SANT GADGE BABA AMRAVATI UNIVERSITY GAZETTE

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PART- TWO

(Extra-Ordinary)

Wednesday, the 1st January, 2025

NOTIFICATION

No. 01 /2025 Date : 01 /01 /2025

Subject: Implementation of new Syllabus of Semester I & II of the new Course Five Years Integrated Master in Computer Application as per NEP-2020 norms.

It is notified for general information of all concerned that the authorities of the University have accepted to implement the new Syllabus of Semester I & II of the new Course Five Years Integrated Master in Computer Application as per NEP-2020 norms to be implemented from the academic session 2024-2025 onwards as given below:

Sd/-
(Dr.Avinash Asanare)
Registrar
Sant Gadge Baba Amravati University

SEMESTER I

1IMC101 COMPUTER FUNDAMENTAL

Course Objectives:

1. Fundamental Understanding of Computers
2. Comprehension of Operating Systems
3. Proficiency in Productivity Tools
4. Knowledge of Modern Communication
5. Grasp of Networking Concepts
6. Exploration of AI Tools

Course Outcomes:

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

1. Acquire comprehensive knowledge of computer systems.
2. Understand system software and utility programs.
3. Apply document processing and presentation tools effectively.
4. Utilize modern communication techniques efficiently.
5. Develop fundamental networking skills.
6. Explore and implement AI tools for practical applications.

Unit I: Introduction to Computers (7 hours)

Introduction, Characteristics of computer, Evolution of Computer, Block Diagram of a computer, Generations of Computer, Classification of Computers, Applications of Computer, Input and Output units. Role of I/O devices in a computer system.

Unit II: Operating System (7 hours)

Concept of operating system, Functions and types of operating system, Measuring System Performance, Assemblers, Compilers and Interpreters**.** Windows, Feature, Types and Elements, Operating system simple setting (Date and Time, Control panel)

Unit III: Introduction to MS-WORD, Power Point and MS EXCEL (8 hours)

Introduction to MS –WORD, Screen Element and Create New Document, editing Documents, working with Tables: Create table, insert and Delete rows and column Using shapes, Graphics, Text box, word art, Clip art, Hyperlink, Concept and Applications of Power Point, Basics of Power Point: Screen Content, procedure to Create Slides with different layout, Opening and Saving Presentation. Basics of Excel: Interface and Worksheet Layout, Creating, Saving, and Opening Workbooks, working with Cells: Data Entry, Editing, and Formatting, Using Formulas and Functions: SUM, AVERAGE, COUNT, Creating and Formatting Charts: Pie, Bar, Line Graphs

Unit IV: Modern Communication (7 hours)

Communication Process, Data Transmission speed, Communication Types (modes), Data Transmission Medias, Modem and its working, characteristics, Communication: Fax, Voice Mail, Information Services, E-mail, Group Communication: Tele Conferencing and Video Conferencing.

Unit V: Network: Concept and Functions (8 hours)

Introduction to Computer Networks, Types of Networks: LAN, WAN, MAN, Topology: Star, Bus, Ring, Mesh, and Hybrid, Network devices: Routers, switches, hubs, and modems. Transmission media: Wired (coaxial cable, twisted pair, fiber optics) and wireless (Wi-Fi, Bluetooth).

Unit VI: Interaction to AI tools (8 hours)

Introduction to AI Tools, Overview of Artificial Intelligence and its applications in various fields, Text-Based AI Tools, Image and Design AI Tools, Ethics and Best Practices in AI.

Text Books:

1. Computer Fundamentals by P.K. Sinha and Priti Sinha
2. Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne
3. An Introduction to Computer Networks by Peter Dordal (Open Textbook)
4. Artificial Intelligence: A Guide to Intelligent Systems by Michael Negnevitsky

Reference Books:

1. "Fundamentals of Computers" by V. Rajaraman
2. Modern Operating Systems" by Andrew S. Tanenbaum
3. "Microsoft Office 365 All-in-One For Dummies" by Peter Weverka
4. Computer Networks" by Andrew S. Tanenbaum
5. Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth

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1IMC102 - C PROGRAMMING

Objective of the Course:

The primary objective of this course is to:

1. Develop Problem-Solving Skills
2. Learn Algorithmic Thinking
3. Handle Data Effectively
4. Understand File Handling and Memory Management
5. Enhance Debugging and Testing Skills
6. Apply Knowledge to Real-World Problems

Course Outcomes (CO)

After completing the course, students will be able to:

1. Recall the basic syntax, semantics, and constructs of the C programming language.
2. Explain the process of developing algorithms and flowcharts to solve computational problems.
3. Implement fundamental programming concepts in C to solve real-world problems.
4. Examine the use of arrays, pointers, and functions for modular programming.
5. Assess the effectiveness of file handling and dynamic memory allocation techniques in solving complex problems.
6. Develop and debug C programs to manage structured and unstructured data efficiently.

Unit I: Fundamentals of C Programming (7 hours)

- **Problem-Solving Techniques:** Algorithms, Flowcharts, Pseudo-codes.
- **Basics of C Language**: History, Structure of a C program, Syntax, Data types, Variables, Constants.
- **Input and Output Functions**: scanf, printf, character input/output (getchar, putchar).
- **Operators and Expressions**: Arithmetic, Relational, Logical, Bitwise, Assignment operators, Precedence, and Associativity.

Unit II: Control Structures and Arrays (7 hours)

- **Control Statements**:
  - Conditional: if, if-else, nested if else, switch-case.
  - Iterative: for, while, do-while.
  - Jump: break, continue, goto.
- **Arrays**:
  - Single-dimensional arrays: Declaration, Initialization, Accessing elements.
  - Multi-dimensional arrays: Matrix operations.

Unit III: Functions, Recursion, and Strings (8 hours)

- **Functions**:
  - User-defined and library functions.
  - Function arguments, Return types, Scope of variables.
  - Call by value and Call by reference.
- **Recursion**:
  - Concept and examples (e.g., Factorial, Fibonacci series).
- **Strings**:
  - String manipulation functions: strlen, strcpy, strcat, strcmp.
  - String handling techniques.

Unit IV: Pointers and File Handling (7 hours)

- **Pointers**:
  - Basics, Pointer arithmetic, Pointers to arrays and strings.
  - Dynamic memory allocation: malloc, calloc, free, realloc.

Unit V: File Handling: (7 hours)

- File operations: Opening, Closing, Reading, Writing.
- Modes of file access: Text and Binary.
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Unit VI: Structures, Unions, and Advanced Concepts (8 hours)

- **Structures and Unions**:
  - Defining, Declaring, and Accessing members.
  - Nested structures, Arrays of structures.
  - Difference between structures and unions.
- **Advanced Topics**:
  - Enumerations (enum), Typedef.
  - Command-line arguments.
  - Error handling in C.

Text Books:

1. The C Programming Language Authors**:** Brian W. Kernighan, Dennis M. Ritchie
2. Let Us C Author**:** Yashavant Kanetkar
3. Programming in ANSI C Author**:** E. Balagurusamy**.**

Reference Books:

1. C: The Complete Reference Author: Herbert Schildt
2. Problem Solving and Program Design in C Authors: Jeri R. Hanly, Elliot B. Koffman
3. Head First C Authors: David Griffiths, Dawn Griffiths.

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1IMC103 - WEB DEVELOPMENT

Course Objectives:

1. Understand web design principles and practices.
2. Learn tools, technologies, and frameworks for web development.
3. Build and style web pages using HTML, CSS, and JavaScript.
4. Explore Word Press for content management and site creation.
5. Design responsive websites and deploy on local/remote servers.

Course Outcomes:

After completion of this course Students will be able to

1. Recall fundamental web design principles, standards, and terminology.
2. Explain the structure and purpose of HTML, CSS, and JavaScript in web development.
3. Develop basic web pages using HTML, CSS, and JavaScript.
4. Examine the effectiveness of responsive designs and interactive features in enhancing user experience.
5. Assess the compatibility and performance of websites across different platforms and devices.
6. Deploy fully functional websites on local and hosting platforms, integrating design and interactivity.

Unit I: Introduction to Web Design: (7 hours)

History and Evolution of the Web, Basics of Web Design and Development, Web Standards (W3C), Introduction to Client-Side vs. Server-Side Scripting, Overview of Tools and Technologies (Browsers, Editors, Frameworks), Basic Web Project Structure.

Unit II: HTML Fundamentals: (7 hours)

Introduction to Web Design: Definition and importance of web designing, Components of a website: frontend, backend, and hosting, Web design principles: aesthetics, usability, accessibility, and responsive design.

HTML Basics: Introduction to HTML, document structure, and syntax., Tags: <html>, <head>, <title>, <body>, <p>, <a>, <img>, <br>, and <hr>, Creating tables, lists (ordered, unordered, nested), and forms (text fields, buttons, checkboxes, dropdowns).

Unit III: CSS for styling: (7 hours)
Introduction to CSS: Role of CSS in web design., CSS types: Inline, Internal, and External, Basic CSS syntax and structure. Selectors and Properties: Selectors: Universal, Class, ID, Group, Child., Text styling: fonts, sizes, alignment, colors., Box model: margins, borders, padding, and height/width., Backgrounds and positioning.

Unit IV: JavaScript and Interactivity: (8 hours)
JavaScript Basics: Syntax, Variables, and Data Types, DOM Manipulation and Events, Functions, Loops, and Conditional Statements, Form Validation Techniques.

Unit V: Word Press Basics: (7 hours)
Introduction to Word Press: Overview of Content Management Systems (CMS), Installing Word Press on local and web servers, Word Press dashboard overview.
Themes and Templates: Theme installation, activation, and customization., Template hierarchy and structure., Adding content: Pages, posts, categories, and tags.

Unit VI: Responsive Web Design and Deployment (8 hours)
Paradigms of a responsive website, Concept of Homepage, About, Contact Us, and a blog section, steps to deploy project on a local server or hosting platform.

Text Books:

1. HTML and CSS: Design and Build Websites Author: Jon Duckett
2. JavaScript and JQuery: Interactive Front-End Web Development Author: Jon Duckett
3. Responsive Web Design with HTML5 and CSS Author: Ben Frain
4. Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics Author: Jennifer Robbins
5. WordPress for Beginners Author: Dr. Andy Williams

Reference Books:

1. CSS: The Definitive Guide Author: Eric A. Meyer and Estelle Weyl
2. JavaScript: The Good Parts Author: Douglas Crockford
3. Web Development with WordPress Author: Stephanie Leary

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1IMC104- STATISTICS FOR DATA SCIENCE-I

Course Objectives:

1. To introduce matrices, statistics, and their applications in data science.
2. To develop skills in organizing and analyzing data using statistical methods.
3. To teach diagrammatic and graphical techniques for data visualization.
4. To understand measures of central tendency for statistical analysis.
5. To explore permutations and combinations for solving data problems.

Course Outcomes

Upon completing this course, students will be able to:

1. Understand matrices, their operations, and applications in data science.
2. Apply statistical methods for data classification and analysis.
3. Create and interpret visual data representations.
4. Compute and compare measures of central tendency.
5. Solve problems using permutations and combinations in data analysis.

This structure ensures clarity in the objectives and outcomes while aligning with the syllabus content.

Unit I: Introduction to Matrices: (8 Hours)
Introduction to Matrices: Definition, Representation, and Types of Matrices, Algebra of Matrices, Addition, Subtraction, and Scalar Multiplication: Transpose of a Matrix, Matrix Multiplication, Applications Matrix Operations, Inverse of a Matrix (Adjoint Method)

Unit II: Introduction to Statistics: (7 Hours)
Introduction to Statistics: Definition, scope, and significance of statistics in data analysis, data Science, Applications in various fields, challenges, and limitations. Statistical Investigation: Concept, objectives, and process of statistical investigation. Sources of Data: Overview of primary and secondary data sources with examples. Techniques of Data Collection: Primary data collection methods (surveys, interviews), secondary data collection methods (reports, publications).

Unit III: Classification and Tabulation of Data: (7 Hours)
Classification of Data: Approaches to organizing data into meaningful categories for analysis. Statistical Series: Preparation of statistical series and its types, Individual, Discrete and Continuous . Sampling Methods: Definition, types, and significance of sampling; random and non-random sampling. Tabulation of Data: Methods for organizing data in tabular formats.

Unit IV: Diagrammatic and Graphical Representation: (7 Hours)
Diagrammatic Representation: Introduction, significance, and general rules for constructing diagrams. Bar diagrams, Pie charts, Graphical Representation: Introduction, features, and rules for constructing graphs. Histogram Frequency polygon Ogive curves.

Unit V: Measures of Central Tendency: (8 Hours)

Introduction to Measures of Central Tendency: Definition and significance in statistical analysis.

Mean, Median and Mode in individual, discrete, and continuous series.: Difference between Mean Median and Mode. Geometric Mean and Harmonic Mean.

Unit VI: Permutations and Combinations (8 Hours)

Permutations: Definition, Importance and real-world applications and cryptography factorial Notation Fundamental Counting Principle Permutations. Permutations of distinct objects with simple examples.

Combinations: Definition and formula for combinations. Selection of objects without considering order key principles of combinations. Simple Difference between permutations and combinations, Relation between permutation & combination, with simple examples.

Text Books:

1. Garg, Reena, Engineering Mathematics, Khanna Book Publishing Company, 2024
2. Vasishtha A. R. and Vasishtha A.K., Matrices, Krishna Prakashan, 2022.
3. Manish Sharma, Amit Gupta, The Practice of Business Statistics, Khanna Book Publishing Company, 2010 (AICTE Recommended Text book)
4. Das N. G., Statistical Methods, Combined Edition, Tata McGraw Hill, 2010.

Reference Books:

1. Probability and Statistics with Reliability, Queuing And Computer Science Applications Author Kishore S Trivedi Publish by Wiley
2. Statistical Methods Author S. P. Gupta Publish by Sultan Chand & Sons
3. Fundamentals of Mathematical Statistics Author- S C Gupta; V. K. Kapoor Publish by Sultan Chand & Sons
4. Higher Engineering mathematics by B. S. Grewal Published by Khanna Pub

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1IMC105 - COMPUTER FUNDAMENTAL – Lab.

Course Outcomes:

1. Apply basic computer skills using MS Office tools to create documents, spreadsheets, and presentations.
2. Analyze computer system components, devices, and network topologies through diagrams and categorization.
3. Evaluate the use of online tools and AI design tools for communication and content creation.

Tentative list of experiments (ideas) based on the syllabus:

1. Create a block diagram of a computer system using MS PowerPoint. Label all components and describe their functions in a short paragraph.
2. Identify different input and output devices in your laboratory. Categorize them based on type (input/output) and usage.
3. Perform basic OS tasks in Windows: Set date and time. Customize display settings through the Control Panel.
4. Create a formatted document in MS Word: Add a table with 3 columns and 5 rows. Insert shapes, a WordArt title, and a hyperlink.
5. Develop a PowerPoint presentation (5 slides) on "Generations of Computers": Include different slide layouts. Add an image and a transition effect.
6. Create "Student Data" sheet in MS-Excel, create a table with the following columns:
   Student Name | Subject | Marks1 | Marks2 | Total Marks | Percentage
   Enter data for at least 5 students in the table (choose any names and subjects). Ensure Marks1 and Marks2 values are between 0 and 100.
7. Conduct a mock teleconference using online tools like Zoom, Google Meet, etc.
8. Identify the topology (Star, Bus, or Ring) of your local computer network. Create a diagram representing this topology and describe the advantages.
9. Use Image and Design AI **Tools** to design a poster or banner on "Applications of Artificial Intelligence."
10. Use Text-Based AI Tools to generate a creative paragraph or a small story on a topic like "The future of AI in education."

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1IMC106 - C PROGRAMMING - Lab.

Course Outcomes:

1. Apply basic C programming constructs to develop algorithms, flowcharts, and simple programs using decision-making and loop control.
2. Analyze and manipulate arrays, strings, and functions to solve computational problems and implement modular programming.
3. Evaluate the use of recursion, pointers, memory management, file handling, and structures to optimize program functionality and memory usage.

1: Algorithm Development and Basic C Programming

- **Tasks**:
  1. Write algorithms and flowcharts for computing the factorial of a number and finding the largest of three numbers.
  2. Implement these algorithms using basic C constructs (scanf, printf).

2: Decision-Making and Loop Control

- **Tasks**:
  1. Write a program to check if a number is prime.
  2. Create a menu-driven program for basic calculator operations (Addition, Subtraction, Multiplication, Division).
  3. Implement a program to print a multiplication table using loops.

3: Array Manipulation

- **Tasks**:
  1. Write a program to find the largest, smallest, and average of elements in an array.

4: Functions and Modular Programming

- **Tasks**:
  1. Write a program to calculate the GCD of two numbers using a function.
  2. Implement call by value and call by reference with simple examples.

5: Recursion

- **Tasks**:
  1. Write a recursive program to find the factorial of a number.
  2. Create a recursive program to calculate the nth Fibonacci number.

6: String Manipulation

- **Tasks**:
  1. Write a program to reverse a string without using library functions.
  2. Implement a program to check if a string is a palindrome.
  3. Use string library functions (strlen, strcpy, strcmp) in a program.

7: Pointers and Memory Management

- **Tasks**:
  1. Write a program to demonstrate pointer arithmetic.
  2. Implement a program to create a dynamic array using malloc and perform insertion and deletion operations.
  3. Create a program to swap two numbers using pointers.

8: File Handling

- **Tasks**:
  1. Write a program to create a file and store user data (name, age, marks).
  2. Implement a program to read data from a file and display it in a structured format.
  3. Create a program to append data to an existing file.

9: Structures and Unions

- **Tasks**:
  1. Create a program to store and display information of n students (roll number, name, marks) using a structure.
  2. Write a program to compare the memory usage of structures and unions.
  3. Implement nested structures to store employee details (name, department, salary).

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1IMC107 – WEB DEVELOPMENT LAB.

Course Outcomes

1. Apply web design fundamentals by setting up project environments and creating basic HTML, CSS, and JavaScript structures.
2. Analyze and implement interactive elements, including forms, tables, and dynamic styling using JavaScript and CSS.
3. Evaluate and work with web development tools, including local servers, content management systems (like Word Press), and basic web page functionality.

List of Practicals:

1. Install a code editor (e.g., VS Code) and set up a project folder.
2. Create a basic folder structure for a web project (HTML, CSS, JavaScript directories).
3. Write a simple client-side script using JavaScript to display an alert.
4. Create an HTML document with a title, headings, and paragraphs. Add links (<a>), images (<img>), and line breaks (<br>).
5. Create a table with rows, columns, and headers.
6. Create a form with text fields, checkboxes, radio buttons, dropdowns, and buttons.
7. Write inline, internal, and external CSS to style an HTML page.
8. Apply basic text styling: font family, size, color, and alignment.

9. Create a layout with margins, borders, padding, and specific dimensions, Add a background image and position it using CSS.
10. Write a script to perform basic arithmetic operations.
11. Practice using conditional statements and loops.
12. Create a button that changes the color of a paragraph when clicked.
13. Set up a local server using XAMPP/WAMP.
14. Install WordPress and explore the dashboard.
15. Create pages and posts with categories and tags.

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1IMC108- STATISTICS FOR DATA SCIENCE-I - LAB.

Course Outcomes:

1. To perform fundamental matrix operations and apply them effectively.
2. To analyze and interpret data using statistical tools and methods.
3. To organize data into meaningful formats for further analysis.
4. To create visual representations of data through diagrams and graphs.
5. To compute and compare mean, median, and mode for different datasets.
6. To solve problems using permutations and combinations.

Here's a list of practical lab. exercises based on the syllabus you provided, using Python and Google Colab or any other IDE for data science and data analysis which is as under:

Unit I: Matrices:

1. **Matrix Operations**: Implement matrix addition, subtraction, scalar multiplication, and transpose using NumPy.
2. **Matrix Multiplication**: Demonstrate matrix multiplication using NumPy's dot function.
3. **Inverse of a Matrix**: Compute the inverse of a matrix using the adjoint method and verify using NumPy's linalg.inv.
4. **Symmetric and Skew-Symmetric Matrices**: Write a program to check whether a matrix is symmetric or skew-symmetric.
5. **Determinants**: Calculate the determinant of a matrix and explain its applications (e.g., checking singularity).

Unit II: Statistics:

1. **Data Collection Simulation**: Write Python scripts to simulate data collection from surveys and organize it in pandas DataFrames.
2. **Data Sources Analysis**: Import datasets from online sources (e.g., Kaggle or public APIs) and analyze primary vs. secondary data.
3. **Descriptive Statistics**: Use pandas to compute mean, median, mode, variance, and standard deviation for a dataset.

Unit III: Classification and Tabulation of Data:

1. **Data Classification**: Write Python scripts to classify data into discrete and continuous categories using pandas.
2. **Sampling Techniques**: Implement random and stratified sampling on a dataset using the random module and pandas.
3. **Tabulation**: Create frequency tables and cross-tabulations using pandas and visualize them with seaborn.

Unit IV: Diagrammatic and Graphical Representation:

1. **Bar Diagrams and Pie Charts**: Use matplotlib to create bar diagrams and pie charts for a given dataset.
2. **Histogram and Frequency Polygons**: Generate histograms and frequency polygons using matplotlib.
3. **Ogive Curve**: Construct an ogive curve and compare it with the cumulative frequency distribution.

Unit V: Measures of Central Tendency:

1. **Calculating Central Tendencies**: Write functions to compute mean, median, and mode for individual observations, discrete series, and continuous series.
2. **Geometric and Harmonic Mean**: Compute geometric and harmonic means using NumPy and explain their differences.
3. **Comparative Analysis**: Plot graphs to compare mean, median, and mode for a given dataset using matplotlib.

Unit VI: Permutations and Combinations:

1. **Permutations**: Write a Python function to compute permutations using factorial notation and validate results with scipy's special. perm.
2. **Combinations**: Create a program to compute combinations and demonstrate selection problems.
3. **Applications**: Implement a basic cryptography problem using permutations and combinations.

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Tools and Libraries in Python:-

- **NumPy:** For matrix operations and general numerical calculations.
- **Pandas:** For data collection, classification, and handling datasets.

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1IMC101VS -DIGITAL MARKETING (VSEC-I)

Course Objectives:

1. Provide a strong foundation in digital marketing principles, tools, and techniques.
2. Explore Digital Marketing Channels.
3. Develop Skills in Social Media Marketing.
4. Understand Digital Advertising Techniques.
5. Gain Proficiency in Analytics and Performance Measurement.

Course Outcomes:

After successfully completing the course, students will be able to:

1. Explain Core Digital Marketing Concepts.
2. Develop Social Media Campaigns
3. Plan and Execute Digital Advertising Campaigns.
4. Analyze Campaign Performance.
5. Execute Real-World Digital Marketing Strategies

UNIT I: Introduction to Digital Marketing (8 Hours)

Digital Marketing: Definition and scope of digital marketing; Key terminologies and concepts; Comparison with traditional marketing; Current trends and the future of digital marketing.

Digital Marketing Channels: Search Engine Optimization (SEO), Social Media Marketing (SMM), Email Marketing, Content Marketing, Recent trends in the digital marketing.

UNIT II: Handling Social Media (8 Hours)

Social Media Marketing (SMM): Popular social media platforms and their marketing potential; Creating engaging content for social platforms; Social media advertising (Facebook, Instagram, Linkedin), Analytics and performance tracking on social media.

UNIT III: Digital Advertising and Performance Indicator (8 Hours)

Digital Advertising: Introduction to Pay-Per-Click (PPC) advertising; Google Ads; Display advertising and retargeting; Measuring ROI for digital advertisements.

Key Performance Indicators (KPIs) and their importance; Generating and interpreting campaign performance reports; Optimizing campaigns based on analytics.

Practical: Minimum eight (8) experiments to be performed based on the above curriculum.

Text Books:

1. Digital Marketing For Dummies by Ryan Deiss and Russ Henneberry; John Wiley & Sons, 25 Aug 2020
2. Advanced Digital Marketing Strategies in a Data-Driven Era by Saura, Jose Ramon; 2021.

Reference Books:

1. Social Media Marketing and Content Creation by Vandana Ahuja
2. Digital Marketing: Concepts, Strategy, and Practice by Dr. Rajendra Nargundkar and Romi Sainy

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1IMC102K- INDIAN KNOWLEDGE SYSTEM

Course Objectives

- To introduce students to the fundamental concepts and significance of Indian traditional knowledge systems.
- To explore the contributions of Indian knowledge to fields like mathematics, astronomy, medicine, and philosophy.
- To promote an understanding of cultural and ethical values rooted in traditional knowledge.
- To encourage critical thinking about the relevance of traditional practices in contemporary times.

Course Outcomes:

After successfully completing the course, students will be able to:

1. Recall key concepts of Indian traditional knowledge across various fields
2. Explain the significance of ancient Indian wisdom in shaping culture, science, and ethics.
3. Demonstrate the relevance of Indian traditional knowledge in modern interdisciplinary contexts.
4. Examine the impact of Indian wisdom on addressing contemporary challenges.
5. Assess the sustainability and ethical value of traditional Indian practices.
6. Design solutions inspired by Indian traditional knowledge for current issues

Unit I: Introduction to Indian Knowledge (6 Hours)

- Meaning and scope of traditional knowledge systems
- Historical context and evolution
- Relevance in modern education and technology
- Overview of Vedic, Upanishadic, and Puranic knowledge

Unit II: Indian Scientific Heritage (7 Hours)

- Contributions to mathematics (e.g., Aryabhata, Brahmagupta, and Ramanujan)
- Astronomy and cosmology in ancient India (e.g., Surya Siddhanta)
- Metallurgy and engineering (e.g., Iron Pillar of Delhi, Stepwells)
- Agricultural practices and sustainability

Unit III: Indian Medicine and Wellness (8 hours)

- Overview of Ayurveda, Siddha, and Unani systems
- Contributions of Charaka and Sushruta
- Indigenous healing practices and herbal medicine

Unit IV: Philosophy and Ethics (9 Hours)

- Overview of Indian philosophical schools (Vedanta, Samkhya, Nyaya, etc.)
- Ethical values in Indian tradition: Dharma, Karma, and Ahimsa
- Indian perspectives on environmental conservation and sustainability
- Indian classical music, dance, and art forms (Bharatanatyam, Kathak, Madhubani art)
- Contributions of Indian epics like Mahabharata and Ramayana
- Insights from ancient Indian texts: Arthashastra, Natya Shastra, and Sangam literature

Unit V: Indian Knowledge Systems and Modern Applications (8 Hours)

- Role of traditional knowledge in modern computing and AI
- Application of Vedic mathematics in problem-solving
- Relevance of Ayurveda and Yoga in modern healthcare
- Fusion of traditional and modern approaches in sustainable development.

Unit VI: Case Studies and Practical Applications (7 Hours)

- Case studies on successful integration of traditional knowledge in modern industries
- Field visits or projects on local traditional practices and their significance.

Recommended Text Books and Resources:

1. **Books:**
   - *Indian Knowledge Systems* by Kapil Kapoor and Avadhesh Kumar Singh
   - *The Wonder That Was India* by A.L. Basham
   - *Ancient Indian History and Culture* by R.S. Sharma.

2. **Online Resources and Journals:**
   - National Digital Library of India
   - IGNCA (Indira Gandhi National Centre for the Arts) resources
   - Research papers on Indian traditional knowledge

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1IMC103CC - PROFESSIONAL COMMUNICATION - I

Course Objectives:

1. To develop foundational skills in professional communication.
2. To enhance verbal and non-verbal communication abilities.
3. To instill proficiency in writing and speaking for academic and professional contexts.

Course Outcomes:

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

1. Understand the fundamentals of professional communication.
2. Demonstrate effective verbal and written communication skills.
3. Apply the principles of non-verbal communication in real-life scenarios.
4. Prepare professional documents like reports, emails, and resumes.
5. Communicate confidently in presentations and group discussions.

Unit I: Fundamentals of Communication (7 hours)

- Communication Process: Elements and Importance
- Types of Communication: Verbal, Non-verbal, Written
- Barriers to Communication and Overcoming Them
- Interpersonal Communication and Feedback.

Unit II: Language Skills for Communication (7 hours)

- Grammar Essentials: Sentence Structure, Tenses, and Modifiers
- Vocabulary Building: Synonyms, Antonyms, and Word Usage
- Listening Skills: Active and Empathic Listening
- Reading Skills: Skimming, Scanning, and Summarizing.

Unit III: Written Communication (8 hours)

- Professional Writing: Emails, Reports, and Business Letters
- Resume Writing: Structure, Content, and Design
- Writing Proposals and Abstracts
- Plagiarism and Ethical Writing Practices.

Unit IV: Oral Communication (8 hours)

- Public Speaking: Overcoming Stage Fear and Structuring Speech
- Group Discussions: Techniques and Practice
- Effective Presentations: Visual Aids and Audience Engagement
- Telephonic and Video Communication Etiquette.

Text Books:

1. Effective Business Communication by Asha Kaul
2. Communication Skills by Sanjay Kumar and Pushp Lata.

Reference Books:

1. English for Business Communication by Simon Sweeney
2. Developing Communication Skills by Krishna Mohan and Meera Banerjee.

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SEMESTER- II

2IMC101 COMPUTER ARCHITECTURE & ORGANIZATION

Course Objective:

1. Understand Fundamental Concepts
2. Master Data Representation and Digital Logic
3. Explore Processor and Memory Organization
4. Analyze Input and Output Unit Organization
5. Learn Advanced Processor Concepts
6. Understand Storage Systems and Technologies.

Course Outcomes:

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

1. Comprehend the Fundamentals of Computer Systems
2. Apply Knowledge of Digital Logic and Data Representation
3. Analyze Processor and Memory Organization
4. Understand Input and Output Unit Architecture
5. Evaluate Advanced Processor Technologies.
6. Assess Storage Solutions and Emerging Trends.

Unit I: Introduction to Computer Systems (7hours)

Basics of Computers: Definition, Characteristics, and Applications, Generations of Computers, Types of Computers (Micro, Mini, Mainframe, And Supercomputers), Basic Organization of a Computer: Input Unit, Processing Unit, and Output Unit, Overview of Von Neumann Architecture.

Unit II: Data Representation and Digital Logic (7 hours)

Number Systems: Binary, Decimal, Octal, Hexadecimal, and Conversions, Representation of Data: Signed, Unsigned, and Floating Point Numbers, Logic Gates: AND, OR, NOT, XOR, NAND, NOR, Boolean Algebra and Simplification Techniques, Combinational Circuits: Half Adder, Full Adder, Multiplexers, DE multiplexers, Sequential Circuits: Flip-Flops, Registers, and Counters.

Unit III: Processor and Memory Organization (7hours)

CPU Organization: Registers, ALU, Control Unit, Instruction Formats and Addressing Modes Memory Hierarchy: Cache, Primary, and Secondary Memory, Types of Memory: RAM, ROM, EPROM, Flash Memory, Cache Mapping Techniques: Direct, Associative, and Set-Associative.

Unit IV: Input and Output Unit Organization (8hours)

I/O Devices: Keyboard, Mouse, Printers, Display Monitors, I/O Techniques: Programmed I/O, Interrupt-driven I/O, Buses: Data Bus, Address Bus, Control Bus
I/O Ports and Interfaces: USB, PCI, Serial, and Parallel Ports.

Unit V: Advanced Processor Concepts (7hours)

Introduction to Parallel Processing, Pipelining: Stages and Hazards, RISC and CISC Architectures, EPIC architecture, Multiprocessors and Multithreading, Speed up law.

Unit VI: Introduction to Storage and Peripherals (8 hours)

Magnetic Storage: Hard Disk Drives, Magnetic Tapes, Optical Storage: CD/DVD, Blu-ray Solid-State Storage: SSDs, Flash Drives, Virtual Memory and Paging, Emerging Technologies: Cloud Storage and Data Centers.

Text Books:

1. William Stallings, "Computer Organization and Architecture"
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization".

Reference Books:

1. M. Morris Mano, "Computer System Architecture"
2. Rajaraman & Radhakrishnan, "Computer Fundamentals"

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2IMC102 FUNDAMENTALS OF ELECTRONICS AND MICROPROCESSORS

Course Objectives:

1. To provide foundational knowledge of electronic components and their applications.
2. To develop an understanding of circuit theory and design principles.
3. To introduce the concepts of digital electronics and logic circuits.
4. To acquaint students with microprocessor basics, architecture, and applications.
5. To explore the evolution and functionality of computer microprocessors.

Course Outcomes:

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

1. Explain the functioning and applications of basic electronic components.
2. Analyze and design electronic circuits using passive and active components.
3. Apply the principles of semiconductor devices in various applications.
4. Understand the basics of digital logic and construct simple logic circuits.
5. Demonstrate an understanding of microprocessors, their architecture, and their use in modern computing systems.
6. Compare and evaluate the features and performance of microprocessor.

SYLLABUS

Unit I: Fundamentals of Electronics and Circuit Analysis (7 hours)

Basics of electricity**:** Voltage, current, power, resistance, and energy; Circuit elements**:** Resistors, capacitors, and inductors; Ohm's Law, Kirchhoff's Voltage and Current Laws (KVL and KCL); Series and parallel circuits**:** Equivalent resistance and capacitance calculations; **Basics of measurement tools:** Multi-meters, oscilloscopes, and signal generators.

Unit II: Semiconductor Components and Applications (8 hours)

Overview of semiconductors**:** Intrinsic and extrinsic types; Diodes**:** Characteristics, types (Zener, LEDs, photodiodes), and rectifier circuits; Transistors**:** BJT, FET, and MOSFET – working principles, configurations, and characteristics; Applications of transistors**:** Switching and amplification; Special components**:** SCR, TRIAC, and optoelectronic devices.

Unit III: Introduction to Digital Electronics (7 hours)

Number systems: Binary, octal, decimal, and hexadecimal; **Boolean algebra and logic gates:** AND, OR, NOT, NAND, NOR, XOR, and XNOR; **Combinational logic circuits:** Adders, subtractors, multiplexers, and de-multiplexers; **Sequential logic circuits:** Flip-flops (SR, JK, D, T) and basic counters; **ADC and DAC:** Principles and interfacing.

Unit IV: Power Supplies and Troubleshooting Techniques (8 hours)

Overview of power supply systems: Linear and switching power supplies; **Voltage regulators:** IC-based (78xx, 79xx) and adjustable regulators (LM317); Basics of UPS and inverters; **Common circuit faults:** Open circuits, short circuits, and noise; Tools for circuit troubleshooting and debugging techniques.

Unit V: Introduction to Microprocessors (7 Hours)

Evolution of microprocessors; **Basic architecture of microprocessors**: ALU, registers, control unit, and buses; **Overview of 8085 microprocessors**: Instruction set, addressing modes, and simple programs; Applications of microprocessors in automation and control systems.

Unit VI: Advanced Microprocessors and Modern Computing (8 Hours)

Overview of advanced microprocessors (e.g., Intel i3, i5, i7, i9): Architecture, features, and applications; Comparison of microprocessor generations and their performance benchmarks**; Microprocessor-based systems**: Applications in IoT, embedded systems, and robotics; **Future trends**: Multi-core processors, quantum computing basics, and AI accelerators.

Text Books:

1. Floyd, T. L. Electronic Devices (Latest Edition). Pearson Education.
2. Gaonkar, R. S. (2013). *Microprocessor Architecture, Programming, and Applications with the 8085*. Penram International.

Reference Books:

1. Sedra, A. & Smith, K. C. *Microelectronic Circuits*. Oxford University Press.
2. Malvino, A. P. & Bates, D. J. *Electronic Principles*. McGraw-Hill.
3. Millman, J. & Halkias, C. *Integrated Electronics: Analog and Digital Circuits and Systems*. McGraw-Hill.

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2IMC103 - C++ PROGRAMMING

Course Objectives:

1. Learn problem-solving techniques and write basic C++ programs using core concepts.
2. Implement control structures and functions to write modular C++ code.
3. Apply object-oriented principles to design classes and objects in C++.
4. Use arrays, pointers, and dynamic memory allocation in C++.
5. Leverage inheritance and polymorphism for flexible C++ programming.
6. Implement templates, exception handling, and file operations in C++.

Course Outcomes:

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

1. Use problem-solving techniques to write basic C++ programs.
2. Implement control structures and functions in C++.
3. Apply object-oriented principles to design classes and objects.
4. Manage data with arrays, pointers, and dynamic memory allocation.
5. Use inheritance and polymorphism to enhance C++ programs.
6. Implement templates, exception handling, and file operations.

Unit I: Introduction to Problem Solving and C++ Basics (7 hours)

- Overview of problem-solving techniques
- Introduction to C++ programming
- Structure of a C++ program
- Data types, variables, constants, and literals
- Input and output using cin and cout
- Basic operators and expressions
- Comparison between C and C++

Unit II: Control Structures and Functions (7 hours)

- Conditional statements (if, else if, switch)
- Iterative statements (for, while, do-while)
- Introduction to functions and modular programming
- Function overloading
- Inline functions
- Scope and lifetime of variables
- Recursive functions

Unit III: Object-Oriented Programming Concepts (8 hours)

- Introduction to OOP principles (Encapsulation, Inheritance, Polymorphism)
- Classes and objects
- Access modifiers (public, private, protected)
- Constructors and destructors
- Static members of a class
- this pointer

Unit IV: Arrays, Pointers, and Dynamic Memory Allocation (7 hours)

- Arrays (one-dimensional and multi-dimensional)
- Strings as character arrays and string class
- Introduction to pointers and pointer arithmetic
- Pointers and functions
- Dynamic memory management (new and delete)
- Smart pointers in modern C++

Unit V: Inheritance and Polymorphism (8 hours)

- Types of inheritance (single, multiple, hierarchical, multilevel, hybrid)
- Constructor and destructor in inheritance
- Virtual functions and runtime polymorphism
- Abstract classes and interfaces
- Function overriding
- Solving real-world problems using inheritance

Unit VI: Templates, Exception Handling, and File Handling (8 hours)

- Introduction to templates (function and class templates)
- Standard Template Library (STL): Vectors, lists, stacks, queues, maps
- Exception handling (try, catch, throw)
- File operations: Reading from and writing to files
- Case studies integrating file handling and templates.

Text Books:

1. The C++ Programming Language **Author**: Bjarne Stroustrup
2. Object Oriented Programming with C++, 8th Edition, E. Balgurusamy.

Reference Books:

1. Problem Solving with C++ **Author**: Walter Savitch
2. The C++ Standard Library: A Tutorial and Reference **Author**: Nicolai M. Josuttis

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2IMC104 STATISTICS FOR DATA SCIENCE-II

Course Objectives:

1. Introduce foundational probability concepts and their practical applications.
2. Equip students to analyze data using measures of central tendency and dispersion.
3. Develop skills in bivariate analysis through correlation and regression techniques.
4. Provide knowledge of time series analysis for trend forecasting.
5. Familiarize students with financial concepts such as shares, dividends, profit, and loss.
6. Enhance problem-solving abilities through practical examples and numerical exercises.

Course Outcomes:

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

1. To define and apply probability concepts and solve problems, including Bayes' theorem.
2. To compute and interpret measures of central tendency and dispersion.
3. To analyze variable relationships using bivariate correlation and calculate correlation coefficients.
4. To develop regression models and interpret results for decision-making.
5. To perform time series analysis and forecast trends.
6. To solve financial problems involving shares, dividends, and profit/loss.

Unit I: Introduction to Probability: (8 Hours)

Elementary Probability: Concept of random experiment/trial and possible outcomes; Sample Space and Discrete Sample Space; Events their types, Algebra of Events, Mutually Exclusive and Exhaustive Events, Complementary events. Classical definition of Probability, Addition theorem (without proof), **conditional probability**. Multiplication theorem on probability, independent events, Bayes' theorem Simple examples.

Unit II: Introduction to Statistics: (7 Hours)

Measures of Central Tendency: Overview Mean, mode, Median mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Relationship between Mean, Median and Mode, on Statistics series.

Unit III: Correlation: (7 Hours)

Bivariate Linear Correlation: Correlation meaning, definition, type and degree of correlation, methods of correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation between two Variable, Coefficient of Correlation of Spearman's Rank Differences Method (case of repeated ranks up to 2 repetitions only) Numerical problems on Bivariate Linear Correlation. Skewness and kurtosis.

Unit IV: Bivariate Linear Regression: (7 Hours)

Bivariate Linear Regression: What is Regression, Difference between correlation and regression, Regression Lines and Regression Equation, Calculation of coefficient of regression, Least Square Methods, Properties of Regression Coefficients- i) $r = \sqrt{byxbxy}$ ii) $(\bar{x}, \bar{y})$ is the point of intersection of two regression lines. Basics of regression, simple and multiple regression, Ridge regression, Lasso regression Numerical problems on Bivariate Linear Regression.

Unit V: Time series: (8 Hours)

Time series: Definition of Time series & uses of time series. Components of Time series, Additive & multiplicative models. Methods of Measuring trend by Free-Hand (Or Graphical) Method, Semi-Average Method, Moving average method, Least Square Method, Numerical problems on Time Series.

Unit VI: Shares and Dividends and Profit, Loss (8 Hours)

Concepts of Shares and Stock Exchange Definition and Types of Shares Overview of Stock Exchange and its Role **Key** Terminologies Face Value, Market Value, Dividend, Equity Shares, Bonus Share, **Profit and Los**s Cost Price (C.P.),Selling Price (S.P.) Profit and Loss, **Interest**, Types of Interest, Simple Interest, Compound Interest Applications and Problem-Solving.

Text Books:

1. Manish Sharma, Amit Gupta, The Practice of Business Statistics, Khanna Book Publishing Company, 2010 (AICTE Recommended Textbook)
2. Das N. G., Statistical Methods, Combined Edition, Tata McGraw Hill, 2010.
3. Ross Sheldon M., Introduction to Probability and Statistics for Engineers and Scientists, 6th Edition, Elsevier, 2021.

Reference Books:

1. Probability and Statistics with Reliability, Queuing And Computer Science Applications Author Kishore S Trivedi Published by Wiley
2. Statistical Methods Author S. P. Gupta Publish by Sultan Chand & Sons
3. Fundamentals of Mathematical Statistics Author- S C Gupta; V. K. Kapoor Publish by Sultan Chand & Sons
4. Higher Engineering mathematics by B. S. Grewal Published by Khanna Pub.

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2IMC105- FUNDAMENTALS OF ELECTRONICS AND MICROPROCESSORS – Lab.

Course Outcomes:

By the end of the practical sessions, students will be able to:

1. Assemble and analyze electronic circuits using passive and active components.
2. Design and troubleshoot basic digital circuits.
3. Write and execute simple programs on the 8085 microprocessor.
4. Configure, evaluate, and compare advanced microprocessor features and performance.
5. Apply electronic and microprocessor knowledge to modern industry-relevant applications.

Practical Syllabus:

Tentative list of experiments (ideas) based on the syllabus:

1. **Component Identification and Measurements**
- Identify and measure resistance, capacitance, and inductance using multimeters and LCR meters.
2. **Basic Circuit Assembly**
- Construct and verify Ohm's Law, Kirchhoff's Voltage Law (KVL), and Kirchhoff's Current Law (KCL) using resistive circuits.
3. **Diode Applications**
- Build and analyze half-wave and full-wave rectifier circuits with filters.
4. **Transistor Characteristics**
- Study the input and output characteristics of a BJT in common emitter configuration.
5. **Operational Amplifier Applications**
- Design and test op-amp-based amplifiers, summers, and integrators.
6. **Digital Logic Circuits**
- Construct and verify the truth table of basic gates (AND, OR, NOT) and universal gates (NAND, NOR).
7. **Combinational Circuit Design**
- Design a 4-bit binary adder/subtractor circuit using logic gates.
8. **Introduction to the 8085 Microprocessor**
- Familiarization with 8085 microprocessor kit and basic instructions (e.g., data transfer, arithmetic operations).
9. **Simple Programs on the 8085**
- Write and execute programs for addition, subtraction, and data movement using the 8085 microprocessor.
10. **Advanced Microprocessor Exploration**
- Analyse and compare features of modern microprocessors (e.g., Intel i3, i5, i7, i9) using datasheets and benchmarking tools.

Additional Notes for Practical Sessions:

1. **Tools & Simulations:** Encourage the use of simulation software like Multisim, LTSpice, or Proteus for initial circuit analysis before hands-on implementation.
2. **Industry Context:** Highlight practical applications of the circuits, such as in IoT devices, consumer electronics, or communication systems, during the sessions.
3. **Skill Development:** Emphasize troubleshooting, debugging, and interpretation of circuit performance using measuring tools.

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2IMC106 C++ PROGRAMMING - LAB.

Course Outcomes:

By the end of the practical sessions, students will be able to:

1. Apply basic C++ programming constructs, control structures, and functions to solve problems and implement user-interactive programs.
2. Analyze and manipulate arrays, strings, and dynamic memory, implementing functions, classes, and inheritance for object-oriented programming.
3. Evaluate and demonstrate advanced C++ concepts like polymorphism, templates, exception handling, and file operations in practical applications.

Lab 1: Basics of C++ Programming:

1. Write a C++ program to display "Hello, World!" on the screen.
2. Write a program to perform basic arithmetic operations (addition, subtraction, multiplication, division).
3. Create a program to accept user details (name, age, and grade) and display them.

Lab 2: Control Structures:

1. Write a program to determine if a number is positive, negative, or zero.
2. Develop a program to print the Fibonacci series up to a given number of terms.
3. Write a program to generate a multiplication table for a given number.

Lab 3: Functions:

1. Write a program to calculate the factorial of a number using a function.
2. Write a recursive function to calculate the power of a number.
3. Implement function overloading for calculating the area of a circle, rectangle, and triangle.

Lab 4: Classes and Objects:

1. Create a class Student with attributes like name, roll number, and marks. Implement methods to input and display details.
2. Design a class Bank Account with methods for deposit, withdrawal, and balance inquiry.

Lab 5: Arrays and Strings:

1. Write a program to find the largest and smallest elements in an array.
2. Develop a program to perform matrix addition and multiplication.
3. Write a program to reverse a string without using predefined functions.

Lab 6: Pointers and Dynamic Memory Allocation:

1. Write a program to demonstrate pointer arithmetic.
2. Develop a program to reverse an array using pointers.
3. Implement dynamic memory allocation to store and display a list of numbers entered by the user.

Lab 7: Inheritance:

1. Create a class Vehicle and derive classes Car and Bike. Add appropriate attributes and methods to each.
2. Implement multiple inheritance to create a class Employee inheriting from classes Person and Company.
3. Write a program to demonstrate the use of protected access specifier in inheritance.

Lab 8: Polymorphism and Virtual Functions:

1. Create a base class Shape and derived classes Circle, Rectangle, and Triangle with a virtual function area().
2. Demonstrate runtime polymorphism using a pointer to the base class.
3. Write a program to implement an abstract class with pure virtual functions.

Lab 9: Templates and Exception Handling

1. Write a program to implement a function template for finding the maximum of two values.
2. Implement exception handling to handle divide-by-zero errors.
3. Write a program to demonstrate catching multiple exceptions.

Lab 10: File Handling

1. Write a program to read data from a file and display it on the console.
2. Develop a program to write user input into a file.
3. Create a program to append data to an existing file.

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2IMC107 - STATISTICS FOR DATA SCIENCE-II LAB.

Course Outcomes:

By the end of the practical sessions, students will be able to:

1. To simulate probability experiments and compute probabilities using Python.
2. To calculate statistical measures and analyze datasets.
3. To visualize and interpret relationships using correlation and regression.
4. To analyze time series data using trend estimation methods.
5. To solve financial computations using Python scripts.

Lab Practical for the Syllabus (Using Python on Google Colab or any Other IDE)

Unit I: Introduction to Probability:

1. **Simulating a Coin Toss and Die Roll**
   - Write a program to simulate a coin toss and die roll to determine the sample space and probabilities.
2. **Probability of an Event**
   - Compute the probability of drawing a specific card from a deck or selecting specific colored balls from a bag.
3. **Addition Theorem**
   - Implement the addition theorem to calculate the probability of union events.

Unit II: Introduction to Statistics:

1. **Calculate Mean, Median, and Mode**
   - Compute these measures for a given dataset using Python's numpy and pandas.
2. **Visualize Central Tendency**
   - Plot histograms and box plots to show the distribution of data and its central tendencies.
3. **Compute Measures of Dispersion**
   - Calculate range, variance, standard deviation, and coefficient of variation.
4. **Create a Summary Table**
   - Use Python to generate a descriptive statistics summary for a dataset (mean, median, mode, standard deviation, etc.).

Unit III: Correlation

1. **Plot a Scatter Diagram**
   - Visualize the relationship between two variables using matplotlib or seaborn.
2. **Compute Karl Pearson's Correlation**
   - Use Python's numpy.corrcoef() to calculate Pearson's correlation coefficient.
3. **Spearman's Rank Correlation**
   - Rank the data and compute Spearman's correlation coefficient using scipy.stats.spearmanr().
4. **Analyze Skewness**
   - Calculate and interpret skewness using scipy.stats.skew().

Unit IV: Bivariate Linear Regression

1. **Derive Regression Line Using Least Squares**
   - Implement least squares regression manually for a small dataset.
2. **Perform Linear Regression Using scikit-learn**
   - Fit a linear regression model using scikit-learn and plot the regression line.
3. **Multiple Linear Regression**
   - Perform regression analysis with multiple predictors using scikit-learn.
4. **Predict Future Values**
   - Use a regression model to predict outcomes for unseen data.

Unit V: Time Series

1. **Visualize Time Series Data**
   - Plot a time series dataset using matplotlib and interpret its components.
2. **Moving Average Calculation**
   - Implement moving averages to smooth out fluctuations in a dataset.
3. **Semi-Average Method**
   - Divide the data into two parts and calculate semi-averages to estimate trends.
4. **Least Squares Trend Estimation**
   - Use least squares regression to fit a trend line for time series data.

Unit VI: Shares, Dividends, Profit, and Loss

1. **Compute Shares and Dividends**
   - Write a Python program to calculate dividends for given face value and market value.
2. **Profit and Loss Calculation**
   - Implement formulas to calculate profit, loss, cost price, and selling price.
3. **Simple and Compound Interest**
   - Compute simple and compound interest for given principal, rate, and time.
4. **Simulate Stock Market Calculations**
   - Develop a simple Python program to track gains and losses from stock transactions.

These practicals integrate the syllabus topics with Python programming, providing hands-on experience in applying statistical and mathematical concepts to real-world problems.

Tools and Libraries:

- **NumPy:** For matrix operations and general numerical calculations.
- **Pandas:** For data collection, classification, and handling datasets.
- **Matplotlib:** For graphical representations like bar charts, histograms, and frequency polygons.
- **SciPy:** For additional statistical functions (e.g., mode calculation).

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2IMC108 LINUX - Lab.

Course Outcomes:

By the end of the practical sessions, students will be able to:

1. Apply basic Linux commands and file management techniques to navigate and manage directories, files, and permissions.
2. Analyze and manage users, groups, and processes, demonstrating effective control over system resources.
3. Develop shell scripts to automate tasks and display system information, enhancing scripting and automation skills.

Lab Requirements:

- A computer with Linux OS installed (e.g., Red Hat, Ubuntu, Fedora, CentOS).
- Virtual Machine (VM) setup with Linux if physical installation is not available.
- Access to a terminal or command-line interface.

Experiment 1: Introduction to Linux and Terminal Basics

Tasks:

1. Open the terminal and explore its interface.
2. Execute the following commands and observe their outputs:
    - pwd (Print Working Directory)
    - ls (List Directory Contents)
    - cd (Change Directory)
    - man (Manual Pages)
3. Create a new directory using mkdir.
4. Create a file using touch and verify its existence.
5. Remove a file and directory using rm and rmdir.

Experiment 2: File Management and Permissions

Tasks:

1. Create a file using nano, vi, or cat > filename.
2. Check file permissions using ls -l.
3. Change file permissions using chmod:
    - Add write permission: chmod +w filename.
    - Remove read permission: chmod -r filename.
4. Change ownership of a file using chown (requires root privileges).

Experiment 3: User and Group Management

Tasks:

1. Create a new user using useradd and set a password using passwd.
2. Check the list of users from the /etc/passwd file.
3. Create a group using groupadd.
4. Add a user to a group using usermod.
5. Switch users using su or ssh.

Experiment 4: Process Management

Tasks:

1. View running processes using ps, top, and htop.
2. Start a background process using &.
3. Kill a process using kill and killall.
4. Change process priority using nice and renice.

Experiment 5: Shell Scripting Basics

Tasks:

1. Write a shell script to display "Hello, World!" using echo.
2. Write a script to list files in the current directory.
3. Write a script that accepts a filename as input and checks if it exists.
4. Write a script to display system information (e.g., date, uptime, disk usage).

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2IMC101VS COMPUTER HARDWARE & NETWORKING (VSEC- II)

Course Objectives:

1. Understand the fundamental principles of computer hardware and networking.
2. Learn about key networking devices and their configurations.
3. Develop hands-on skills for assembling, troubleshooting, and maintaining computer systems.
4. Acquire knowledge about network setup, security, and basic troubleshooting techniques.
5. Align theoretical knowledge with industry-relevant skills.

Course Outcomes:

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

1. To identify and describe various hardware components and their functions.
2. To perform assembly and troubleshooting of computers.
3. To configure and manage basic network setups.
4. To demonstrate practical skills in network diagnostics and security essentials.
5. To adapt to real-world hardware and networking challenges with confidence.

Unit I: Fundamentals of Computer Hardware (6 Hours)

Components of a computer system: Motherboard, CPU, RAM, Storage (HDD/SSD); Input/Output devices and their configurations; Power supplies, connectors, and cooling systems; **Storage Technologies**: HDDs, SSDs, NVMe, and RAID configurations; **System Assembly and Installation**: Understanding slots, ports, & connections, Identifying hardware components and understanding compatibility, Assembling a PC; Installing operating systems and device drivers

Unit II: Basics of Networking (6 Hours)

Networking fundamentals: LAN, WAN, MAN, and PAN; Network topologies and standards; Cables and connectors: CAT5, CAT6, RJ45, fiber optics; Overview of OSI and TCP/IP models;

Introduction to networking hardware: Switches, routers, modems, and cables; Wired and wireless networking technologies;

IP Addressing and Subnetting: IPv4 and IPv6 concepts, Static vs. dynamic IP addressing, Introduction to subnet masks and CIDR notation; **Network Configuration:** Setting up and configuring a basic LAN, Sharing resources over a network (e.g., printers, files).

Unit III: Network Configuration and Security Essentials (6 Hours)

Setting up and configuring small-scale networks; Troubleshooting tools: ping, tracert, ipconfig, netstat; Introduction to firewalls and basic network security practices; Overview of backup and recovery strategies; Wireless network setup and security basics (WPA2, encryption); Emerging Trends in Hardware and Networking: IoT, edge computing, and cloud-based networking solutions.

Text Books:

1. Andrews, J. A. (2016). A+ Guide to IT Technical Support. Cengage Learning.
2. Forouzan, B. A. (2017). Data Communications and Networking. McGraw-Hill Education.

Reference Books:

1. Comer, D. E. (2018). Computer Networks and Internets. Pearson.
2. Tanenbaum, A. S., & Wetherall, D. J. (2013). Computer Networks. Pearson.
3. Meyers, M. (2022). CompTIA A+ Certification All-in-One Exam Guide. McGraw-Hill.

Practical Laboratory:

1. Identification and Function of Hardware Components
   - Study motherboard components, connectors, slots, and ports.
2. System Assembly and Installation
   - Assemble a PC, install an operating system, and verify its functionality.
3. Hardware Troubleshooting
   - Identify and fix common hardware faults such as memory errors or faulty drives.
4. Basic Networking Hardware Setup
   - Connect and configure network devices: switches, routers, and modems.
5. IP Addressing and Subnetting
   - Configure static and dynamic IP addresses and understand subnet masks.
6. Network Resource Sharing
   - Set up file and printer sharing on a local area network.
7. Wireless Network Configuration
   - Configure a wireless router and troubleshoot connectivity issues.
8. Using Network Diagnostic Tools
   - Explore tools like *ping*, *tracert*, and *ipconfig* for basic diagnostics.
9. Basic Firewall Configuration
   - Implement basic firewall rules for network security.
10. Backup and Recovery
    - Set up and test data backup and restoration using networked storage.

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2IMC102AE - PROFESSIONAL COMMUNICATION II

Course Objectives:

- To enhance advanced communication skills required in professional environments.
- To develop cross-cultural and virtual communication competencies.
- To prepare students for effective negotiation, conflict resolution, and leadership communication.

Course Outcomes:

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

1. Demonstrate advanced speaking and writing skills.
2. Apply non-verbal communication techniques in diverse scenarios.
3. Conduct effective cross-cultural and virtual communication.
4. Utilize negotiation and conflict resolution techniques.
5. Lead group discussions and team collaborations effectively.

Unit I: Advanced Oral Communication (7 hours)

- Extempore and Debate Techniques
- Advanced Group Discussion Skills
- Handling Q&A Sessions in Presentations
- Mock Interviews and Feedback

Unit II: Non-verbal Communication (7 hours)

- Role of Body Language in Professional Settings
- Paralanguage: Voice Modulation and Tonality
- Dressing and Grooming for Success
- Case Studies on Effective Use of Non-Verbal Cues

Unit III: Cross-Cultural Communication (8 hours)

- Understanding Cultural Diversity in Communication
- Adapting Communication Styles for Global Audiences
- Common Barriers in Cross-Cultural Communication
- Business Etiquette Across Cultures

Unit IV: Virtual Communication and Conflict Management (8 hours)

- Communication in Virtual Environments: Tools and Best Practices
- Managing Virtual Teams and Conducting Online Meetings
- Negotiation Strategies and Techniques
- Conflict Management: Causes, Strategies, and Case Studies

Text Books:

1. Cross-Cultural Management by Shobhana Madhavan
2. Virtual Communication: Engaging Remote Audiences by Kate Fisher.

Reference Books:

1. The Art of Negotiation by Michael Wheeler
2. Interpersonal Communication by Steven McCornack.

PRACTICAL LABORATORY:
Professional Communication Lab – I and II

- Objective: To provide hands-on experience in communication through various exercises, role-plays, and simulations.
- Format: Minimum 8 practical exercises based on the syllabus for each semester.

Sample Activities:

1. **Sem I**:
    - Writing professional emails and reports.
    - Group discussion simulations.
    - Presentation on assigned topics.
2. **Sem II**:
    - Conducting mock interviews.
    - Role-playing cross-cultural communication scenarios.
    - Case study discussions on negotiation and conflict resolution.

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2IMC103CC CO-CURRICULAR COURSE (Credit: 2)

Any of the following courses can be conducted for 24 hours or more:

1. Intellectual Property Rights
2. Indian Constitution
3. Financial Literacy

[**Detailed Syllabus of the above courses are as under**:]

2IMC103CC CO-CURRICULAR COURSE

[**Note:** Under the Co-Curricular Course (2IMC103), there are three subjects offered. Students are required to choose any one of them.]

Subject I: 2IMC103CC (i) FINANCIAL LITERACY

Course Objectives:

- Understand the basics of financial literacy, including income, expenses, savings, and investments.
- Learn the fundamentals of banking systems and digital financial tools.
- Explore personal finance tools such as budgeting, investments, and insurance.

Course Outcomes:

- Grasp effective financial resource management and utilize modern banking services.
- Make informed decisions about personal finance, investments,
- Understand risk management.

Unit I: Basics of Financial Literacy (7 Hours)

- Importance of financial literacy in daily life
- Understanding income, expenses, savings, and investments
- Introduction to financial goals and budgeting techniques.

Unit II: Banking and Financial Services (7 Hours)

- Overview of banking systems: Types of accounts (savings, current)
- Digital banking: UPI, net banking, and mobile banking
- Credit and debit cards: Usage, advantages, and managing credit.

Unit III: Personal Finance and Investment (6 Hours)

- Introduction to investment options: Fixed deposits, mutual funds, and stocks
- Basics of insurance: Life, health, and general insurance
- Understanding loans and managing debt effectively
- Types of Financial Risks: Market, Credit, Liquidity, and Inflation Risks.

Reference Books:

1. "Indian Financial System: Markets, Institutions, and Services" **Author:** Bharati V. Pathak, Pearson Edn. Pub.
2. **"Financial Markets and Services"**, **Author:** E. Gordon and K. Natarajan, Himalaya Publishing House Pub.
3. **Personal Finance"**, Jeff Madura (Indian Edition by Pearson) Pearson Education Pub.:

Subject II: 2IMC103CC (ii) INDIAN CONSTITUTION

Course Objectives:

- Understand the framing, principles, and key features of the Indian Constitution.
- Learn the structure and functions of the Executive, Legislature, and Judiciary.
- Explore emergency provisions, Centre-State relations, and constitutional amendments.

Course Outcomes:

- Acquire basic knowledge of the Indian Constitution and governance.
- Understand the roles and powers of various government branches.
- Understand the key constitutional provisions and their significance.

Unit I: Introduction to the Indian Constitution (7 Hours)

- Historical background and framing of the Constitution
- Preamble and its significance
- Fundamental Rights and Duties
- Directive Principles of State Policy

Unit II: Structure of the Government (7 Hours)

- Union and State Executive: President, Prime Minister, Governor, and Chief Minister
- Legislature: Parliament and State Legislatures (composition, powers, and functions)
- Judiciary: Supreme Court, High Courts, and Judicial Review

Unit III: Key Constitutional Provisions (6 Hours)

- Emergency Provisions: National, State, and Financial Emergency
- Centre-State Relations: Legislative, Administrative, and Financial
- Constitutional Amendments and their significance.

Text Books:

1. Introduction to the Constitution of India Author: Durga Das Basu
2. The Constitution of India: A Politico-Legal Study Author: J. N. Pandey
3. Bare Act: The Constitution of India (Government of India Publication).

Reference Books:

1. Our Constitution Author: Subhash C. Kashyap
2. Working a Democratic Constitution: The Indian Experience Author: Granville Austin.

Subject 3: 2IMC103CC (iii) INTELLECTUAL PROPERTY RIGHTS

Course Objectives:
1. To introduce the fundamental concepts of Intellectual Property Rights (IPR).
2. To understand the significance of IPR in fostering innovation and creativity.
3. To explore various forms of IPR and their applications in diverse industries.
4. To familiarize students with the processes of acquiring and protecting intellectual property.

Course Outcomes:
1. Upon successful completion of the course, students will be able to:
2. Understand the basic principles and types of Intellectual Property Rights.
3. Analyze the importance of IPR in legal and business frameworks.
4. Apply fundamental concepts of IPR to real-world scenarios.
5. Demonstrate awareness of ethical considerations and societal implications of IPR.

SYLLABUS

Unit I: Introduction to Intellectual Property: (5 Hours)
Definition and Importance of Intellectual Property; History and Evolution of IPR; Categories of Intellectual Property: Patents, Copyrights, Trademarks, Trade Secrets, Industrial Designs; International Organizations Governing IPR: WIPO, WTO-TRIPS; The Role of IPR in Business and Innovation; Case Studies: Global Examples of IPR Impact.

Unit II: Patents, Copyrights, and Trademarks: (7 Hours)
Patents: Definition, Types, and Process of Filing, Rights of Patent Holders and Infringement Issues; Copyrights: Protection of Literary, Artistic, and Musical Works; Copyright Infringement and Fair Use Doctrine; Trademarks: Concepts of Brand Names, Logos, and Symbols, Process of Trademark Registration and Infringement, Case Studies: Landmark Cases in Patents, Copyrights, and Trademarks.

Unit III: Industrial Designs, Trade Secrets, and Emerging Issues in IPR: (8 Hours)
Industrial Designs: Protection of Aesthetic Features of Products, Registration Process and Duration of Protection; Trade Secrets: Definition, Importance, and Protection Mechanisms; Misappropriation and Remedies; Emerging Trends in IPR: Intellectual Property in the Digital Age, IPR and Artificial Intelligence, Ethical and Societal Considerations, Case Studies: Emerging Trends and Controversies in IPR.

Text Books:
1. Intellectual Property Rights: Unleashing the Knowledge Economy *by Prabuddha Ganguli*
2. Intellectual Property Rights in the Global Economy *by Keith E. Maskus.*

Reference Books:
1. Law Relating to Intellectual Property by Dr. B. L. Wadehra
2. Intellectual Property: The Law of Copyrights, Patents, and Trademarks by Deborah E. Bouchoux
3. Intellectual Property: Patents, Copyright, Trademarks, and Allied Rights by Cornish W.R., Llewelyn D., & Aplin T.

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