Intelligence: Foundations of Computational Agents", by David L. Poole and Alan K. Mackworth Cambridge University Press, 2010.
3. Alexey Grigorev, 2020, "Machine Learning Bookcamp", MEAP.
4. Jeffrey S.Saltz, Jeffrey M.Stanton ,2018 , "An introduction to Data Science", SAGE Publications.
5. Chirag Shah, 2020, "A Hands on introduction to Data Science", Cambridge University Press.

**Reference Books:**

1. Deepak Khemani, Artificial Intelligence,, Tata McGraw Hill Education 2013.

**Web References:**

1. <https://www.coursera.org/learn/data-cleaning>
2. <https://www.coursera.org/learn/exploratory-data-analysis>

**Course Objectives:**

- To understand the basic concepts of operating system.
- To learn the mechanisms of OS to handle processes, thread, scheduling mechanism and Inter Process communication.
- To learn memory management strategies in contemporary OS.
- To know about file structure and disk structures.
- To appreciate the emerging trends in operating systems.

**Unit I - INTRODUCTION**

7

Computer System - Elements and organization; Operating System Overview - Objectives and Functions - Evolution of Operating System; Operating System Structures – Operating System Services - User Operating System Interface - System Calls – System Programs - Design and Implementation - Structuring methods.

**Unit – II PROCESS MANAGEMENT AND SCHEDULING**

11

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - Multithread Models – Threading issues; Process Synchronization - The Critical-Section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - Monitors; Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

**Unit III – MEMORY MANAGEMENT**

9

Logical Versus Physical Address Space, Basics of linking and loading, Swapping, Contiguous Memory Allocation, Virtual Memory - Paging–Structure of the Page Table, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing–Memory Mapped Files, Allocating Kernel Memory, Kernel security mechanisms: ASLR, KPTI, SMAP, SMEP, OS level GPU management: scheduling, memory allocation, and driver optimization.

**Unit IV - STORAGE MANAGEMENT**

9

Mass Storage system – Disk Structure - Disk Scheduling and 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; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem.

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS - iOS and Android-Security models and mechanisms in mobile operating systems like Android and iOS.

**Theory : 45 Hours****List of experiments:**

1. Installation of operating system, Install any guest operating system (Linux) using VMware
2. Illustrate UNIX commands and Shell Programming
3. Process Management using System Calls : Fork, Exit, Getpid, Wait, Close
4. Programs using the various CPU Scheduling Algorithms
5. Program using Deadlock detection methods.
6. Program using Deadlock avoidance methods.
7. Paging Technique
8. Memory Allocation Methods.
9. Page Replacement Algorithms
10. Disk scheduling algorithms

**Practical : 30 Hours****Total : 75 Hours****Course Outcomes:**

- CO1: Describe the structure and basic components of an operating system.
- CO2: Discuss and execute basic UNIX commands for system operations.
- CO3: Implement different CPU scheduling algorithms to manage processes.
- CO4: Explain various memory allocation methods and their significance.
- CO5: Apply different disk scheduling algorithms for efficient storage management.
- CO6: Define and describe file organization and file allocation strategies.

**Text Books:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”®, 10th Edition, John Wiley and Sons Inc., 2018.
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi

**Reference Books:**

1. Ramaz Elmasri, A. Gil Carrick, David Levine, “ Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.
2. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition,

Prentice Hall, 2018

3. Achyut S.Godbole, Atul Kahate, “Operating Systems”, McGraw Hill Education, 2016
4. Algorithms”, Second Edition, Universities Press, 2008

**Web References:**

1. <https://nptel.ac.in/courses/>
2. [https://onlinecourses.nptel.ac.in/noc20\\_cs04/](https://onlinecourses.nptel.ac.in/noc20_cs04/)
3. <https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/pages/>

**24CS405**

**WEB PROGRAMMING II**

**L T P C**

**0 0 2 1**

**Course Objectives:**

- Learn server-side programming using PHP and MySQL.
- Understand the fundamentals of Node.js and Express.js.
- Develop RESTful APIs and perform CRUD operations.
- Build real-time applications using WebSockets.

**Lab Experiments:**

1. Introduction to PHP & XAMPP - Set up a local server and run a basic PHP script.PHP Forms & GET/POST Methods - Implement form handling.
2. PHP CRUD Operations with MySQL.
3. User Authentication System using PHP.
4. Introduction to Node.js & Express.js.
5. REST API Development in Node.js.
6. CRUD Operations in Node.js.
7. Real-time Chat App using WebSockets.
8. Full Stack Mini Project (PHP & Node.js)

**Total : 30 Hours**

**Course Outcomes:**

CO1: Understand PHP scripting and database interaction.

CO2: Develop server-side applications using Node.js.

CO3: Implement CRUD operations in PHP & MySQL and Node.js.

CO4: Build real-time applications using WebSockets.

CO5: Develop and deploy full-stack web applications.

**Course Objectives:**

- Solve Logical Reasoning questions of easy to intermediate level
- Solve Quantitative Aptitude questions of easy to intermediate level
- Solve Verbal Ability questions of easy to intermediate level
- Crack mock interviews with ease
- Be introduced to problem-solving techniques and algorithms

**Unit = I LOGICAL REASONING 5**

Logical Connectives - Syllogisms - Venn Diagrams: Interpretation - Venn Diagrams - Solving

**Unit – II QUANTITATIVE APTITUDE 8**

Logarithm - Arithmetic Progression - Geometric Progression - Geometry – Mensuration - Coded inequalities - Quadratic Equations - Permutation, Combination: Fundamental Counting Principle, Permutation and Combination, Computation of Permutation, Circular Permutations, Computation of Combination – Probability.

**Unit - III VERBAL ABILITY 2**

Critical Reasoning: Argument – Identifying the Different Parts (Premise, assumption, conclusion), Strengthening statement, Weakening statement, Mimic the pattern.

**Unit IV - RECRUITMENT ESSENTIALS 3**

Cracking interviews - demonstration through a few mocks - Sample mock interviews to demonstrate how to crack the: HR interview, MR interview, Technical interview - Cracking other kinds of interviews: Skype/ Telephonic interviews, Panel interviews, Stress interviews - Resume building – workshop: A workshop to make students write an accurate resume.

**Unit V - RECRUITMENT ESSENTIALS 12**

Logical methods to solve problem statements in Programming - Basic algorithms introduced

**Total: 30 Hours**

**Course Outcomes:**

- CO1: Students will excel in the complex reasoning.
- CO2: Students will be proficient to create and verify their own conjectures.
- CO3: Imbibe effective relevant knowledge in English.
- CO4: Students will identify different life skills required in personal and professional life.
- CO5: Students will develop skills in ideation, innovation in algorithmic thinking, and be able to apply them in problem solving.

**Reference Books:**

1. Logical Reasoning and Data Interpretation for CAT by Nishit K. Sinha
2. A Modern Approach To Verbal Reasoning by R S Aggarwal.
3. Quantitative Aptitude for Competitive Examinations (5th Edition) - Abhijit Guha
4. Verbal Ability & Reading Comprehension by Ajay Singh
5. Computer Programming for Beginners: Fundamentals of Programming Terms and Concepts – Nathan Clark

**Course Objectives:**

- To analyse possible patterns and relationships between a biotic or abiotic factor and a biological system.
- To identify the pollutants, their sources, transport mechanisms and respective controls.
- To identify the methods for recycling, recovery and reuse of the materials considered to be waste.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

**Unit I - ECOSYSTEM DYNAMICS AND BIODIVERSITY**

3

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – food chains, food webs and ecological pyramids. Introduction to biodiversity - value of biodiversity, consumptive use, productive use .India as a mega-diversity nation –hot-spots of biodiversity - endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

**Unit – II ENVIRONMENTAL POLLUTION**

3

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution -environmental protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act -Issues and possible solutions - acid rain – role of an individual in prevention of pollution.

**Unit III – NATURAL RESOURCES**

3

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – role of an individual in conservation of natural resources.

**Unit IV - SUSTAINABILITY AND MANAGEMENT**

3

Development , GDP ,Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols. Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global,

Regional and local environmental issues and possible solutions. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry.

## **Unit V - SUSTAINABILITY PRACTICES**

**3**

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Energy efficiency, Sustainable transports. Sustainable energy -carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio-economical and technological change.

**Total : 15 Hours**

### **Course Outcomes:**

CO1: To understand the value of these ecosystems to humans and to animals and plants.

CO2: To identify the major pollutants and abatement devices for environmental management and sustainable development.

CO3: To explain how we can use natural resources in sustainable manner.

CO4: To explain knowledge of various acts and laws and will be able to identify the industries that are violating these rules.

CO5: To estimate the population - economic growth, energy requirement and demand.

### **Text Books:**

1. Benny Joseph, „Environmental Science and Engineering“, Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, „Introduction to Environmental Engineering and Science“, 2nd edition, Pearson Education, 2004.

### **Reference Books:**

1. Dharmendra S. Sengar, „Environmental law“, Prentice hall of India Pvt Ltd, New Delhi, 2007.
2. Erach Bharucha, “Textbook of Environmental Studies”, Universities Press(I) Pvt, Ltd, Hyderabad, 2015.
3. Rajagopalan, R, „Environmental Studies-From Crisis to Cure“, Oxford University Press, 2005.

### **Web References:**

1. <https://www.conserve-energy-future.com>
2. <https://livescience.com/topics/pollution/4>

**24IT406**

**DATABASE MANAGEMENT SYSTEMS LAB**

**L T P C**

**0 0 4 2**

**Course Objectives:**

- To understand the fundamental concepts and techniques to design and implementation of database applications.
- To learn about entity-relationship design and SQL data definition and manipulation.
- To understand the theory of query languages, integrity constraints and normalization.
- To learn about the internal storage structures using different file and indexing techniques.
- To understand the practical differences between relational and non-relational database management systems.
- To understand state-of-art database technology, to easily follow. Technological developments.

**Lab Experiments:**

1. Demonstrate Data Definition Language and integrity constraints.
2. Demonstrate DML, DCL and TCL commands.
3. Execute nested and sub queries in SQL.
4. Demonstrate Join operations in SQL.
5. Create Views, Index and perform SQL operations in it.
6. Demonstrate the concept of looping using PL/SQL statements.
7. Implement Cursors and its operations.
8. Implement Triggers and its operations.
9. Develop Procedures and Functions to perform operations in SQL.
10. Embed SQL queries in high level languages.
11. Mini project with crystal reports

**Total : 45 Hours**

**Course Outcomes:**

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

- CO1: Determine various keys and sketch a suitable schema for a given application.
- CO2: Design an ER model and write SQL queries for a queries for a given scenario.
- CO3: Design relational database using normalization methods for a given application
- CO4: Apply the concept of concurrency control in transaction processing.
- CO5: Execute queries using concepts of embedded query languages and real world Problems using database concepts.

**24NCC03**

**PERSONAL DEVELOPMENT AND AVIATION  
LEADERSHIP**

**L T P C  
1 0 0 1**

**Course Objectives:**

1. To identify the leadership traits.
2. To understand the key components of personality and enhance the decision-making abilities.
3. To acquiring awareness about the basic obstacles and weapon system in training
4. To understand the basic structure and components of an airfield.
5. To understand the basic working principles of aero engines and aeromodelling.

**Unit - I LEADERSHIP DEVELOPMENT 3**

Introduction to Leadership – Leadership traits – Indicators – Motivation – Moral values – Character traits – Honour code – Tenets of honour code.

**Unit – II PERSONALITY DEVELOPMENT 3**

Self awareness – Empathy – Critical thinking – Creative thinking – Decision making and problem solving – Communication skills – Public speaking.

**Unit III – WEAPON TRAINING AND OBSTACLES 3**

Introduction to .22 rifle – Classification of .22 ammunition – Methods of cleaning Handling of .22 rifle – Types of Firing position – Principles of firing – Standard obstacle course – Safety measures – Benefits.

**Unit IV - AIRMANSHIP 3**

Introduction to airfield – Basic terminologies – Airfield layout – Rules of the air – Visual Flight Rules (VFR) – Instruments Flight Rules (IFR) – Circuit rules – Air Traffic Control (ATC).

**Unit V - AERO ENGINES AND AEROMODELLING 3**

Introduction to Aero Engine – Components of Aero Engines – Principles of propulsion – Jet Engines – Principles and working of Aero Engines – History of aeromodelling – Materials used in aeromodelling – Types of aeromodelling – Building and flying of Aeromodels.

**Total : 15 Hours**

**Course Outcomes:**

- CO1: Remember and develop the leadership qualities.
- CO2: Remember the key concepts of self-awareness, empathy, critical thinking and effective communication.
- CO3: Understand and execute weapon handling, firing techniques and obstacles course
- CO4: Understand the airfield layout, fundamental rules of the air and role of ATC.
- CO5: Understand the principle and working of aero engines and aeromodelling procedures and flying controls.

**Text Books :**

1. NCC cadet Handbook Common Subject SD/SW.
2. NCC cadet Handbook (Air Force) Specialised Subject SD/SW.
3. ANO Handbook (SD/SW) by DG NCC, Ministry of Defence, New Delhi.

**Reference :**

1. Digital Forum App 1.0 & 2.0, by DG NCC DG NCC, Ministry of Defence, New Delhi.

**Course Objectives:**

- To demonstrate the interplay between different models and formal languages.
- To identify the need of compiler and stages of compiler.
- To Enumerating top down and bottom up parsing techniques used in compilation process.
- To Understand Syntax directed translation scheme and different ways of representing Intermediate code.
- To Illustrate the various optimization techniques for designing various optimizing compilers.

**Unit I - FINITE MACHINE AND REGULAR EXPRESSION**

12

Finite State Machine-Deterministic finite automation-Non Deterministic finite automation. Conversion of NFA into DFA- Equivalence of NDFAs with and without  $\epsilon$ -moves- Minimization of FSM- Regular sets-regular expressions – Conversion of finite automata into a regular expression.

**Unit – II CONTEXT FREE LANGUAGES AND PDA**

12

Context Free Grammars- Derivation trees, Leftmost and rightmost derivation of strings and sentential forms, Ambiguity - Normal Forms: Chomsky Normal Form (CNF) - Greibach Normal Form (GNF) - Pushdown automata (PDA) – Languages of a PDA - Equivalence of PDA's and CFG's.

**Unit III – LEXICAL AND SYNTAX ANALYSIS**

12

Introduction To Compiling: Overview of Compilers, Phases of a Compiler. Lexical Analysis: The Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A language for specifying Lexical Analyzers(LEX). Syntax Analysis: The role of the Parser, First and Follow, Predictive Parsing, LR Parsers- SLR, Parser Generator (YACC).

**Unit IV - SDT & INTERMEDIATE CODE GENERATOR**

12

Syntax-Directed Translation: Syntax-Directed Definition, S-Attributed SDD, L-Attributed SDD, Translation Schemes. Intermediate Code Generation: Intermediate Languages- Graphical Representations, Three address code, Implementations.

**Unit V- CODE OPTIMIZATION & CODE GENERATOR**

12

CODE OPTIMIZATION: basic blocks and flow graphs, optimization of basic blocks, principal sources of optimization, directed a cyclic graph (DAG) representation of basic block. CODE GENERATION: Machine dependent code generation, object code forms, peephole optimization.

**Total : 60 Hours**

**Course Outcomes:**

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

CO1: Explain finite state machines and regular expressions for modeling and their power to recognize the languages. (2,4)

CO2 : Able to design context free grammars for formal languages. (3,6)

CO3 : Build the lexical and Syntax analyzer phases of compiler.(3,4)

CO4 : Model SDD's using Intermediate Representations.(3,4,6)

CO5 : Generate object code for natural language representations.(3,5,6)

**Text Books:**

1. John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", 3 rd Edition, 2021.
2. A. V. Aho et al, "Compilers: Principles, techniques, & tools", Second Edition, PearsonEducation 2 nd Edition, 2021.
3. K. D. Cooper and L. Torczon, "Engineering a compiler", Morgan Kaufmann, 2004

**Reference Books:**

1. D.M. Dhamdhere, "Systems programming and operating systems", Tata McGraw Hill Education Private Limited, 2011.
2. Peter Linz, Susan H. Rodger, "An Introduction to Formal Languages and Automata", Jones& Bartlett books, 7th Edition, 2023.

**Course Objectives:**

- To understand the concept of layering in networks.
- To know the functions of protocols of each layer of TCP/IP protocol suite.
- To visualize the end-to-end flow of information.
- 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 10**

Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model –fifth-generation wireless technology- Network Slicing-Backhaul and Fiber Networks- Global Standardization of 5G – Software Defined Networks - 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 7**

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

**Unit IV - ROUTING 7**

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

**Unit IV - DATA LINK AND PHYSICAL LAYERS 12**

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. Wi-Fi, Wi-Max, Bluetooth, Zigbee, and NFC.

**Theory : 45 Hours**

### **List of Experiments:**

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like: a) Echo client and echo server b) Chat
4. Simulation of DNS using UDP sockets.
5. Use a tool like Wireshark to capture packets and examine the packets
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of Distance Vector/ Link State Routing algorithm.
10. Simulation of an error correction code (like CRC)

**Practical : 30 Hours  
Total : 75 Hours**

### **Course Outcomes:**

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

- CO 1: Explain the basic layers and its functions in computer networks.
- CO 2: Understand the basics of how data flows from one node to another.
- CO 3: Analyze routing algorithms.
- CO 4: Describe protocols for various functions in the network.
- CO 5: Analyze the working of various application layer protocols.

### **Text Books:**

1. James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Eighth Edition, Pearson Education, 2021.
2. Behrouz A. Forouzan, “Data Communications and Networking with TCP/IP Protocol Suite”, Sixth Edition TMH, 2022

### **Reference Books:**

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, “Computer and Communication Networks”, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill, 2012.

**Web References:**

1. <https://www.enggtree.com/wp-content/uploads/2023/12/CS3591-Computer-Networks-Lecture-Notes-1.pdf?x53111>
2. [https://stannescet.ac.in/cms/staff/qbank/CSE/Notes/CS8591-COMPUTER%20NETWORKS- 1593855642-CS8591%20CN.pdf.](https://stannescet.ac.in/cms/staff/qbank/CSE/Notes/CS8591-COMPUTER%20NETWORKS- 1593855642-CS8591%20CN.pdf)

**24AD403**

**MACHINE LEARNING**

**L T P C**

**3 0 0 3**

**Course Objectives:**

- To understand the basic concepts of machine learning and probability theory.
- To appreciate supervised learning and their applications.
- To understand unsupervised learning like clustering and EM algorithms.
- To get practical knowledge on implementing machine learning algorithms in real time problem.
- To learn other learning aspects such as reinforcement learning, neural networks and other technologies.

**Unit I - INTRODUCTION**

**9**

Introduction: Basic definitions and Concepts, Machine Learning Types of Machine Learning-Machine Learning Process- Supervised Learning Unsupervised Learning-Reinforcement Learning, hypothesis space and inductive bias, evaluation, cross-validation-Weight Space Testing.

**Unit – II SUPERVISED LEARNING**

**9**

Linear and Non Linear Regression, Multivariate Regression, Logistic Regression, Subset Selection, Shrinkage Methods, Principal Component, Regression, Partial Least squares - Linear Classification, Linear Discriminant Analysis - Perceptron, Discriminant Functions Probabilistic Generative and Discriminative Models Laplace Approximation Bayesian Logistic Regression Common Classification Algorithms k-Nearest Neighbors Decision Trees Random Forest model Support Vector Machines.

**Unit III – UNSUPERVISED LEARNING**

**9**

Mixture Models and EM K-Means Clustering Spectral Clustering Hierarchical Clustering The Curse of Dimensionality Dimensionality Reduction Principal Component Analysis Latent Variable Models (LVM) Latent Dirichlet Allocation (LDA).

**Unit IV - GRAPHICAL MODELS**

**9**

Artificial Neural Networks-Gradient Boosting, Random Forests, Multi-class Classification, Naive Bayes, Bayesian Networks, Undirected Graphical Models, HMM, Variable Elimination, Belief Propagation- Conditional Independence Markov Random Fields Learning Naive Bayes Classifiers Markov Model Hidden Markov Model.

Ethical Considerations in AI: Fairness, Bias, and Bias Mitigation, Transparency and Explainability in AI Systems, Sustainability in AI: Energy Efficiency and Environmental Impact, AI in Healthcare: Disease Diagnosis and Drug Discovery, AI-Driven Predictive Analytics in Various Domains, Autonomous Systems: Challenges and Ethical Implications, Predictive Maintenance in Industries, AI in Education: Automated Grading and Personalized Learning.

**Theory: 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Describe the fundamental concepts, types, and processes of Machine Learning.
- CO2: Explain different supervised and unsupervised learning techniques and their applications.
- CO3: Apply regression and classification algorithms to real-world datasets.
- CO4: Implement clustering and dimensionality reduction techniques for data analysis.
- CO5: Identify ethical concerns and sustainability challenges in AI and Machine Learning applications.

**Text Books:**

1. Mathematical Foundations of Machine Learning: Unveiling the Mathematical Essence of Machine Learning (2024 Guide for Beginners) Paperback – Import, 2 March 2024 by David MacKay.

**Reference Books:**

1. Christopher Bishop, —Pattern Recognition and Machine Learning, Springer, 2011.
2. Kevin P. Murphy, —Machine Learning: A Probabilistic Perspective, MIT Press, 2012.
3. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, CRC Press, 2014.
4. Tom Mitchell, —Machine Learning, McGraw-Hill, 2017.

## **Course Objective:**

- To study the fundamental programming aspects of python.
  - To learn about various packages used for data analysis.

## **Unit I      BASICS OF PYTHON**

10

Introduction – Setting working directory – Creating and saving, File execution, clearing console, removing variables from environment, clearing environment – variable creation – Operators – Data types and its associated operations – sequence data types – conditions and branching – Functions-Virtual Environments.

## **Unit II      PYTHON DATA STRUCTURES, PACKAGES**

10

List – Tuples- Set – Dictionary – Its associated functions - File handling - Modes– Reading an dwriting files - Introduction to Pandas – Series – Data frame – Indexing and loading – Data manipulation – Merging – Group by – Scales – Pivot table – Date and time.

## **Unit III PACKAGES FOR DATA ANALYSIS**

10

Numpy – 1D and 2D numpy – Associated operations – Broadcasting - Linear algebra and related operations – Indexing and other operations – Matplotlib – scatterplot – line plot – bar plot – histogram – box plot – pair plot – Case study on regression and classification.

## Theory : 30 Hours

### **List of Experiments:**

1. Programs using Control and conditional structures.
  2. Programs using functions.
  3. Python program to demonstrate list, tuples, set and dictionary.
  4. Program to work with Pandas series and Data frame.
  5. Program for Merging and Aggregation in Pandas Library
  6. Program in Python to Manipulate, Aggregate and Analyze data using Numpy
  7. Program in Python to perform statistical analysis on Data
  8. Python program to create various plots.
  9. Develop an application to analyze Stock Market Data using Python tools.
  10. Mini Project

**Practical : 60 Hours**

**Total : 90 Hours**

### **Course Outcomes:**

CO1: Describe the fundamentals of Python programming, including data structures, file handling, and scripting environments.

CO2: Apply data processing techniques using Pandas and NumPy for data manipulation, transformation, and analysis.

CO3: Explain different optimization techniques and regression models used in data science.

CO4: Apply classification and clustering techniques such as Logistic Regression, kNN, and k-Means for data-driven decision-making.

CO5: Interpret data visualizations and perform exploratory data analysis (EDA) to identify patterns and trends.

### **Text Books:**

1. Alex Campbell , “Python for Data Science: Clear and Complete Guide to Data Science and Analysis with Python”, Feb 202
2. William McKinney , “Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython ”,2nd Edition, O’Reilly, 2017.

### **Reference Books:**

1. John Paul Mueller and Luca Massaron , “Python for Data Science For Dummies”, 2nd Edition,
2. Jake VanderPlas ,“Python Data Science Handbook: Essential Tools for Working with Data” , O’Reilly Publication,

### **Web References:**

1. <https://www.udacity.com/course/programming-for-data-science-nanodegree--nd104>
2. <https://www.udemy.com/course/complete-data-science-training-with-python-for-data-analysis/>
3. <https://in.coursera.org/professional-certificates/ibm-data-science>.

**24CS407**

**WEB PROGRAMMING III**

**L T P C**

**0 0 2 1**

**Course Objectives:**

- Learn advanced Node.js and Express.js concepts.
- Integrate MongoDB with web applications.
- Implement security and authentication in web applications.
- Deploy applications on cloud platforms.

**Lab Experiments:**

1. Introduction to Node.js & Express.js.
2. REST API with Express.js.
3. MongoDB Integration with Node.js.
4. User Authentication System in Node.js.
5. File Upload & Management.
6. Real-Time Chat Application.
7. Role-Based Access Control (RBAC).
8. Caching with Redis in Node.js.
9. Deploying Node.js & MongoDB Application.
10. Full Stack Mini Project.

**Total : 30 Hours**

**Course Outcomes:**

- CO1: Understand backend development with Node.js & Express.js.  
CO2: Develop REST APIs with MongoDB integration.  
CO3: Build real-time applications using WebSockets.  
CO4: Optimize web apps using Redis caching.  
CO5: Deploy full-stack applications on cloud platforms.

**24MC805**

**INDIAN CONSTITUTION**

**L T P C**

**3 0 0 0**

**Course Objectives:**

- To know about Indian constitution.
- To know about central government and state government functionalities in India.
- To know about Indian society

**Unit - I INTRODUCTION**

**9**

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

**Unit – II STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT**

**9**

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

**Unit - III STRUCTURE AND FUNCTION OF STATE GOVERNMENT**

**9**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

**Unit - IV CONSTITUTION FUCTIONS**

**9**

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

**Unit - V INDIAN SOCIETY**

**9**

Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

**Total : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Understand the functions of the Indian government.
- CO2: Describe and abide the rules of the Indian constitution
- CO3: Appraise and appreciate different culture among the people.
- CO4: Illustrate the functions of constitution
- CO5: Express the nature of Indian Society and Citizens

**Text Books:**

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.2016.
2. 2 Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.2015.

**Reference Books:**

1. Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.2017.
2. U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar.2013.
3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.2015.

**24AD405**

**MACHINE LEARNING LABORATORY**

**L T P C**

**0 0 4 2**

### **Course Objectives:**

- To understand the basic concepts of machine learning and probability theory.
- To appreciate supervised learning and their applications.
- To understand unsupervised learning like clustering and EM algorithms.
- To get practical knowledge on implementing machine learning algorithms in real time problem.
- To learn other learning aspects such as reinforcement learning, neural networks and other technologies.

### **Lab Experiments:**

1. Implement the concept of decision trees with suitable data set from real world problem and classify the data set to produce new sample.
2. Implement Dimensionality reduction using Principle component Analysis method on a suitable dataset.
3. Implement Simple Linear Regression using sklearn and plot the confusion matrix.
4. Implement Logistic Regression for binary classification for a suitable dataset and evaluate its performance.
5. Classify the medical data into two categories using Support Vector Machine.
6. Implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7. Facial recognition application with artificial neural network.
8. Implement the K-Nearest Neighbors (K-NN) algorithm for classification and evaluate its performance using real time dataset.
9. Sentiment analysis using random forest optimization algorithm.
10. Implement k-means clustering for a real time dataset.
11. Construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of patients using standard Data Set.
12. Cluster Customers based on their spending behavior using Hierarchical Clustering with the suitable Dataset
13. Implement suitable Machine learning algorithm for online fraud detection.
14. Mini-project

**Practical: 60 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

CO1: Apply supervised learning techniques to real-world datasets and practical problems.

CO2: Relate ethical concerns in unsupervised learning, including bias and privacy considerations.

CO3: Discover the importance of domain knowledge in feature engineering.

CO4: Apply graphical models to real-world datasets and solve practical problems by modeling dependencies and making predictions.

CO5: Implement Q-learning and TD learning algorithms to learn value functions and optimal policies in environments with unknown dynamics.

**24NCC04**

**COMMUNITY DEVELOPMENT AND AVIATION  
NAVIGATION**

**L T P C**  
**1 0 0 1**

**Course Objectives:**

1. To learn about various rural development programs and their impact on community upliftment.
2. To understand the concept of social security and its role in ensuring the well-being of individuals and communities.
3. To recognize the significance of mobile security and best practices to protect personal data and devices.
4. To explore the use of maps in aviation and the importance of aviation medicine in maintaining the health.
5. To understand the importance of meteorology in aviation and explore the structure of the atmosphere.

**Unit - I SOCIAL SERVICES CAPSULE 3**

Basics of social services and its need – Rural development programs – NGOs in social services – Contribution of youth – Role of NCC – Swachh Bharat Abhiyan.

**Unit - II SOCIAL SERVICES AND COMMUNITY DEVELOPMENT 3**

Introduction – Social security – Social evils – Beti Bachao-Beti Padhao – Mission Indradhanush – Digital India – Protection of children – Women safety.

**Unit - III SAFETY AND SECURITY 3**

Road and Rail travel safety – New initiatives – Cyber security – Mobile security

**Unit - IV NAVIGATION AND AVIATION MEDICINE 3**

Introduction to navigation – Requirement of navigation – Importance in aviation – Lines on earth – Maps – Introduction to aviation medicine – Hypoxia – Hyperventilation – Ear block – Flying fatigue.

**Unit - V METEOROLOGY AND ATMOSPHERE 3**

Introduction to meteorology – Importance of meteorology in aviation – Composition of air – Atmosphere – Layers of atmosphere – Clouds and its classification – Precipitation and its types.

**Total : 15 Hours**

**Course Outcomes:**

CO1: Remember the fundamental concepts of social service and community engagement.

CO2: Understand the key concepts related to social security, social evils and government welfare programs.

CO3: Remember the fundamental principles of road and rail travel safety, cyber security and mobile security.

CO4: Understand the fundamental concepts of navigation and significance of aviation medicine.

CO5: Understand the fundamental concepts of meteorology and the structure of the atmosphere.

**Text Books :**

1. NCC cadet Handbook Common Subject SD/SW.
2. NCC cadet Handbook (Air Force) Specialised Subject SD/SW.
3. ANO Handbook (SD/SW) by DG NCC, Ministry of Defence, New Delhi.

**Reference :**

1. Digital Forum App 1.0 & 2.0, by DG NCC DG NCC, Ministry of Defence, New Delhi.

**Course Objectives:**

- To introduce fundamental concepts of software engineering, including software processes and project management.
- To understand various software development methodologies, including agile and extreme programming.
- To develop skills in requirements analysis, specification, and documentation using structured techniques.
- To familiarize students with software design principles, architectural styles, and user interface design.
- To explore software testing techniques, including black-box and white-box testing, and understand software implementation best practices.

**Unit I - SOFTWARE PROCESS AND PROJECT MANAGEMENT**

9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models .Introduction to Agility-Agile process-Extreme programming-XP Process.

**Unit – II REQUIREMENTS ANALYSIS AND SPECIFICATION**

9

Software Requirements:Functional and Non-Functional, User requirements, System requirements, Software Requirements Document –Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management- Classical-analysis: Structured system Analysis, Petri Nets-Data Dictionary. .

**Unit III – SOFTWARE DESIGN**

9

Design process –Design Concepts-Design Model–Design Heuristic –Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow-User interface Design: Interface analysis, Interface Design –Component level-design: Designing Class based components, traditional Components.

**Unit IV - TESTING AND IMPLEMENTATION**

9

Software testing fundamentals-Internal and external views of Testing-white box testing-basis path testing-control structure testing-black box testing-Regression Testing –Unit Testing – Integration Testing –Validation Testing –System Testing And Debugging –Software Implementation-techniques: Coding practices-ING.

Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

**Theory: 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Explain fundamental software engineering principles and methodologies
- CO2: Apply software development life cycle (SDLC) models in real-world projects
- CO3: Design and develop software using structured and object-oriented techniques
- CO4: Implement software testing, validation, and verification strategies
- CO5: Identify and manage risks in software development and maintenance

**Text Books:**

- 1.Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 2005
- 2. Ian Sommerville, “Software engineering”, Seventh Edition, Pearson Education Asia, 2007.

**Reference Books:**

- 1.Rajib Mall, —Fundamentals of Software Engineering, Third Edition, PHI Learning PrivateLimited, 2009.
- 2. PankajJalote, —Software Engineering, A Precise Approach, Wiley India, 2010.
- 3. Kelkar S.A., —Software Engineering, Prentice Hall of India Pvt Ltd, 2007.
- 4. Stephen R.Schach, —Software Engineering, Tata McGraw-Hill Publishing Company Limited,2007.

**Course Objectives:**

- To understand the basics of security and security services.
- To explain authentication, key management, and cryptographic techniques.
- To apply public-key cryptography for secure communication.
- To learn network security attacks and defence mechanisms.
- To implement security solutions using firewalls, VPNs, and secure protocols.

**Unit I - FUNDAMENTALS OF NETWORKING SECURITY****9**

Overview of networking security- Security Services -Confidentiality, Authentication, Integrity, Nonrepudiation, access Control – Availability and Mechanisms- Security Attacks -Interruption, Interception, Modification and Fabrication.

**Unit – II AUTHENTICATION AND SECURITY****9**

Authentication overview – Authentication protocols – Authentication and key establishment – key exchange – mediated key exchange – User Authentication – password-based authentication password security – Certificate Authority and key management – digital signatures – digital Certificates.

**Unit III – PUBLIC-KEY CRYPTOGRAPHY AND MESSAGE AUTHENTICATION****9**

Basics of cryptography -cryptographic hash functions – symmetric and public-key encryption public key cryptography principles & algorithms – cipher block modes of operation – Secure Hash Functions – HMAC

**Unit IV - SECURITY ATTACKS****9**

Buffer overflow attacks & format string vulnerabilities – Denial-of-Service Attacks -Hijacking attacks: exploits and defenses – Internet worms – viruses – spyware –phishing – botnets – TCP session hijacking – ARP attacks – route table modification – UDP hijacking – man-in-the-middle attacks.

**Unit V- IP SECURITY AND WEB SECURITY****9**

Network defense tools: Firewalls, VPNs, Intrusion Detection, and filters – Email privacy: Pretty Good Privacy (PGP) and S/MIME – Network security protocols in practice- Introduction to Wireshark – SSL – IPsec, and IKE -DNS security- Secure Socket Layer (SSL) and Transport Layer Security (TLS) – Secure Electronic Transaction (SET).

**Total : 45 Hours**

**Course Outcomes:****Upon completion of the course, the students will be able to**

- CO1: Explain network security concepts and security attacks.
- CO2: Understand authentication methods and key management.
- CO3: Apply cryptographic techniques for secure communication.
- CO4: Identify security threats and vulnerabilities.
- CO5: Use security tools like firewalls, VPNs, and encryption protocols.

**Text Books:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education 6<sup>th</sup> Edition, 2021.
2. Cryptography and Network Security: Principles and Practice by William Stallings: Pearson Education Limited, Edition: 8<sup>th</sup>, 2022

**Reference Books:**

1. Principles of Information Security by Michael E. Whitman and Herbert J. Mattord, Publisher: Cengage Learning, Edition: 7<sup>th</sup>, 2021.
2. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
3. A look back at Security Problems in the TCP/IP Protocol Suite, S. Bellovin, ACSAC 2004.

**Web References:**

1. <https://www.geeksforgeeks.org/network-security/>
2. <https://www.fortinet.com/resources/cyberglossary/what-is-network-security>
3. <https://www.coursera.org/learn/network-security>

**24EC418**

**IOT AND EMBEDDED SYSTEMS**

**L T P C**

**2 0 2 3**

**Course Objectives:**

- To introduce the architecture of embedded system and interfacing.
- To introduce-evolution of the Internet of Things (IoT) and interfacing I/O devices to the processor.
- To introduce the Arduino/Raspberry Pi/IOT application.
- To develop embedded application using Arduino/Raspberry Pi.
- To apply the concept of Internet of Things in real world scenario.

**Unit I - EMBEDDED PROCESSOR 10**

Fundamental Components of Embedded Systems - Architecture of Embedded Systems - Embedded Design Life Cycle - Development Environment - Validation - Host and Target Testing - Debugging tool, Memory And I/O Devices Interfacing.

**Unit – II INTRODUCTION TO IOT AND COMMUNICATION PROTOCOLS 10**

Introduction to IoT–Definition, Characteristics, functional requirements, motivation, Physical design-things in IoT, IoT protocols, Logical Design functional blocks. IoT Communication Models and APIs – IoT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules.

**Unit III – ARDUINO PROGRAMMING AND IOT APPLICATION 10**

Introduction to Arduino – Types of Arduino– Pins – Input/Output. Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino. Open Platform (like Raspberry Pi) – Architecture – Programming – Interfacing – Accessing GPIO Pins.IOT Application: Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare.

**Theory: 30 Hours**

## **List of experiments:**

1. Write Basic and arithmetic Programs Using Embedded C
2. ARM evaluation system
3. Interfacing real time clock and serial port.
4. Introduction to Arduino platform and programming
5. Explore different communication methods with IoT devices (Zigbee, GSM, Bluetooth)
6. Introduction to Raspberry PI platform and python programming
7. Interfacing sensors with Raspberry PI
8. Communicate between Arduino and Raspberry PI using any wireless medium
9. Log Data using Raspberry PI and upload to the cloud platform
10. Design an IOT based system.

**Practical : 30 Hours**  
**Total : 60 Hours**

## **Course Outcomes:**

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

- CO1: Describe the Architecture of embedded system and I/O device interfacing.
- CO2: Discuss fundamental concept of IOT and Communication Protocols.
- CO3: Interpret the fundamental concept of Arduino/Raspberry Pi /open platform.
- CO4: Develop embedded application using Arduino/Raspberry Pi
- CO5: Design and develop complete IoT application in real world scenario.

## **Text Books:**

1. Muhammed Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, Second Edition, 2014.
2. Marilyn Wolf, —Computers as Components - Principles of Embedded Computing System Design, Third Edition —Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.
3. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017.

## **Reference Books:**

1. Michael J. Pont, “Embedded C”, Pearson Education, 2007.
2. Wayne Wolf, “Computers as Components: Principles of Embedded Computer System Design”, Elsevier, 2006.
3. Andrew N Sloss, D. Symes, C. Wright, “Arm System Developer's Guide”, Morgan Kauffman/ Elsevier, 2006.
4. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015.

**24CS409**

**WEB PROGRAMMING IV**

**L T P C**

**0 0 2 1**

**Course Objectives:**

- Learn full-stack development using the MERN stack.
- Implement authentication and security in web applications.
- Build and deploy scalable applications.

**Lab Experiments:**

1. Introduction to MERN Stack.
2. Building REST APIs with Express.js & MongoDB.
3. Building the Frontend with React.
4. User Authentication with JWT.
5. Form Validation & Error Handling in React.
6. Connecting Frontend with Backend (Full-Stack Application).
7. Real-Time Web Application using WebSockets.
8. Integrating MongoDB with React for Data Display.
9. Advanced Data Operations with MongoDB.
10. Deployment of MERN Application on Cloud.

**Total : 30 Hours**

**Course Outcomes:**

- CO1: Understand MERN stack components.  
CO2: Develop RESTful APIs with Express.js and MongoDB.  
CO3: Integrate frontend React application with backend Node.js.  
CO4: Implement secure JWT authentication in MERN apps.  
CO5: Build real-time applications using WebSockets.

**Course Objectives:**

- To develop an ability, enthusiasm critical thinking in research process, design and research issues
- To develop the Fundamental concepts of Research & their applications in different areas of the business
- To study various types of research, data, its respective research design, sample design and data analysis techniques
- To develop an ability and understanding of Research Methodology for use in designing and conducting business research
- To develop an inclination towards business research and its application in the corporate world.

**Unit - I INTRODUCTION TO RESEARCH 9**

Definition, Meaning, Importance types and Qualities of Research, Research applications in functional areas of Business, Emerging trends in research. Research & the Scientific Method: Characteristics of scientific method. Steps in Research Process Concept of Scientific Enquiry: – Formulation of Research Problem – Management Question – research Question – Investigation Question.

**Unit – II RESEARCH DESIGN 9**

Concept, Features of a good research design, Use of a good research design Qualitative and Quantitative research approaches, Comparison – Pros and Cons of both approaches. Research Designs: Concept, types and uses. Concept of Cross-sectional and Longitudinal Research. Experimental Design: Concept of Causal relationships, Concept of Independent & Dependent variables, extraneous variable, Treatment and Control group.

**Unit III – SCALING & MEASUREMENT TECHNIQUES 9**

Concept of Measurement: Need of Measurement: Problems in measurement in management research. Validity and Reliability. Levels of measurement – Nominal, Ordinal, Interval, Ratio. Concept of Scaling Rating Scales viz. Likert Scales, Semantic Differential Scales, Constant Sum Scales, Graphic Rating Scales – Ranking Scales – Paired comparison & Forced Ranking – Concept and Application - Content Analysis, Validity and Reliability Test.

**Unit IV - SAMPLING AND SAMPLING DISTRIBUTIONS**

9

Basic Concepts: Defining the Universe, Concepts of Statistical Population, Sample, Characteristics of a good sample, Sampling errors, Non-Sampling errors, Methods to reduce the errors, Sample Size constraints, Non Response. Types of Sampling. Determining size of the sample – Questionnaire Construction.

**Unit V - DATA ANALYSIS AND REPORT WRITING**

9

Editing, Coding, Tabular representation of data, Graphical Representation of Data. Descriptive Statistics and Probability: Measures of Central Tendency, Dispersion, Skewness & Kurtosis. Probability Distribution and Sampling: - Normal Sampling Distribution, Statistical Estimation. Report writing - Contents of report –need of executive summary - contents of chapter– Appendix and Bibliography.

**Total: 45 Hours****Course Outcomes:**

CO1: Understand knowledge on fundamental principles and concepts of Research Methodology.

CO2: Describe the various Research techniques and data analysis tools to identify and solve research problem.

CO3 Apply the knowledge in Research Methodology to design different research projects.

CO4: Evaluate and judge the performance of the different research methodology and data analysis technique.

CO5: Identify the necessity of Research in various stages of the business

**Text Books:**

1. Donald R. Cooper, Pamela S. Schindler and J K Sharma, Business Research methods, 11th Edition, Tata Mc Graw Hill, New Delhi, 2012.
2. Alan Bryman and Emma Bell, Business Research methods, 3rd Edition, Oxford Alan Bryman and Emma Bell, Business Research methods, 3rd Edition, Oxford

**Reference Books:**

1. Uma Sekaran and Roger Bougie, Research methods for Business, 5th Edition, Wiley
2. William G Zikmund, Barry J Babin, Jon C.Carr, Atanu Adhikari,Mitch Griffin, Business Research methods, A South Asian Perspective, 8th Edition, Cengage Learning, New Delhi.