

B.C.A.

SYLLABUS

BCA Semester: I 2025-26
Discipline Centric Core Course (DCC)
PICCC24001T: Programming in C
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: - Understand and apply the basic syntax and structure of C programming. - Analyze and solve computational problems using appropriate algorithms and logic. - Write modular and reusable code using functions and recursion. - Implement and manipulate arrays, strings, and structures effectively. - Use pointers for efficient memory access and dynamic allocation.		
SYLLABUS		
Unit-I: Program Concept, Characteristics of Programming, Various stages in Program Development, Algorithm and Flowchart, Programming Techniques – Top down, Bottom up, Modular, Structured, Cohesion & Coupling. Introduction & features of C, Structure of C program, Variable, Tokens: keywords, identifiers, constants, and operators. Data Types: built-in, derived and user defined. Type conversion: Implicit and Explicit.		
Unit-II: Operator's classification: based on availability of operands (unary, binary and ternary) and based on specific category: Arithmetic, Assignment, Relational, Logical, Bitwise, increment/decrement, conditional. Basic input/output and library functions: Single character (Unformatted) input/output i.e. getch(), getchar(). getche(), putchar(),Formatted input output i.e. printf() and scanf(), Library functions - concepts, Mathematical functions: pow(), sqrt(), sin(), tan(), cos().		
Unit-III: Control structures / statements: Conditional statements: independent if, if..else, if..elseif ladder, nested if, switch.. case, Looping: entry controlled and exit controlled and Jump Statements: goto, break, continue, return, exit(). Array: Single and Multi-Dimensional arrays, Array declaration and initialization of arrays, Strings: declaration, initialization, built-in functions: strupr(), strlwr(), strlen(), strrev(), strcat(), strcpy(), strcmp(). Pointers: Declaration, initialization, pointer arithmetic, pointer to pointer, types: generic (void) pointer, NULL pointer.		
Unit-IV: Functions: needs, types: User defined: function prototyping, function definition, function calling and library function, categories of function, passing arguments: call by value and call by reference, Recursive function, Array as function argument, Scope and life of variables - local and global variable, Storage class specifier - auto, extern, static, register.		
Unit-V: Structure: Defining structure, Declaration of structure variable, Accessing structure members, Union. File Handling Basics: Working with text files		
SUGGESTED BOOKS		
1. "Programming in ANSI C" – E. Balagurusamy 2. "Let Us C" – YashavantKanetkar 3. "The C Programming Language" – Brian W. Kernighan & Dennis M. Ritchie 4. "Programming with C" – Byron Gottfried (Schaum's Outlines) 5. "Computer Fundamentals and Programming in C" – ReemaThareja		

Discipline Centric Core Course (DCC)

DGLCC24001T: Digital Logic

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the concepts of number systems, binary arithmetic, and logic gates • Design and simplify Boolean expressions using laws and theorems. • Design and analyze combinational circuits like multiplexers, demultiplexers, encoders, decoders. • Understand the design of sequential circuits like flip-flops, counters, and registers. • Illustrate memory organization and basic digital system architecture.		
SYLLABUS		
Unit-I: Number Systems and Logic Gates: Introduction to Digital Electronics, Number systems: Binary, Octal, Decimal, Hexadecimal, Conversion between number systems, Binary arithmetic: Addition, subtraction (1's and 2's complement), Logic gates: AND, OR, NOT, NAND, NOR, XOR, XNOR – truth tables and symbols, Logic gate implementation using universal gates		
Unit-II: Boolean Algebra and Simplification: Boolean Algebra: Laws and Theorems, DeMorgan's Theorem, Sum of Products (SOP) and Product of Sums (POS), Canonical and Standard Forms, Karnaugh Map (K-Map) simplification (2, 3, 4 variables)		
Unit-III: Combinational Logic Circuits: Half Adder and Full Adder, Subtractors, Multiplexers and Demultiplexers, Encoders and Decoders, Comparators, Design and analysis of simple combinational circuits		
Unit-IV: Sequential Logic Circuits: Flip-Flops: SR, JK, D, T, Master-Slave JK, Edge-triggered, Registers: Shift registers (SISO, SIPO, PISO, PIPO), Counters: Asynchronous and synchronous counters, Up/Down counters, Ring and Johnson counters, State diagrams and state tables		
Unit-V: Memory and Digital System Overview: Classification of memory: RAM, ROM, PROM, EPROM, EEPROM, Memory hierarchy, Basics of memory organization and addressing, Introduction to programmable logic devices (PLDs): PAL, PLA		
SUGGESTED BOOKS		
1. M. Morris Mano & Michael D. Ciletti – <i>Digital Design</i>, Pearson Education, Latest Edition. 2. R.P. Jain – <i>Modern Digital Electronics</i>, McGraw Hill Education, Latest Edition. 3. Thomas L. Floyd – <i>Digital Fundamentals</i>, Pearson Education.		

Discipline Centric Core Course (DCC)

MFCCC24001T: Mathematics for Computing

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Practical scenarios and determine cardinality and relationships between sets. • Analyse domain, range, and properties of relations and functions in computational and mathematical contexts. • Analyse domain, range, and properties of relations and functions in computational and mathematical contexts. • Apply matrix operations and determinants to solve mathematical and geometric problems. • Summarize and analyze data using statistical techniques and graphical tools.		
SYLLABUS		
Unit-I: SETS: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.		
Unit-II: RELATIONS AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.		
Unit-III: PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebraic Systems, Principle of Duality, Basic Properties, Sublattices, Distributed & Complemented Lattices.		
Unit-IV: MATRICES AND DETERMINANT: Definition and Types of Matrices, Addition, Subtraction and Multiplication of Matrices, Non-commutativity of multiplication of matrices, Scalar Multiplication, Transpose of a Matrix. Determinant: Determinant of a square matrix (up to 3x3 matrices), properties of determinants, minors, cofactors, expansion of determinants, application of determinants in finding the area of a triangle. Adjoint and Inverse of a matrix.		
Unit-V: Statistics: Data collection methods, Data classification, Frequency Distribution. Graphical representation of frequency distribution. Measures of Central Tendency - Mean, Median, Mode. Measures of Dispersion - Mean Deviations, Standard Deviations, Variance and Skewness.		
SUGGESTED BOOKS		
1. C. L. Liu – Elements of Discrete Mathematics, TMH 2. R. D. Sharma - Basic Mathematics 3. S. P. Gupta – Statistical Methods, Sultan Chand & Sons 4. U. Rizwan, Mathematical Foundation - SciTech, Chennai		

Ability Enhancement Core Course (AECC)

ENGAC24001T: General English

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to:		
• Students will gain a comprehensive understanding of basic sounds of English and identify key literary forms. • Students will Interpret and appreciate selected poetic and literary texts by Shakespeare, Tagore, and R.K. Narayan, demonstrating a grasp of theme, tone, and literary techniques. • Students will apply knowledge of English grammar structures such as form classes, articles, prepositions, modal auxiliaries, and the use of prefixes, suffixes, and connectives in context.. • Students will explore the concept of Using appropriate tenses, voice (active/passive), and speech (direct/indirect) so as to learn English effectively. • Students will compose formal and informal letters, reports, and job applications with clarity, correct structure, and suitable vocabulary.		
SYLLABUS		
Unit-I: The Sounds of English: Consonants, Mono-thongs, Diphthongs. An Acquaintance with Literary Forms:- Elegy, Ballad, and Sonnet An Acquaintance with Figures of Speech:- Simile, Metaphor, Personification, and Irony		
Unit-II: Poetry : William Shakespeare – All the World is a stage. Rabindranath Tagore – Where the Mind is without Fear. Act Play/Novel: R. K. Narayan – Vendor of Sweets.		
Unit-III: Introduction to Form Classes, Tenses and its uses. Articles, Preposition and Modal auxiliaries.		
Unit-IV: Active and Passive Voice, Direct and Indirect Speech, Prefixes and Suffixes, Connectives.		
Unit-V: English Writing Skills: Formal Letters & Informal Letters, Report Writing, Application for Job / Job Letter.		
SUGGESTED BOOKS		
1. "An Introduction to Literary Forms" by W.H. Hudson. 2. "The Vendor of Sweets" by R.K. Narayan 3. "English Verse: An Introduction" by David Kennedy 4. "High School English Grammar and Composition" by P.C. Wren & H. Martin. 5. "Effective English Communication" by M.A. Yadugiri&GeethaRajeevan.		

Discipline Centric Core Course (DCC)

PICCC24001P: Programming in C Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
1. Write a program to swap two numbers using a temporary variable. 2. Write a program to find the sum and average of three numbers. 3. Write a program to check whether a number is even or odd using. 4. Write a program to find the largest among three numbers. 5. Write a program to display a simple calculator using switch-case. 6. Write a program to print the multiplication table of a number using loops. 7. Write a program to generate the Fibonacci series up to n terms. 8. Write a program to find the sum and average of elements in a 1D array. 9. Write a program to sort an array in ascending order. 10. Write a program to perform matrix addition and multiplication. 11. Write a program to count the number of vowels in a string. 12. Write a program to find the factorial of a number using recursion. 13. Write a program to demonstrate call by value and call by reference. 14. Write a program to create a structure for student data and display it. 15. Write a mini-project to manage employee records using structures and file handling.		
SUGGESTED BOOKS		
1. "Programming in ANSI C" – E. Balagurusamy 2. "Let Us C" – Yashavant Kanetkar 3. "The C Programming Language" – Brian W. Kernighan & Dennis M. Ritchie 4. "Programming with C" – Byron Gottfried (Schaum's Outlines) 5. "Computer Fundamentals and Programming in C" – Reema Thareja		

Discipline Centric Core Course (DCC)

OALCC24001P: Office Automation Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
Part A: MS Word		
1. Create a formal letter to your principal requesting leave for a personal reason. Use proper formatting: ○ Font: Times New Roman, Size: 12 ○ Bold the headings and underline the subject. ○ Insert header with your name and footer with page number. 2. Design a biodata/resume using tables, bullet points, and borders. 3. Create a mail merge document to send invitations to 10 friends.		
Part B: MS Excel		
1. Create a marksheet for 10 students with fields: Name, Roll No, Subject 1–5, Total, Percentage, Grade. ○ Use formulas for Total and Percentage. ○ Use conditional formatting for grades (A, B, C, etc.). 2. Prepare a monthly expense sheet using Excel with bar/line chart representation. 3. Use functions like SUM, AVERAGE, IF, VLOOKUP/HLOOKUP in sample data.		
Part C: MS PowerPoint		
1. Design a 5-slide presentation on any one of the following topics: ○ Impact of Technology in Education ○ Cyber Security Basics ○ Artificial Intelligence in Daily Life Include: ○ Title Slide ○ At least one image ○ Use of transitions and animations ○ Proper use of bullet points and layout		

Discipline Centric Core Course (DCC)

ECLCC24001P: English Communication Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours

SUGGESTED LABORATORY EXERCISE

SELF DEVELOPMENT

Self-Management: Self-Evaluation, Self-Discipline, Self-Criticism, Self Awareness, Positive Thinking, Perceptions and Attitudes, Values and Belief Systems, Personal success factors, Handling failure, Knowing Yourself, identifying one's strengths and weaknesses.

Activity:

1. Student will describe about him/herself along with their strength and weakness.
2. Students should write their short term and long term goals.

COMMUNICATION SKILLS

Communication: Introduction, Verbal and non-verbal Communication. Listening Skills: Fundamentals of Good Listening. Reading Skills: Comprehension. Speaking Skills: Importance of speaking effectively, speech process, Style, conversation and oral skills, fluency and self expression, body language phonetics and spoken English, speaking techniques, word stress, voice quality, correct tone, positive image projection techniques, Public Speaking, Group discussion.

Activity:

1. Group discussion on current affairs. (at least 2 topics)
2. Students have to listen carefully each discussion and prepare a summary for it.

LANGUAGE AND WRITING SKILLS

Business Writing: Note Making, Letter writing, Writing Formal Letters. Technical Report Writing, Agenda and Minutes of a Meeting, E-Mail. Employment Communication: Job Application, Preparation of CV and Resume writing. Presentation skills: Professional Presentation, Planning a Presentation, Preparing the Presentation, Delivering the Presentation.

Activity:

1. Prepare a report for an IT project.
2. Write a job application and prepare your resume for the same.

LEADERSHIP AND TEAM BUILDING

Leader and Leadership, Culture and Leadership: Salient Features of Corporate Culture, Leadership

Styles, Leadership Trends, team Building: Team Development Stages,

Activity:

1. Split students into small groups and have them develop a product, logo, brand name and marketing strategy.
2. Students have to write down 5 positive points in their personality.

INTERVIEW SKILLS

Interview Skills: concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conferencing and video-conferencing.

Activity:

1. Organizing mock interviews for the students.
2. Organizing mock meetings for the students

BCA Semester: II 2025-26

Discipline Centric Core Course (DCC)

OPCCC24002T: Object-Oriented Programming with C++

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Explain the principles of object-oriented programming and apply them effectively and also Understand and apply the syntax and semantics of C++ programming language. • Implement operators and control statements used in C++. • Apply array and core concepts of OOP. • Explain polymorphism and inheritance in OOP. • Perform file operations for reading/writing external data using C++.		
SYLLABUS		
Unit-I: What is Object Oriented Programming, Characteristics of OOP, Difference between C and C++. Basics:-Input/Output in C++ using cin/cout, Preprocessor Directives, Data Types: built-in, derived and user defined. Type conversion: Implicit and Explicit, Manipulators.		
Unit-II: Operator's classification: based on availability of operands (unary, binary and ternary) and based on specific category (Arithmetic, Assignment, Relational, Logical, Bitwise, increment/decrement, conditional). Control structures / statements: Conditional, Looping and Jump Statements. Functions: needs, types: User defined and library function, Function arguments, Return values and nesting of function, Recursion, Default arguments, Dynamic initialization of variables, Inline functions		
Unit-III: Array: Single and Multi-Dimensional arrays, Array declaration and initialization of arrays, Strings: declaration, initialization, built-in functions. Pointers: Declaration, initialization, pointer arithmetic, pointer to pointer, types: generic (void) pointer, NULL pointer.Principles of OOP: data hiding, encapsulation, inheritance, polymorphism, overloading. Access specifiers: public, private, protected. Constructors (default, parameterized, copy) and Destructors, this pointer, Static data members and member functions.		
Unit-IV: Polymorphism: compile time / overloading: operator and function, and run time / overriding, virtual and pure virtual function, Abstract classes, Inheritance: needs, types: single, multilevel, multiple, hierarchical, hybrid inheritance.		
Unit-V: Templates: function templates, Exception Handling. File handling: built in functions, Stream Classes :iostream and fstream.		
SUGGESTED BOOKS		
1. E Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill. 2. YahwantKanetkar, "C++ Programming", BPB Publication 3. BjarneStroustrup , "The C++ Programming Language", Addison-Wesley 4. D. Ravichandran, "Programming with C++", Tata McGraw-Hill		

Discipline Centric Core Course (DCC)

DSTCC24002T: Data Structures

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Explain the foundational concepts of data structures and memory management, and demonstrate the concept of recursion through examples. • Apply and implement array and linked list structures in programs, performing insertion, deletion, and traversal operations. • Construct stacks and queues and apply them in expression handling and recursive function simulations. • Analyze tree and graph data structures using various traversal techniques and apply them in real-world applications. • Evaluate the performance of searching and sorting algorithms and choose the most appropriate method for different scenarios.		
SYLLABUS		
Unit-I: Introduction and Basic Concepts: Introduction to Algorithms and Flowcharts. Definition of Data Structures, Classification of data structures (primitive and non-primitive, linear and non-linear), and Abstract Data Type (ADT). Definition and meaning of static and dynamic memory allocation, Memory allocation functions. Recursion – Definition, advantages, Writing Recursive algorithms.		
Unit-II: Array & Linked List: Arrays: Definition, Single and Multidimensional Arrays, Row Major Order, and Column Major Order, Sparse Matrices and their representations. Linked lists: Definition of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list. Operations on singly linked list: creation, insertion, deletion, search and display. Applications of Arrays and Linked lists.		
Unit-III: Stack and Queue: Stacks: Definition, Array and Linked list representation of Stack, Push & Pop Operation. Application of stack: Infix, Prefix and Postfix representation and conversion using Stack, Postfix expression evaluation using stack, recursion using stack. Queues: Array and Linked list representation of Queue, Operations on Queue: Create, Add, Delete. Types of queues: Simple queue, Circular queue, Double ended queue (deque), Priority queue. Applications of queues.		
Unit-IV: Tree and Graph: Trees: Definition of Tree and basic Tree terminology, Types of Trees: Binary tree, Complete binary tree, Binary search tree, AVL Tree and Heap. Binary Tree Representation and operations. Tree Traversal algorithms: In order, Pre-order and Post order. Graphs: Terminology used with Graph, Data Structure for Graph Representations (Adjacency Matrices, Adjacency List). Graph Traversal: Depth First Search and Breadth First Search. Applications of graphs.		
Unit-V: Searching and Sorting: Searching & Sorting: Concept of Searching, Sequential search, Binary Search. Comparison between sequential and binary search. Concept of Hashing & Collision resolution Techniques used in Hashing. Sorting: Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Merge Sort.		
SUGGESTED BOOKS		
1. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill. 2. Ellis Horowitz, S. Sahni, Freed, "Fundamentals of Data Structures in C", 2nd edition, 2015. 3. Thomas H. Cormen, C.E. Leiserson, R L. Rivest and C. Stein, Introduction to Algorithms, Third edition, MIT Press. 4. Y. Langsam, M. J. Augenstein and A. M. Tanenbaum, —Data Structures using C, Pearson Education, Asia.		

Discipline Centric Core Course (DCC)

CNTCC24002T: Computer Networks

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
6 Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • To understand the fundamental concepts of computer networks, • To explore various types of networks (LAN, WAN, MAN) • To analyze the role and functioning of different network layers, • To study routing algorithms and congestion control mechanisms • To develop practical skills in configuring and troubleshooting network devices and protocols		
SYLLABUS		
Unit-I: Introduction: Data Communication: components – Networks: distributed processing, network criteria – Protocols and Standards. Basic Concepts:– Topology: Mesh, Star, Tree, Bus, and Ring, Transmission Mode (Simplex, Half duplex, Full Duplex) Categories of Networks: LAN, MAN, WAN– Internetworks.		
Unit-II: OSI and TCP/IP Models: Layers and their functions, comparison of models. Digital Transmission: Interfaces and Modems: Modems, Cable modems. Signals: Analog and Digital, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength. Modulation: Amplitude, Frequency and Phase modulation. Transmission Media: Guided and unguided.		
Unit-III: Multiple access protocol and networks, ALOHA, SLOTTED ALOHA, CSMA/CD, protocols; Ethernet LANs, Token Ring, Token Bus, back-bone networks, Network Devices: network adapters cards, repeaters, hubs, switches, bridges, types of bridges, router and gateways.		
Unit-IV: Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer Network Layer - Routing Algorithms (RIP, OSPF, BGP) - Congestion Control Algorithms - IP Protocol - IP Addresses – IPv4, IPv6.		
Unit-V: Network Security: Network security issues, approaches to network security, hacking. Firewalls: types of firewall technology- network level and application level, IP packets filter screening routers, limitations of firewalls Overview of Digital Signature and Digital Certificates technology.		
SUGGESTED BOOKS		
1. Behrouz A. Forouzan. Data Communications and Networking. Tata McGraw-Hill Edition, Fourth Edition. 2. Andrew s. Tanenbaum .Computer Networks. Pearson Education .Fourth Edition		

Ability Enhancement Core Course (AECC)

HINAC24002T: General Hindi

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L+1T)Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to:		
- इस पाठ्यक्रम के माध्यम से विद्यार्थी हिन्दी भाषा की परिभाषा एवं परिचय के साथ उसकी व्याकरणिक विशेषताओं की सामान्य जानकारी प्राप्त कर सकेगा। विद्यार्थी हिन्दी भाषा की वर्ण व्यवस्था आदि व्याकरणिक आधारों का परिचय प्राप्त कर सकेगा। भाषा के उच्चारण, लेखन तथा पठन में शुद्ध रूप का प्रयोग कर अपने कार्य क्षेत्र में भाषा के माध्यम से अपनी योग्यता सिद्ध कर सकेगा। - पाठ्यक्रम पूर्ण करने के पश्चात विद्यार्थी इनमें सक्षम होंगे—भाषा ओर उसकी उत्पत्ति के मूल सिद्धांतों अवधारणाओं से परिचित हो भाषिक परिवर्तनों को समझने में सक्षम होगा। हिन्दी भाषा की उत्पत्ति, व्याकरणिक विशेषता तथा उसके विकास क्रम को समझ सकेगा। वर्णों के भेदों व उच्चारण स्थानों का ज्ञान प्राप्त कर लेखन व उच्चारण में शुद्धता लायेगा। प्रभावी संप्रेषण का महत्व समझने के साथ-साथ विद्यार्थी रोजगार के विभिन्न क्षेत्रों हेतु लेखन, वाचन, पाठन में भी सक्षम होगा। विभिन्न प्रकार के पत्र लेखन शैलियों से परिचित हो उसका उपयोग करेगा।		
SYLLABUS		
Unit-I: भाषा की परिभाषा, प्रकृति एवं विविध रूप। हिन्दी भाषा की विशेषताएँ।		
Unit-II: संज्ञा, सर्वनाम, विशेषण, क्रिया, विभक्ति एवं अव्यय। हिन्दी की वर्ण व्यवस्था।		
Unit-III: संधि, समास, उपसर्ग, प्रत्यय।		
Unit-IV: भाषा संप्रेषण के चरण—श्रवण, अभिव्यक्ति, वाचन तथा लेखन। हिन्दी वाक्य रचनाएँ वाक्य और उपवाक्य, वाक्य भेद।		
Unit-V: भावार्थ और व्याख्या, पत्र लेखन – प्रार्थना पत्र, आवेदन पत्र, शिकायती पत्र, अभिनंदन पत्र, व्यावसायिक पत्र।		
SUGGESTED BOOKS		
- हिन्दी व्याकरण – कामता प्रसाद गुरु - मानक हिन्दी का स्वरूप – भोलानाथ तिवारी - संक्षेपण और पल्लवन – कैलाश चन्द भाटिया, तुमन सिंह - पत्र व्यवहार निर्देशिका – भोलानाथ तिवारी, विजय कुलश्रेष्ठ - राजकाज में हिन्दी – हरदेव बाहरी - व्यावहारिक हिन्दी व्याकरण एवं रचना – हरदेव बाहरी		

Discipline Centric Core Course (DCC)

OPCCC24002P: Object Oriented Programming with C++ Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
1. Write a program in C++ to implement arithmetic operators (by functions) using switch case with in class. 2. Write a program in C++ to perform function overloading. 3. Write a program in C++ to implement inline function. 4. Write a program in C++ to implement friend function. 5. Write a program in C++ to overload unary operator (++/- -). 6. Write a program in C++ to overload binary operator (-). 7. Write a program in C++ to implement constructor overloading. 8. Write a program in C++ to implement single inheritance. 9. Write a program in C++ to perform multilevel inheritance. 10. Write a program in C++ to perform multiple inheritance. 11. Write a program in C++ to perform hybrid inheritance. 12. Write a program in C++ to perform hierarchical inheritance. 13. Write a program in C++ to implement virtual function. 14. Write a program in C++ to implement static members. 15. Write a program in C++ to implement template.		
SUGGESTED BOOKS		
1. E Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill. 2. YahwantKanetkar, "C++ Programming", BPB Publication 3. BjarneStroustrup , “The C++ Programming Language”, Addison-Wesley 4. D. Ravichandran, “Programming with C++”, Tata McGraw-Hill		

Discipline Centric Core Course (DCC)

DSTCC24002P: Data Structures Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
1. Array Operations Create an array and perform the following: • Insertion • Deletion • Traversal • Searching		
2. Stack using Array Implement stack using array with operations: • Push • Pop • Peek • Display		
3. Stack using Linked List • Same as above but using singly linked list.		
4. Infix to Postfix Conversion • Convert an infix expression to postfix using stack.		
5. Queue using Array • Implement a linear queue with enqueue and dequeue operations.		
6. Circular Queue • Implement a circular queue and handle overflow and underflow conditions.		
7. Singly Linked List • Create a singly linked list and perform: • Insert at beginning/end • Delete from beginning/end • Display list		
8. Doubly Linked List • Perform insert and delete operations on both ends of a doubly linked list.		
9. Binary Search • Implement binary search on a sorted array.		
10. Sorting Algorithms • Write programs to implement: • Bubble Sort • Insertion Sort • Selection Sort		
11. Binary Search Tree (BST) • Create a BST and perform: • Insertion • Deletion • In-order, Pre-order, Post-order traversals		

BCA Semester: III 2026-27

Discipline Centric Core Course (DCC)

DMSCC25003T: Database Management Systems

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: - Recall the Database Management Systems (DBMS) and the challenges of file-based data management systems and the responsibilities of a database administrator (DBA) and a database manager in database management. - Explain the concepts of entities, attributes, and relationships in ERM and their roles in database design - Apply the concepts of database languages, data independence principles to design and create database schemas - Apply various join operations, mathematical functions and string oriented functions - Explain PL/SQL block, data type, control structures, sequential control, transaction management		
SYLLABUS		
Unit-I: Introduction to Database: Need for DBMS, advantages of DBMS, views of data, instances and schema data independence, database administrator, database manager, database languages, overall structure of DBMS.		
Unit-II: Entity Relationship Model: Entities, attributes, relationships, constraints, keys, E-R diagram. Concept of strong and weak entity sets, generalization, specialization and aggregation. RDBMS – Basic concept, Codd's rule for RDBMS. Functional dependencies and Normalization for relational databases - design guidelines for relational schema, functional dependencies, normal forms (1NF, 2NF and 3NF).		
Unit-III: SQL – Basic structure – Clauses, data types, creates tables. Modification of the database – deletion, insertion, updates. Retrieving data from tables, ordering, set operations – union, intersect, except, concept of NULL values, nested subqueries – set membership, set comparison, exist and not exist operator, unique, not unique construct.		
Unit-IV: Joins, equi-joins, non-equi-joins, self joins, outer joins. Aggregate functions – group by and having clause. Math functions-ABS, CEIL, FLOOR, ROUND, POWER, SQRT, EXP, MOD AND TRUNC, string functions-LENGTH, LOWER, UPPER, TRIM, CONCAT. Views, granting and revoking permissions.		
Unit-V: PL/SQL: Basics concepts, advantages, variables, constants, data types, comments, output function, control structures – conditional, iterative and sequential control, database access with PL/SQL, transaction management Cursor – basic concept, types-implicit and explicit, Procedures and Functions - advantages, creation, execution, deletion, overloading, stored procedures and functions. Packages – creation and execution. Triggers - use, types, creating, deleting. Exception Handling.		
SUGGESTED BOOKS		
1. Ivan Bayross, Title: SQL, PL/SQL – The Programming Language of Oracle, BPB Publications		
2. Silberschatz, Korth & Sudarshan, Database System Concepts, McGraw Hill Education		
3. Dr. Madhulika Jain, Satish Jain, DBMS: Complete Practical Approach, BPB Publications		

Discipline Centric Core Course (DCC)

OSYCC25003T: Operating Systems

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Define the concept of an Operating System and Process Management. • Analyze different page replacement algorithms and their impact on system performance, process scheduling criteria and various CPU scheduling algorithms. • Analyze the effectiveness of various deadlock prevention and avoidance techniques. • Integrate multiple Linux commands and utilities to solve complex problems efficiently. • Evaluate the security implications of changing permissions and ownership in a Linux environment		
SYLLABUS		
Unit-I: Introduction: Definition of Operating System, Operating System Services, Types of operating systems, Process Management: Process concept, Process States, Representation of process (PCB), Process Scheduling.		
Unit-II: CPU Scheduling: Scheduling Criteria, Scheduling Algorithms: First-Come, First-Served (FCFS), Shortest Job First (SJF), Shortest Remaining Time First (SRTF), Round Robin (RR), Priority Scheduling, algorithm evaluation.		
Unit-III: Memory Management: Contiguous, Non-contiguous, Swapping, Fragmentation, Paging, Segmentation, Virtual memory management, Demand paging, Page replacement algorithms. The Deadlock problem, Characterization (Hold and wait, Circular Wait, Non-Pre-emption, no sharing of resources), concepts of -Prevention, Avoidance, Detection and Recovery from Deadlock.		
Unit-IV: Introduction to the Concept of Open-Source Software, Linux distributions, architecture, Linux file system (inode, Super block), Kernel, Introduction to Shell, Various shells, vi editor, Linux files and the file structure, I/O redirection and Piping, File and Directory oriented commands, Internal and External commands, Simple filters commands – grep, head, tail, cut, paste, sort, uniq. nohup command. Compiling C Programs in Linux Environment.		
Unit-V: Shell programming: Interactive scripts. Shell variables, assigning values to variables, positional parameters, arithmetic in shell script and exit status of a command. sleep and wait, taking decisions, Loop Control Structure, Shell Meta-characters. changing permissions and ownership.		
SUGGESTED BOOKS		
1. Linux: The Complete Reference, Richard Petersen. 2. Design of the UNIX Operating System Maurice J. Bach, AT&T Bell Labs. 3. Unix shell programming, YashwantKanetkar, BPB Publications.		

Discipline Centric Core Course (DCC)

JPGCC25003T: Java Programming

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the fundamentals of Java including data types, control structures, and arrays. • Implement object-oriented concepts like classes, objects, inheritance, and polymorphism. • Handle exceptions and apply robust error-handling mechanisms. • Use threads and perform file operations using Java I/O APIs. • Develop GUI-based applications using AWT/Swing and handle events effectively.		
SYLLABUS		
Unit-I: Introduction to Java Programming: History and evolution of Java, Java features and architecture, Java Development Kit (JDK), JRE, JVM, Structure of a Java program, Data types, variables, operators, expressions, Control structures (if, switch, loops), Introduction to arrays and command-line arguments		
Unit-II: Object-Oriented Programming in Java: Classes and objects, Constructors and types, Method overloading, Static members, Access specifiers, Introduction to packages and interfaces		
Unit-III: Inheritance, Polymorphism & Exception Handling: Inheritance: types, super and final keywords, Method overriding and dynamic method dispatch, Abstract classes and interfaces, Exception handling: try-catch, finally, throw, throws, Built-in and user-defined exceptions		
Unit-IV: Multithreading, String Handling & I/O: String and StringBuffer classes, Multithreading: Thread class, Runnable interface, thread lifecycle, Thread synchronization and inter-thread communication, Java I/O: Byte and Character streams, File handling (FileReader, FileWriter, BufferedReader)		
Unit-V: Applet, AWT & Event Handling (GUI Programming): Applet lifecycle and basics, Abstract Window Toolkit (AWT) controls and layout managers, Event handling mechanisms, Introduction to Swing components (JButton, JLabel, JTextField) Simple GUI-based applications. Introduction to JDBC, Essential JDBC classes, Connecting to database.		
SUGGESTED BOOKS		
1. E. Balagurusamy – <i>Programming with Java</i>, McGraw Hill Education 2. Herbert Schildt – <i>Java: The Complete Reference</i>, McGraw Hill 3. Kathy Sierra, Bert Bates – <i>Head First Java</i>, O'Reilly Media 4. Paul Deitel & Harvey Deitel – <i>Java How to Program</i>, Pearson Education 5. Dr. R. Nageswara Rao – <i>Core Java: An Integrated Approach</i>, Dreamtech Press		

Discipline Centric Core Course (DCC)
DMSCC25003P: Database Management Systems Lab
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
Q1. Create a database named UniversityDB. Q2. Create the following tables with appropriate data types and constraints: • Students(StudentID, Name, Gender, DOB, DepartmentID) • Departments(DepartmentID, DeptName) • Courses(CourseID, CourseName, Credits) • Enrollments(EnrollID, StudentID, CourseID, Semester) Q3. Alter the Students table to add a new column Email with NOT NULL constraint. Q4. Add a CHECK constraint to ensure that the Credits in Courses table is between 1 and 6. Q5. Add a FOREIGN KEY to Enrollments table referencing Students. Q6. Insert at least 5 sample records into each of the above tables. Q7. Update the Email of a student whose name is 'Amit'. Q8. Delete all students who belong to a department that no longer exists. Q9. Display all student names in ascending order. Q10. List all students born after the year 2000. Q11. Retrieve the list of departments that start with the letter 'C'. Q12. Count the total number of students enrolled in the 'Computer Science' department. Q13. Find the average number of credits for all courses. Q14. List departments having more than 3 students. Q15. Write a query to list all students with their course names using INNER JOIN. Q16. Display all students and the courses they are enrolled in, including those not enrolled in any course (LEFT JOIN). Q17. Find the courses that are not taken by any student. Q18. Find the names of students who have enrolled in all courses having more than 3 credits. Q19. Retrieve students who belong to the same department as 'Priya'. Q20. Display the names of courses that have more credits than the average course credit. Q21. Write a PL/SQL block to check if a number is even or odd. Q22. Write a PL/SQL program to calculate factorial of a number using FOR loop.		
SUGGESTED BOOKS		
1. Ivan Bayross, Title: SQL, PL/SQL – The Programming Language of Oracle,BPB Publications 2. Silberschatz, Korth&Sudarshan, <i>Database System Concepts</i>, McGraw Hill Education 3. Dr.Madhulika Jain, Satish Jain, <i>DBMS: Complete Practical Approach</i>, BPB Publications		

Discipline Centric Core Course (DCC)

JPLCC25003P: Java Programming Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
Q1. Write a program to calculate the sum of 2 user input integer number. Q2. Write a program to find whether a given number is prime or not. Q3. Write a menu driven program for following: 1. Compute Factorial of a number. 2. Check whether a given number is odd or even. 3. Check whether a given string is Palindrome or not. Q4. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed. Q5. Write a program in java to input N numbers in an array and print out the Armstrong numbers from the set. Q6. Write Java program to find the sum of all odd numbers in a 2D array. Q7. Write a Java program to find duplicate elements in a 1D array and find their frequency of occurrence. Q8. Write a java program for the following matrix operations: 1. Addition of two matrices. 2. Multiplication of two matrices. Note: Input the elements of matrices from user. Q9. Write a java program that computes the area of a circle, rectangle and a triangle using function overloading. Q10. Write a Java for the implementation of multiple inheritance using interfaces to calculate the area of a rectangle and triangle. Q11. Write a java program to create a package that validates username and password. Q12. Write a java program to design a basic calculator using SWING. Q13. Write a program for the following string operations: Compare two strings, Concatenate two strings, Compute length of a string. A14. Create a class called Fraction that can be used to represent the ratio of two integers. Include appropriate constructors and methods. If the denominator becomes zero, throw and handle an exception. Q15. Write a Java program in which total 4 threads should run. Set different priorities to the thread. Q16. Write a JAVA program to perform the following: 1. Insert records in a database 2. Update searched record in a database 3. Delete searched records in a database 4. Display selected/all records from a database		

Discipline Centric Core Course (DCC)

OSYCC25003P: Operating System Lab (Linux and Shell Script)

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
1. Launch the vi editor to create and save a text file named sample.txt. 2. List all files in your current directory, showing hidden files and detailed information. 3. Display the contents of a text file example.txt using different commands. 4. Create a directory named testdir and then delete it. 5. Change the permissions of a script myscript.sh to make it executable for everyone. 6. Change the owner of the file data.txt to another user on your system. 7. Write a command to list files in a directory and redirect the output into a file named output.txt. 8. Use pipes to search for the word “Linux” in a text file named notes.txt. 9. Demonstrate any three internal commands and three external commands in Linux. 10. Use the grep command to find all lines containing the word “kernel” in a file. 11. Display the first five and last five lines of a file named log.txt. 12. Use the cut command to extract the first column from the file /etc/passwd. 13. Combine two files side by side using the paste command. 14. Sort the contents of a file and remove duplicate lines using appropriate commands. 15. Execute a shell script so that it continues running even after you log out using the nohup command. 16. Write, compile, and execute a simple C program in Linux to display “Hello, Linux!”. 17. Write a shell script that asks the user for their name and prints a welcome message. 18. Write a shell script to perform addition, subtraction, multiplication, and division of two numbers. 19. Create a shell script that prints the values of the first and second positional parameters passed to it. 20. Write a shell script that checks if a number entered by the user is greater than 10.		

BCA Semester: IV 2026-27

Discipline Centric Core Course (DCC)

PPGCC25004T: Python Programming

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand and apply basic syntax, variables, and program structure in Python. • Apply control statements of python programming language • Understand and implement built in data structures of Python • Perform file handling and exception handling in Python • Apply object-oriented programming principles and libraries of Python.		
SYLLABUS		
Unit-I: Introduction to Python: Python Features, Structure of a Python Program, Elements of Python, Python Interpreter, Python shell, Indentation, Strongly Typed features, Basic data types, Variables, Expressions, Statements, Flow of Execution, Input and Output Statements, Atoms, Identifiers and Keywords, Literals, Strings. Operators: Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator.		
Unit-II: Control Statements: IF, IF...ELSE, IF...ELIF..ELSE, MATCH...CASE. Loop Controls: WHILE Loop, FOR Loop, Range function, break, continue and pass statement with loop. Python Data Structures: Strings: single line and multi-line strings, formatter, isdigit, isalpha, isalnum, islower, isupper, isspace, title, lower, upper, strip, split, splitlines join.		
Unit-III: Lists: append, extend, insert, index, remove, pop, count, sort, reverse, slicing, Copying a list deep copy, shallow copy. Tuples: tuples, index, count, max, min, len. Dictionaries: keys, values, nested dictionaries, dictionary comprehension, clear, copy, get, items, keys, pop, popitem. Sets Union, Intersection, Subset, Superset, Difference, Symmetric Difference, Copy, Add, Remove, Discard.		
Unit-IV: Files, Regular Expression, and Exception Handling: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules. Regular Expression: Introduction/Motivation, Special Symbols, and Characters for REs, REs, and Python. What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.		
Unit-V: Concept of Object Oriented Programming: Data Hiding, Data Encapsulation, Class and Object, Polymorphism, Inheritance, Advantages of Object Oriented Programming over Earlier Programming Methodologies Classes: Defining Classes, Creating Instance Objects, Accessing Attributes and Methods, Constructor Methods in a Class. Introduction to Libraries: NumPy, Pandas, Matplotlib.		
SUGGESTED BOOKS		
1. Core Python Programming, R. NageswaraRao, Dreamtech Press, Second Edition, 2018 2. Python Programming, Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, Notion Press, First Edition, 2020 3. The Complete Reference Python, Martin C. Brown, McGraw Hill Education, Fourth Edition, 2018 4. Think Python, Allen B. Downey, O'Reilly Media, 2016		

Discipline Centric Core Course (DCC)

CGPCC25004T: Computer Graphics

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Demonstrate understanding of the graphics pipeline and coordinate systems. • Apply algorithms for line, circle, and polygon drawing. • Perform 2D geometric transformations and understand viewport transformation • Understand the concept of 3D transformation and concept of projection. • Understand basics of animation, its types and apply graphics implementation through C language		
SYLLABUS		
Unit-I: Introduction to Computer Graphics: Definition and applications of computer graphics, Types of graphics: Raster and Vector, Interactive and non-interactive graphics, Display devices: CRT, LCD, LED, Touchscreen, Input devices: Mouse, Keyboard, Digitizers. Logical classification of input devices.		
Unit-II: Output Primitives: Line drawing algorithms: DDA and Bresenham's, Mid Point circle algorithm, Polygon drawing: scan-line polygon fill algorithm, Attributes of Graphics Primitives – color and gray scale, Character generation methods		
Unit-III: Geometric Transformations: Basic transformations: Translation, Rotation, Scaling, Shearing, Reflection. Homogeneous coordinates and matrix representation, Composite transformations, Window-to-viewport transformation, Clipping algorithms: Cohen-Sutherland, Sutherland Hodgeman polygon clipping, Weiler-Atherton polygon clipping, Text clipping.		
Unit-IV: 3D Graphics and Transformations: 3D concepts and representation, 3D transformations: Translation, Rotation, Scaling, Projections: Perspective and parallel projection.		
Unit-V: Animation and Graphics Programming: Basics of animation and its types, Keyframe animation concepts, Morphing, Graphics implementation in C language: graphics.h header file and available built-in functions like: initgraph(), closegraph(), line(), lineto(), linerel(), circle(), rectangle(), putpixel(), setcolor(), setfillstyle(), floodfill(), getmaxx(), getmaxy(), moveto(), moverel()		
SUGGESTED BOOKS		
1. Hearn, D. & Baker, M.P. – Computer Graphics with OpenGL, Pearson Education. 2. Foley, van Dam, Feiner & Hughes – Computer Graphics: Principles and Practice, Addison-Wesley. 3. Amitabh Mukherjee & Arup Chattopadhyay – Computer Graphics, Vikas Publishing.		

Discipline Centric Core Course (DCC)

ECSCC25004T: E-Commerce & Cyber Security

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L + 2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the concept and models of E-Commerce and their application in business. • Analyze the architecture and technological infrastructure of E-Commerce. • Identify security threats in the digital world and understand cyber laws. • Apply cyber security principles and countermeasures to safeguard information. • Evaluate various digital payment systems and secure online transactions.		
SYLLABUS		
Unit-I: Introduction to E-Commerce: Definition and Scope of E-Commerce, Types of E-Commerce: B2B, B2C, C2C, G2C, Advantages and Limitations of E-Commerce, E-Commerce Framework and Architecture, Internet, Intranet, and Extranet in E-Commerce, E-Commerce vs Traditional Commerce		
Unit-II: E-Commerce Infrastructure and Business Models: Electronic Data Interchange (EDI), E-Commerce Platforms and Technologies (Web servers, Web 2.0/3.0), Business Models in E-Commerce, E-shop, E-mall, E-Auction, E-Broker, E-Business Strategy and Revenue Models, Online Retailing and e-Tailing		
Unit-III: Cyber Security Fundamentals: Introduction to Cyber Security, Information Security Objectives: CIA Triad, Threats and Vulnerabilities, Malware: Virus, Worms, Trojan, Social Engineering, Phishing, Spoofing, Cyber Attacks: DoS, DDoS, SQL Injection, Firewalls, Antivirus, and Security Tools		
Unit-IV: Security in E-Commerce and Legal Issues: Secure Electronic Transactions (SET), SSL/TLS Protocols, Digital Signatures and Certificates, Authentication Mechanisms, IT Act 2000 and Amendments, Cyber Law and Ethics in India		
Unit-V: Online Payment Systems and Case Studies: Online Payment Modes: Credit Card, Debit Card, UPI, Net Banking, Wallets, E-Banking and Mobile Commerce, Blockchain and Crypto in E-Commerce, Case Studies: Amazon, Flipkart, Paytm, etc., Security in Mobile and Cloud Commerce		
SUGGESTED BOOKS		
1. E-Commerce: Fundamentals and Applications – Henry Chan, Raymond Lee (Wiley) 2. Frontiers of E-commerce – Ravi Kalakota and Andrew Whinston (Pearson) 3. Cyber Security Essentials – James Graham, Richard Howard, Ryan Olson (CRC Press) 4. Introduction to Cyber Security – Chwan-Hwa (John) Wu, J. David Irwin (CRC Press) 5. Cyber Laws – Justice Yatindra Singh (Universal Law Publishing)		

Discipline Centric Core Course (DCC)
PPLCC25004P: Python Programming Lab
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISES		
1. Write a program in Python to count repeated characters in a string. 2. Write a program in Python to implement various string operators. 3. Write a program in Python to implement different types of built in string oriented functions. 4. Write a program in Python to create, append, and remove list elements from a given list. (List elements must be from user side) 5. Write a program in Python to display the sum and square of given integer elements from a given list. 6. Write a program in Python to find the largest and smallest number in a user defined list. 7. Write a program in Python to find unique and duplicate items of a user defined list. 8. Write a program in Python to count the numbers of characters in the string and store them in a dictionary data structure. 9. Write a program in Python to implement linear search. 10. Write a program in Python to implement various built in functions for Tuple. 11. Write a program in Python to implement Regular Expression (RegEx). 12. Write a program in Python to define a module to find Fibonacci Numbers and import the module to another program. 13. Write a program in Python to define a module and import a specific function in that module to another program. 14. Write a Python script named demo.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file. 15. Write a program in Python to accept student details and store in a database.		
SUGGESTED BOOKS		
1. Core Python Programming, R. NageswaraRao, Dreamtech Press, Second Edition, 2018 2. Python Programming, Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, Notion Press, First Edition, 2020 3. The Complete Reference Python, Martin C. Brown, McGraw Hill Education, Fourth Edition, 2018 4. Think Python, Allen B. Downey, O'Reilly Media, 2016		

Discipline Centric Core Course (DCC)
CGLCC25004P: Computer Graphics Lab
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
Q1. Write a C program to initialize graphics mode and draw a straight line using line() function. Q2. Write a C program to draw basic shapes: circle, rectangle, and ellipse. Q3. Write a C program to draw a line using DDA (Digital Differential Analyzer) algorithm. Q4. Write a C program to implement Bresenham's Line Drawing Algorithm. Q5. Write a C program to draw a polygon by accepting vertices from the user. Q6. Write a C program to fill a polygon using Boundary Fill Algorithm. Q7. Write a C program to implement the Flood Fill Algorithm. Q8. Write a C program to perform 2D Translation of a triangle. Q9. Write a C program to perform 2D Rotation of a triangle. Q10. Write a C program to implement 2D Scaling of a square. Q11. Write a C program to implement Midpoint Circle Drawing Algorithm. Q12. Write a C program to create simple animation: a moving car or bouncing ball.		
SUGGESTED BOOKS		
1. "Computer Graphics (C Version)", Donald Hearn & M. Pauline Baker, Pearson Education 2. "Computer Graphics & Multimedia", A. P. Godse & D. A. Godse, Technical Publications		

BCA Semester: V 2027-28

Discipline Specific Elective (DSE)

CSASE26005T: Computer System Architecture

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to • Understand the fundamental architecture of computer systems, including functional units, instruction cycles, and performance metrics. • Analyze and design control units, differentiating between hardwired and micro programmed approaches, and evaluate instruction set architectures (RISC vs CISC). • Apply knowledge of data representation and arithmetic operations, including binary formats, floating-point standards, and arithmetic algorithms. • Evaluate memory organization and management techniques, including cache mapping, virtual memory, and hierarchy models. • Demonstrate understanding of I/O systems and advanced architectural concepts, such as pipelining, parallel processing, and multicore systems.		
SYLLABUS		
Unit-I: Introduction to Computer Architecture and Organization: Basic Concepts : Definition and scope of computer architecture, Von Neumann vs Harvard architecture, Flynn's classification (SISD, SIMD, MISD, MIMD), Register Transfer and Microoperations : Register Transfer Language (RTL), Arithmetic, logic, and shift micro operations, Bus and memory transfers, Instruction Cycle and Design, Instruction formats and types, Addressing modes (direct, indirect, indexed, etc.), Design of a basic computer: control unit, ALU, memory		
Unit-II: Central Processing Unit and Pipelining: 8085 CPU Organization : General register organization, Stack organization and subroutine handling, Instruction formats , 8085 instruction set , Control Unit Design : Hardwired vsmicroprogrammed control, Control memory and sequencing, Instruction Set Architecture (ISA) : RISC vs CISC characteristics, Instruction pipelining, Arithmetic and instruction pipelines.		
Unit-III: Computer Arithmetic: Number Representation: Binary, octal, hexadecimal systems, Fixed-point and floating-point formats, Arithmetic Operations: Addition and subtraction, Multiplication: add-and-shift, Booth's algorithm, Division, Floating Point Arithmetic: Addition, subtraction.		
Unit-IV: Memory Organization: Memory Types and Hierarchy: RAM, ROM, Cache, Virtual Memory, Memory hierarchy and access time, Associative and Cache Memory: Mapping techniques: direct, associative, set-associative, Replacement policies and write strategies, Virtual Memory Management: Paging and segmentation and page replacement algorithms		
Unit-V: Input-Output Organization and System Design: I/O Techniques : Programmed I/O, Interrupt-driven I/O, DMA, I/O interfaces and buses, Interrupt Handling : Priority interrupt, vectored and non-vectored, I/O processors and controllers, Advanced System Concepts : Pipelining and parallel processing, Introduction to multicore and distributed systems, Performance metrics: throughput, latency, speedup		
SUGGESTED BOOKS		
1. Malvino, A. Digital Computer Electronics, Tata McGraw-Hill. 2. Sinha, P.K. Computer Fundamentals, BPB Publications. 3. Carpinelli, J.D. Computer Systems Organization & Architecture, Pearson Education. 4. Malvino, A.P. Electronic Principles, McGraw-Hill.		

Discipline Specific Elective (DSE)

MOASE26005T: Mobile Application Development

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the fundamentals of mobile computing and development platforms. • Design user interfaces for mobile applications with responsive layouts. • Implement mobile applications using Android SDK / Kotlin / Java. • Integrate mobile applications with databases and web services. • Test and deploy mobile applications on emulators and physical devices.		
SYLLABUS		
Unit-I: Introduction to mobile applications – Challenges faced in Mobile Development, Types of Mobile App., Device and Design considerations for mobile applications, user interfaces for mobile applications, touch events and gestures, Overview of mobile OS: Android, iOS, Windows Mobile, Android Architecture & Components. Installing and configuring Android SDK and Android Studio. Android virtual Emulators.		
Unit-II: Android Application Structure, adding Android virtual device, Creating first android application, Testing Android application. Knowing XML file, AndroidManifest.XML, Activity, Activity life cycle, Passing data between activities, Navigating between screen, Intents/Filters, Fragment: life cycle, creation and usage.		
Unit-III: Application User Interface – Views and Layouts: Linear, Relative, Frame, Table, Constraint, Widgets: Button, TextView, EditText, CheckBox, RadioButton, ImageView, Menus and Menu Hierarchies, context Menus and Popup Menus, Dialog - Alert Dialog class, activities as Dialogs, Toasts and Notifications.		
Unit-IV: Sharing Data in Android-Creating and Using the Content Provider- Android Contacts, Media, Calendar are accessed using content providers. SMS Messaging -Sending Email-Displaying, Phone Calls. .		
Unit-V: Database : Introducing SQLite, SQLite Programming, Testing, Debugging, and Deployment-Debugging and Error Handling ,Testing on Emulator and Physical Device, APK Generation and App Signing, Publishing App to Google Play Store		
SUGGESTED BOOKS		
1. Head First Android Development by Dawn Griffiths & David Griffiths 2. “Android Studio 3.0 Development Essentials: Android”, 8th Edition. Neil Smyth , 3. “Android Application Development (With Kitkat Support)”, Black Book 2014. Pradeep Kothari, 4. Android Programming: The Big Nerd Ranch Guide by Bill Phillips & Chris Stewart 5. Professional Android by Reto Meier 6. Beginning Android Application Development by Wei-Meng Lee		

Discipline Specific Elective (DSE)

IAMSE26005T: Introduction to AI and ML

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L + 2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand and describe AI types, applications, and explain the structure and functioning of intelligent agents using PEAS representation. • Apply and implement various search strategies and solve path-finding and game-based problems using appropriate AI algorithms. • Analyze and apply logical reasoning methods for knowledge representation in intelligent systems. • Analyze and distinguish various machine learning paradigms and explain their use in data-driven decision making. • Apply and develop basic ML models using supervised and unsupervised algorithms for pattern detection and prediction.		
SYLLABUS		
Unit-I: Introduction to Artificial Intelligence: Definition and History of Artificial Intelligence, Types of AI (Narrow AI, General AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Aware AI), Applications of Artificial Intelligence. Intelligent Agents, Types of Agents, Agent Environments, PEAS representation for an Agent, Architecture of Intelligent agents.		
Unit-II: Search Strategies: Solving problems by searching, Un-Informed Search strategies - BFS, DFS; Informed Search strategies: Hill Climbing, Best-First Search, A* Algorithm. Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.		
Unit-III: Knowledge Representation & Reasoning: Approaches to knowledge representation: Propositional Logic, First Order Predicate Logic, Inference Rules (Modus Ponens, Modus Tollens, Resolution, And elimination, Syllogism), Production Rules, Reasoning: Forward and backward reasoning, Non-monotonic Reasoning, Reasoning with uncertainties.		
Unit-IV: Introduction to Machine Learning: Definition of Machine Learning, Applications of ML, Key differences between AI and ML. Types of Machine Learning (Supervised Learning, Unsupervised Learning, Reinforcement Learning). Data Mining vs Machine Learning vs Big Data Analytics.		
Unit-V: Supervised and Unsupervised Learning: Supervised Learning: Linear and Logistic Regression, Classifying with k-Nearest Neighbor classifier, Decision Tree classifier, Support Vector Machine (SVM). Unsupervised Learning: Dimensionality reduction (Principal component analysis), Clustering (K- means clustering), Association Rule Learning (Apriori Algorithm).		
SUGGESTED BOOKS		
1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed., 2009 2. Stuart Russell, Peter Norving, "Artificial Intelligence: A Modern Approach", Pearson Education, 3rd edition, 2010. 3. Ethem Alpaydm, Introduction to Machine Learning, PHI, Third Edition. 4. Tom Mitchell, Machine Learning, McGraw-Hill, First Edition, 5. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, 1st edition, 1997.		

Discipline Specific Elective (DSE)

DSCSE26005T: Data Science

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L + 2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the fundamental concepts of data science. • Evaluate the data analysis techniques for applications handling large data and demonstrate the data science process. • Understand the concept of machine learning used in the data science process. • Understand and apply the concept of correlation, association, regression analysis and infer its results.		
SYLLABUS		
Unit-I: Data Evolution: Data to Data Science – Understanding data: Introduction – Type of Data, Data Evolution – Data Sources. Preparing and gathering data and knowledge - Philosophies of data science - data all around us: the virtual wilderness - Data wrangling: from capture to domestication - Data science in a big data world - Benefits and uses of data science and big data - facets of data.		
Unit-II: Digital Data-An Imprint: Introduction to Big Data: - Evolution of Big Data - What is Big Data – Sources of Big Data. Characteristics of Big Data 6Vs – Big Data-Challenges of Conventional Systems- — Data Processing Models – Limitation of Conventional Data Processing Approaches – Big Data. Big Data Exploration - The Big data Ecosystem and Data science. Overview of the data science process - retrieving data - Cleansing, integrating, and transforming data.		
Unit-III: Machine learning – Modelling Process – Training model – Validating model – Predicting new observations –Supervised learning, Unsupervised learning, Semi-supervised learning. Exploratory data analysis.		
Unit-IV: Basic Statistics: The basics of statistics include the measure of central tendency and the measure of dispersion. Mean, median and mode are the central tendencies and dispersions include variance and standard deviation.		
Unit-V: Correlation and Regression Correlation: Scatter plot- Karl Pearson coefficient of correlation- Spearman's rank correlation coefficient- multiple and partial correlations (for 3 variates only). Regression: Concept of errors Principles of Least Square- Simple linear regression and its properties.		
SUGGESTED BOOKS		
1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman and Mohamed Ali, Manning Publications, 2016. 2. Think Like a Data Scientist, Brian Godsey, Manning Publications, 2017. 3. Ethics and Data Science, Mike Loukides, Hilary Mason and D J Patil, O'Reilly, 1st edition, 2018. 4. B.L. Agarwal - Basic Statistics- 6th ed.- New Age International Publication- 2015. 5. V.K. Rohatgi and E. Saleh - An Introduction to Probability and Statistics- 3rd ed.- John Wiley & Sons Inc.- New Jersey- 2015.		

Discipline Specific Elective (DSE)

CLCSE26005T: Cloud Computing

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L + 2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to:		
• Explain the concepts and models of cloud computing. • Differentiate among various cloud service and deployment models. • Understand the role of virtualization in cloud computing. • Evaluate and apply cloud security and management practices. • Understand the role of cloud in current market trends and get knowledge of cloud's disaster management		
SYLLABUS		
Unit-I: Introduction to Cloud Computing: Evolution of cloud computing, Basic concepts and definitions, Characteristics of cloud computing, Benefits and challenges, Risks and Approaches of Migration into Cloud, Service-oriented architecture (SOA), Grid computing vs. cloud computing, Green computing		
Unit-II: Cloud Architecture: cloud architecture, features, and benefits of Service Models: Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.		
Unit-III: Virtualization: Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples- VMware and Microsoft Hyper-V. Virtualization of CPU, Memory, I/O Devices, Virtual Cluster, data center, and Resources Management.		
Unit-IV: Cloud Security and Management: Cloud security fundamentals, Identity and access management (IAM), Data privacy and compliance, Risk management, Disaster recovery, Monitoring and resource management tools		
Unit-V: Defining the Clouds for Enterprise: Storage as a service, Database as a service, Process as a service, Information as a service, Integration as a service, and Testing as a service. Disaster Management in Cloud: Disasters in the Cloud, Disaster Recovery Planning.		
SUGGESTED BOOKS		
1. RajkumarBuyya et al., Mastering Cloud Computing, McGraw-Hill. 2. Anthony T. Velte, Cloud Computing: A Practical Approach, McGraw-Hill. 3. GautamShroff, Enterprise Cloud Computing, Cambridge University Press.		

Discipline Specific Elective (DSE)
BDASE26005T: Big Data Analytics
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L + 2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: - Understand and describe Big Data types, features, and the challenges of traditional systems in managing large-scale data. - Analyze the structure and components of Hadoop and differentiate it from traditional systems. - Apply implement MapReduce programs and demonstrate its working through code and execution stages. - Analyze functionalities of Pig, Hive, and HBase, and compare their data processing approaches with RDBMS. - Evaluate and assess real-world Big Data applications and explain their impact across diverse sectors.		
SYLLABUS		
Unit-I: Introduction to Big Data: Classification of data, Types of Data, Evolution and definition of Big data, Big data features and challenges, Problems with Traditional Large-Scale System, Sources of Big Data, Vs of Big Data.		
Unit-II: Introduction to Hadoop and HDFS: Introduction to Hadoop, RDBMS VsHadoop, History of Hadoop, Hadoop overview, Hadoop Distributed File System (HDFS) - Building blocks of Hadoop (Name node. Data node. Secondary Name node. Job Tracker. Task Tracker), Processing data with Hadoop, Managing resources and applications with Hadoop YARN (Yet Another Resource Negotiator).		
Unit-III: Map Reduce: Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce FeatureBasic programs of HadoopMapReduce: Driver code. Mapper code, Reducer code. Record Reader, Combiner, Partitioners.		
Unit-IV: Hadoop Eco System: Pig: Introduction to PIG, PIG Architecture, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.Hbase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.		
Unit-V: Big Data Applications:Application of Big Data in Enterprises, Application of IoT Based Big Data, Application of Online Social Network-Oriented Big Data, Applications of Healthcare and Medical Big Data, Collective Intelligence, Smart Grid.		
SUGGESTED BOOKS		
- SeemaAcharya and SubhashiniChellappan “Big data and Analytics” Wiley India Publishers, 2nd Edition, 2019. - Rajkamal and PreetiSaxena, “Big Data Analytics, Introduction to Hadoop, Spark and Machine Learning”, McGraw Hill Publication, 2019. - Adam Shook and Donald Mine, “MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems” - O'Reilly 2012. - Tom White, “Hadoop: The Definitive Guide” 4th Edition, O'reilly Media, 2015.		

Discipline Specific Elective (DSE)

MOASE26005P: Mobile Application Development Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
Q1. Installation of Android studio. Q2 Develop an android application to display “Hello World” Q3 Create an application that takes the name from a text box and shows “hello” message along with the name entered in text box, when the user clicks the OK button Q4 create a screen that has input boxes for User Name, Password, Address, Gender(radio buttons for male and female), Age (numeric), and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout) Q5 Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity Q 6 Design an android application Using Radio buttons Q7 Design a Registration form in Android Q8 Design a calculator to perform addition, subtraction, multiplication and division. Q 9 Write a program in Android to display the multiplication table of a number Q10 Design a registration form in android to perform the following 1)Insert the data of registration form in the database 2)Update the database 3>Delete the information from database 4)Display the selected information from the database Q11 Design an application to send SMS. Q12 Design an application to make phone call.		

Discipline Specific Elective (DSE)

CSASE26005P: Computer System Architecture Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
1. Addition of two 8-bit numbers 2. Subtraction of two 8-bit numbers 3. Multiplication of two 8-bit numbers using repeated addition 4. Division of two 8-bit numbers using repeated subtraction 5. Addition of two 16-bit numbers 6. Subtraction of two 16-bit numbers using 2's complement 7. Find 1's complement of a number 8. Find 2's complement of a number 9. Mask the lower nibble of a number 10. Mask the upper nibble of a number 11. Shift operations (left/right) 12. Selective set, clear, complement operations 13. Addition of an array of numbers 14. Find the greatest number in an array 15. Find the smallest number in an array 16. Sort an array in ascending order 17. Count the number of 1's in a register 18. Find square of a number 19. Exchange contents of two memory locations 20. Load contents of memory into registers 21. Pack two unpacked BCD numbers 22. Unpack packed BCD numbers 23. Convert BCD to HEX 24. Convert HEX to BCD 25. Convert HEX to ASCII 26. Convert ASCII to HEX		
SUGGESTED BOOKS		
1. Ramesh S. Gaonkar – Microprocessor Architecture, Programming, and Applications with the 8085 A.N. NagoorKani – 8085 Microprocessor and Applications 2. N.K. Srinath – 8085 Microprocessor Programming and Interfacing 3. Eldhose P Sim – A Comprehensive Guide for Microprocessor and Microcontroller 4. B. Ram – Fundamentals of Microprocessors and Microcontrollers 5. K.M. Bhurchandi& A.K. Ray – Advanced Microprocessor and Peripherals		

BCA Semester: VI 2027-28

Discipline Specific Elective (DSE)

SSWSE26006T: Server Side Web Programming

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the architecture, principles, and lifecycle of server-side web applications. • Develop dynamic web pages using server-side scripting languages such as PHP, Node.js, or Python (Django/Flask). • Integrate server-side code with databases (e.g., MySQL, MongoDB) to perform CRUD operations securely and efficiently. • Implement form validation, session management, cookies, and user authentication in server-side environments. • Design and deploy full-stack web applications using server-side frameworks and follow best practices in web security and performance optimization. • Demonstrate the ability to debug, test, and maintain server-side web applications.		
SYLLABUS		
Unit-I: Introduction to Server Side Programming: Client-side vs. Server-side scripting Web server architecture (Apache, Nginx, IIS), HTTP request/response cycle Basics of Web hosting and deployment, Introduction to server-side languages (PHP, Node.js, Python, etc.)		
Unit-II: PHP Programming: Introduction to PHP: syntax, variables, data types Control structures (if, switch, loops) Arrays, functions, form handling File handling and error handling PHP sessions and cookies		
Unit-III: Database Integration: Introduction to MySQL Connecting PHP with MySQL Performing CRUD operations (Create, Read, Update, Delete) Using prepared statements and avoiding SQL injection Building a user authentication system		
Unit-IV: Advanced Server-Side Concepts: MVC architecture Introduction to frameworks (Laravel for PHP or Express.js for Node), RESTful APIs: designing and consuming Security essentials (HTTPS, input validation, XSS, CSRF, etc.) Session management and authentication		
Unit-V: Practical Project & Deployment: Project planning and database design Building a complete dynamic website/application, Hosting a web application on a server (using XAMPP/WAMP or cloud services) Version control basics (Git, GitHub) Introduction to Docker and deployment basics		
SUGGESTED BOOKS		
1. "Learning PHP, MySQL & JavaScript" – Robin Nixon (O'Reilly) 2. "PHP and MySQL Web Development" – Luke Welling & Laura Thomson 3. "Web Technologies: HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax, Black Book" – Kogent Learning		

Discipline Specific Elective (DSE)

SELSE26006T: Software Engineering

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(3L + 1T) Credits	4 Hours	60 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Familiarization with the concept of software engineering and its relevance. • Understanding of various methods or models for developing a software product. • Ability to analyze existing system to gather requirements for proposed system. • Skill to design and code software. • Able to test and implement the software.		
SYLLABUS		
Unit-I: Introduction to Software Engineering: Software Processes & Characteristics, Software, Software Myths Software Process: Software Engineering, Process Framework, Process Models- Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized process Models, Agile Process		
Unit-II: Software Requirements analysis & specifications: Requirement engineering, requirement, requirements analysis using DFD. Design Engineering: Design Concept, Design Model, Architectural Design, Component Level Design, Interface Design.		
Unit-III: Software Project Management: Management Spectrum-The People, The Product, The Process, The Project Project Estimation: Resources, Estimation Models, Project Scheduling, Risk Management, and Quality Management Software Quality Management and QA.		
Unit-IV: Software Testing: Context of testing in producing software. White Box Testing: Static testing by Humans, Static Analysis Tools, Structural Testing, Code Functional Testing, Code Coverage Testing, Code Complexity Testing, Challenges in White Box Testing; Black Box Testing- Need & purpose of Black Box Testing.		
Unit-V: Integration Testing: Introduction, Top-Down Integration, Bi-Directional integration, System Integration; System and Acceptance Testing. Performance Testing, Introduction. Test Planning: Management, Execution and Reporting: - Test Planning, preparing a Test Plan, setting up Criteria for Testing, Test Case Specification, Developing and Executing Test Cases, Test Summary Report.		
SUGGESTED BOOKS		
1. Software Project Management by Edwin Bennatan 2. Software Engineering by Sommerville Pearson 3. Software Project Management in Practice by PankajJalote 4. Software Engineering By Deven Shah, DreamtechWiely India 5. Software Testing Principles and Practices - SrinivasanDesikan and Gopalaswamy Ramesh, Publisher: Pearson Education.		

Discipline Specific Elective (DSE)

FOBSE26006T: Fundamentals of Blockchain

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L+2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Illustrate the concepts of Bitcoin and their usage. • Understand the basic concepts and technology used for blockchain. • Interact with a blockchain system by sending and reading transactions. • Design, build, and deploy smart contracts and distributed applications. • Evaluate security, privacy, and efficiency of a given blockchain system.		
SYLLABUS		
Unit-I: Introduction to Blockchain: Fundamentals of Blockchains Technology, The Structure of Blockchains, Blockchain Applications, The Blockchain Life Cycle, Distributed Ledger vs Centralized System, Merkel Root, Nonce Value, Hash Algorithm, and its applications.		
Unit-II: Cryptocurrency – Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage		
Unit-III: Blockchain Types and Consensus mechanism: Introduction, Decentralization and Distributed system, Types of Blockchain: Public Blockchain, Private Blockchain and Consortium Blockchain, Consensus Protocol: POW, POS, POC, POB, BFT and PBFT Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry		
Unit-IV: Security and applications of Blockchain: Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp)		
Unit-V: Application of Blockchain: Banking and Finance, Education, Energy, Healthcare, Supply Chain, The Blockchain and IoT		
SUGGESTED BOOKS		
1. Blockchain Technology By Chandramouli Subramanian, Asha George, Abhilash K A and Meena Karthikeyan, Universities Press Publication 2. Blockchain Blueprint for a New Economy, By Melanie Swan, O'Reilly Publication 3. Blockchain For Dummies By Tiana Laurence, Wiley Publication 3. The Basics of Bitcoins and Blockchains by Anthony Lewis, Two Rivers Distribution 4. Blockchain Explained: A Pragmatic Approach by Srihari Kapu, 5. Blockchain Technology by Chandramouli Subramanian, University Press India		

Discipline Specific Elective (DSE)

DMWSE26006T: Data Mining and Warehousing

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L+2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Design a data warehouse or data mart to present information needed by management in a form that is usable for management clients. • Implement a high quality data warehouse or data mart. • Effectively administer a corporate data resource in such a way that it will truly meet management's needs. • Evaluate standards and new technologies to determine their potential impact on your information resource. • Distinguish problems related to classification or clustering • Evaluate accuracy of various algorithms and select appropriate method for their respective data.		
SYLLABUS		
Unit-I: Introduction and Data Preprocessing Overview, Motivation (for Data Mining), Data Mining- Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction: -Data Cube Aggregation, Dimensionality reduction, Numerosity Reduction, Data Discretization and Concept hierarchy generation		
Unit-II: Data Warehouse and OLAP Technology, What is data warehouse, Multidimensional data model, Data warehouse architecture, Data warehouse implementation, From data warehouse to data mining		
Unit-III: Association Rule Mining What is an association rule, Support and confidence measures, upward and downward closure property, frequent itemsets, closed frequent itemsets, maximal frequent itemsets, border set, Mining various kinds of association rules, From Association rule mining to correlation analysis, Constraint based association mining.		
Unit-IV: Classification, prediction, issues regarding classification and prediction, comparing classification and prediction methods, classification by decision tree induction, Attribute selection measures: Information gain, Gain ratio, Gini Index, Tree pruning, Bayesian classification, Naïve Bayesian classification.		
Unit-V: Clustering, Cluster analysis, Types of data in cluster analysis: Interval scaled variables, Binary variables, categorical, ordinal, and ratio scaled variables, variables of mixed types, Major clustering methods: Partitioning methods, Hierarchical methods, Density based methods, Grid based methods, Model based methods, Clustering high dimensional data, Constraint based clustering, outlier analysis		
SUGGESTED BOOKS		
1. M. H. Dunham, "Data Mining: Introductory and Advanced Topics" Pearson Education, 2006 2. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, Addison-Wesley Publications, 2000 3. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques", Elsevier, 2011 4. A.K. Pujari, "Data Mining Techniques", Universities Press (India) Private Limited, 2010		

Discipline Specific Elective (DSE)

ITISE26006T: Introduction to Internet of Things (IoT)

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L+2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Explain the architecture, components, and communication protocols of IoT. • Interface sensors and actuators with microcontrollers. • Understand IoT communication protocols and models. • Use cloud services for IoT data storage and visualization. • Analyze security and privacy challenges in IoT ecosystems.		
SYLLABUS		
Unit-I: Basics of IoT: Definition and evolution of IoT, IoT ecosystem, architecture, and building blocks, Applications of IoT in various domains: healthcare, agriculture, smart homes, industry 4.0, Challenges and future trends in IoT.		
Unit-II: IoT architecture: Sensing, network, data, and application layers, IoT hardware: Sensors, actuators, microcontrollers (e.g., Arduino, Raspberry Pi), IoT software: Operating systems, middleware, Connectivity: Wireless protocols (Wi-Fi, Bluetooth, Zigbee), Cloud and edge computing in IoT.		
Unit-III: IoT Protocols and Communication, IoT communication models: Device-to-device, device-to-cloud, device-to-gateway, Standard protocols: MQTT, CoAP, HTTP/HTTPS, WebSocket, Data formats: JSON, XML Network technologies: IPv6, 6LoWPAN		
Unit-IV: Data collection and storage in IoT systems, Introduction to big data and IoT analytics, Cloud-based platforms: AWS IoT, Google Cloud IoT, Microsoft Azure IoT, Real-time data processing and visualization, Introduction to machine learning for IoT applications		
Unit-V: IoT Security and Privacy: Security challenges in IoT: Data privacy, device security, network security, Encryption and authentication in IoT, Secure communication protocols, Ethical considerations in IoT.		
SUGGESTED BOOKS		
1. ArshdeepBahga& Vijay Madiseti – Internet of Things: A Hands-On Approach, Universities 2. PressRaj Kamal – Internet of Things: Architecture and Design, McGraw-Hill 3. EducationAdrian McEwen & Hakim Cassimally – Designing the Internet of Things, Wiley		

Discipline Specific Elective (DSE)

FOCSE26006T: Fundamentals of Cyber Security

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(4L+2T) Credits	6 Hours	90 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Explain the fundamentals of cyber security and its importance. • Recognize various cyber attacks and countermeasures. • Apply basic security principles to protect IT systems. • Analyze security threats in networks and software. • Demonstrate knowledge of legal and ethical issues in cyber security.		
SYLLABUS		
Unit-I: Introduction to Cyber Security Importance and scope of cyber security Threats, vulnerabilities, and attacks Types of attackers (script kiddies, insiders, hacktivists, etc.) Security goals: Confidentiality, Integrity, Availability (CIA)		
Unit-II: Cyber Crimes and Laws Types of cyber-crimes (hacking, phishing, identity theft, etc.) Indian IT Act 2000 and amendments Legal frameworks and cyber law policies Cyber forensics basics		
Unit-III: Network Security Fundamentals Introduction to network security Firewalls, IDS/IPS Cryptography basics: symmetric & asymmetric encryption Secure communication protocols (SSL/TLS, VPNs)		
Unit-IV: System and Application Security Operating system security principles Malware types and prevention Secure coding practices Authentication, authorization, and access control		
Unit-V: Cyber Security Tools and Practices Antivirus, anti-malware, and firewall tools Penetration testing and ethical hacking basics Incident response and disaster recovery Cyber hygiene and best practices for individuals		
SUGGESTED BOOKS		
1. Cybersecurity: The Beginner's Guide by Raef Meeuwisse 2. Principles of Information Security by Michael E. Whitman & Herbert J. Mattord 3. Cyber Security Essentials by James Graham, Richard Howard, and Ryan Olson 4. Information Security by Mark Stamp 5. IT Act 2000 (India) – Government Publications		

Discipline Specific Elective (DSE)

SSWSE26006P: Server Side Web Programming Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
Q1: Database Design Task: Create a MySQL database named student_db and a table students with the following fields: id (INT, Primary Key, Auto Increment) name (VARCHAR(100)) email (VARCHAR(100)) course (VARCHAR(100)) Question: Write the SQL command(s) used to create the database and table. Q2: Database Connectivity Task: Create a PHP file db.php that connects to the MySQL database using mysqli. Question: Write the PHP code for establishing a connection and handle connection errors gracefully. Q3: Insert Operation (Create) Task: Create a form in add.php that allows the user to input a new student's details. On submission, save the data into the students table. Question: What PHP superglobal is used to retrieve form data? How do you sanitize this data before inserting it into the database? Q4: Display Student Records (Read) Task: Create a PHP page index.php that fetches all student records from the students table and displays them in a tabular format with options to Edit or Delete. Question: How do you retrieve data from MySQL using mysqli_query and display it using PHP? Q5: Update Operation Task: In edit.php, fetch a specific student's details based on their id passed through the URL. Populate the form with existing data and allow the user to update the record. Question: How do you pass and retrieve query parameters (id) using the GET method in PHP? Q6: Delete Operation Task: Create a file delete.php that deletes a student record based on the id received via URL. After deletion, redirect the user back to the index.php page. Question: How do you securely perform deletion operations without risking SQL injection?		

Discipline Specific Elective (DSE)
SELSE26006P: Software Engineering Lab
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	4 Hours	60 Hours
SUGGESTED LABORATORY EXERCISE		
1. Problem Definition - Choose a problem domain (e.g., Library Management System, Online Food Delivery, Hospital Management System, Student Attendance System). - Write a problem statement describing the system. 2. Requirement Gathering - List functional and non-functional requirements. - Create a Software Requirements Specification (SRS) document. 3. Feasibility Study - Perform a feasibility study including: - Technical Feasibility - Operational Feasibility - Economic Feasibility 4. Software Design Draw the following: Use Case Diagram Class Diagram Activity Diagram Sequence Diagram DFD (Level 0, 1, 2) 5. Project Planning - Create a Gantt Chart using MS Project or any free tool. - Perform Cost Estimation using COCOMO model. 6. Testing - Write at least 5 test cases. - Perform unit testing and integration testing. 7. Tools Used - Mention any tools used for design, planning, or version control (e.g., StarUML, Git, MS Project, etc.). 8. Documentation Prepare and submit: - SRS Document - Design Document - Testing Report		

Skill Enhancement Course (SEC)
FOISC24001T: Fundamentals of Information Technology
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours
Course Outcome: On successful completion of the course, the students will be able to: - Understand various basics of computer with its types and hardware architecture - understand different types of softwares available in computer - explain fundamentals of computer networking - understand conceptual model of database - explain basics of e-commerce with its applications		
SYLLABUS		
Unit-I: Introduction to Information Technology: Definition and scope of Information Technology, Evolution of computers, Classification of computers: Micro, Mini, Mainframe, Supercomputers, Characteristics and applications of computers, Block diagram of a computer, Input, Output and Storage Devices		
Unit-II: Computer Software and Operating Systems: System Software and Application Software, Operating Systems: Functions and types (DOS, Windows, Linux, Android), Introduction to programming languages: Machine, Assembly, High-level languages, Open-source software and licensing, Utility programs and their types		
Unit-III: Data Communication and Networks: Introduction to data communication, Network types: LAN, MAN, WAN, PAN, Topologies: Bus, Ring, Star, Mesh, Hybrid, Internet, Intranet, and Extranet, Basics of IP address, domain names, and DNS, Network devices: Router, Switch, Hub, Modem		
Unit-IV: Data and Information Management: Concept of Data, Information, and Knowledge, Types and sources of data, Introduction to databases, File systems vs. DBMS, Basic concepts of data storage and retrieval, Data security and privacy basics		
Unit-V: IT Applications and Emerging Trends: Role of IT in business, education, healthcare, and governance, E-Governance, E-Commerce, M-Commerce, Social, legal, and ethical aspects of IT, Cloud Computing and IoT – introduction, Cybersecurity awareness and best practices, Digital India and future IT trends		
SUGGESTED BOOKS		
V. Rajaraman – <i>Introduction to Information Technology</i>, PHI Learning - Leon & Leon – <i>Fundamentals of Information Technology</i>, Vikas Publishing - Alexis Leon & Mathews Leon – <i>Introduction to Computers</i>, Vikas Publishing		

Skill Enhancement Course (SEC)

IWTSC24002T: Introduction to Web Technology

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
2 Credits	2 Hours	30 Hours
Course Outcome: On successful completion of the course, the students will be able to: • To understand the structure and function of the web and client-server architecture. • To develop web pages using HTML, CSS, and JavaScript. • To introduce server-side programming using PHP or Node.js. • To understand the basics of web hosting and databases (like MySQL or MongoDB). • To create responsive and interactive websites.		
SYLLABUS		
Unit-I: Introduction to Web & HTML: Basics of Internet and Web Technologies WWW, HTTP/HTTPS, URL, Web Browsers, Introduction to HTML HTML Elements: headings, paragraphs, links, lists, images, tables, forms HTML5 Features: audio, video, semantic tags		
Unit-II: Cascading Style Sheets (CSS): Introduction to CSS Types of CSS: Inline, Internal, External CSS Selectors and Properties, Box Model, Positioning, Flexbox Media Queries and Responsive Design		
Unit-III: JavaScript & DOM Manipulation: Introduction to JavaScript Variables, Data types, Operators, Functions Conditional statements and loops Events and Event Handling DOM Manipulation: getElementById, querySelector, innerHTML, etc. Introduction to ES6 features (let, const, arrow functions)		
Unit-IV: Server-Side Scripting with PHP : Introduction to PHP Variables, Data types, Control structures, Forms and User Input Sessions and Cookies File Handling Connecting to MySQL		
Unit-V: Web Hosting and Project: Introduction to Web Servers: Apache, Hosting a website: Domain and Hosting basics, FTP, cPanel basics Introduction to CMS (WordPress) – optional Mini Project: Develop a Dynamic Website using HTML, CSS, JS, and PHP		
SUGGESTED BOOKS		
1. Achyut Godbole & Atul Kahate – <i>Web Technologies</i>, Tata McGraw Hill 2. Thomas A. Powell – <i>HTML & CSS: The Complete Reference</i> 3. Robin Nixon – <i>Learning PHP, MySQL & JavaScript</i>, O'Reilly 4. Ivan Bayross – <i>Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP</i> Jon Duckett – <i>JavaScript and jQuery</i>		

Skill Enhancement Course (SEC)

IWTSC24002P: Introduction to Web Technology Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours
SUGGESTED LABORATORY EXERCISE		
1. Basic HTML Pages • Create a personal portfolio page using HTML. • Design a college website homepage using HTML tags and elements. • Create a registration form using form elements.		
2. HTML + CSS • Design a responsive website layout using CSS Grid • Create a product landing page with styled buttons, images, and navigation bar. • Apply external, internal, and inline CSS styles to format a web page.		
3. JavaScript Basics • Write a script to validate user input in a form (email, phone number, etc.). • Create a calculator using JavaScript. • Develop a script to dynamically change content/style of a webpage on button click.		
4. DOM Manipulation • Build a to-do list application with add, delete, and edit features. • Implement an image slider using JavaScript and DOM. • Develop a quiz app that evaluates answers and shows a score.		
5. Bootstrap / Responsive Design • Build a responsive website using Bootstrap. • Create a card-based layout for a blog or gallery using Bootstrap components.		
6. Mini Project • Develop a complete website (e.g., Student Management System / Portfolio / Shopping Cart). • Ensure it has navigation, multiple pages, responsive design, form handling, and JavaScript interactivity.		

Skill Enhancement Course (SEC)

SEMISC26005P: Seminar

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	6 Hours	90 Hours
GENERAL GUIDELINES		
1. Topic Selection and Approval • Topic must be related to: • Emerging technologies in IT / CS • Software tools, languages, or frameworks • Cyber Security, AI, Data Science, IoT, etc. • Individual or group (max 2 students) • Topic must be approved by faculty supervisor		
2. Literature Survey and Content Preparation • Background research using journals, articles, books, websites • Comparative study (if applicable) • Identification of problem area or technological scope • Outline of major sub-topics		
3. Report Writing & Documentation Guidelines Prepare a seminar report in the following format: ➤ General Format • Paper Size: A4 • Font: Times New Roman • Font Size: 12pt (Headings in 14pt Bold) • Line Spacing: 1.5 • Margin: 1 inch on all sides • Page Numbering: Bottom-center • Alignment: Justified ➤ Content Order 1. Cover Page (Title, Student Name, Roll No., Supervisor, College Details) 2. Certificate 3. Acknowledgment 4. Abstract (max 200–250 words)		

5. Table of Contents

6. Chapters

- Chapter 1: Introduction
- Chapter 2: Literature Review / Existing Systems
- Chapter 3: Methodology / Concept Explanation
- Chapter 4: Case Studies / Applications / Tools
- Chapter 5: Future Scope / Challenges
- Chapter 6: Conclusion

7. References / Bibliography (APA/IEEE format)

4. Presentation Guidelines

- Duration: 10–12 minutes per student
- Format: PowerPoint or Google Slides
- Slide Count: 10–15
- Include:
 - Title Slide
 - Problem Statement / Introduction
 - Objectives
 - Key Content (2–4 slides)
 - Diagrams / Charts
 - Tools / Case Studies
 - Future Scope & Conclusion
 - References

Multi-Disciplinary Course (MDC)

POMMC25003T: Principles of Management

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(2L + 1T) Credits	3 Hours	45 Hours
Course Outcome: On successful completion of the course, the students will be able to:		
• Understand the fundamental principles of management • Analyze the internal and external environment of an organization • Apply management principles to real-world scenarios • Evaluate the effectiveness of management practices • Develop critical thinking skills to solve management problems		
SYLLABUS		
Unit-I: Introduction to Management: Definition and importance of management, Evolution of management thought, - Functions of management (planning, organizing, directing, controlling)		
Unit-II: Planning and Decision Making: - Nature and importance of planning, Types of plans (strategic, tactical, operational), Decision-making process and tools		
Unit-III: Organizational Structure and Design: Organizational structure, Departmentalization, chain of command, span of control, centralization vs. decentralization, Organizational design and its impact on performance		
Unit-IV: Leadership and Motivation: Nature and importance of leadership, Leadership styles and theories, Motivation theories and techniques		
Unit-V: Controlling and Performance Management: Nature and importance of controlling, Types of control , Performance measurement and management tools		
SUGGESTED BOOKS		
1. "Management: Principles and Practices" by Ricky W. Griffin 2. "Principles of Management" by David S. Bright and Anastasia H. Cortes 3. "Management" by Stephen P. Robbins and Mary Coulter 4. "Principles of Management" by Talya Bauer and Berrin Erdogan		

Multi-Disciplinary Course (MDC)

DGMCC25004T: Digital Marketing

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(2L + 1T) Credits	3 Hours	45 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the fundamentals and significance of digital marketing. • Apply digital tools and techniques in SEO, SEM, content marketing, and email. • Design and manage social media campaigns and advertisements. • Analyze web traffic and campaign performance using analytics tools • Develop digital marketing strategies using current platforms and trends.		
SYLLABUS		
Unit-I: Introduction to Digital Marketing: Evolution and Importance of Digital Marketing, Traditional Marketing vs Digital Marketing, Key Concepts: Paid, Owned, and Earned Media, Buyer's Journey and Conversion Funnel, Trends and Career in Digital Marketing		
Unit-II: Website Planning and Search Engine Optimization (SEO): Website Structure and Planning Basics, On-page SEO Techniques: Meta Tags, URL Structure, Content Optimization, Off-page SEO: Link Building, Social Bookmarking, Google Algorithms and Ranking Factors, SEO Tools: Google Search Console, SEMrush, Ahrefs		
Unit-III: Search Engine Marketing (SEM) and Online Advertising: Introduction to Google Ads (AdWords), Campaign Creation: Search, Display, Shopping, Video Ads, Keyword Planning and Bidding Strategy, Google Ads Policies and Quality Score, Retargeting and Remarketing Techniques		
Unit-IV: Social Media Marketing (SMM) & Email Marketing: Facebook, Instagram, Twitter, LinkedIn, YouTube Marketing, Social Media Content Strategy and Calendar, Running Paid Ad Campaigns on Facebook & Instagram, Email Marketing Strategy and Tools (Mailchimp, Sendinblue), Crafting Effective Emails and Newsletters		
Unit-V: Web Analytics and Digital Strategy: Introduction to Google Analytics, Key Metrics: Bounce Rate, CTR, Conversions, Engagement, A/B Testing and Campaign Tracking, Affiliate Marketing and Influencer Marketing, Creating a Complete Digital Marketing Plan		
SUGGESTED BOOKS		
1. Digital Marketing – Seema Gupta (McGraw Hill) 2. Digital Marketing: Strategy, Implementation and Practice – Dave Chaffey & Fiona Ellis-Chadwick (Pearson) 3. Fundamentals of Digital Marketing – Puneet Singh Bhatia (Pearson) 4. Digital Marketing For Dummies – Ryan Deiss & Russ Henneberry (Wiley)		

Multi-Disciplinary Course (MDC)

ENTMC26005T: Entrepreneurship

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(2L + 1T) Credits	3 Hours	45 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the fundamentals of entrepreneurship • Identify and evaluate business opportunities • Develop a business plan and pitch • Understand the role of innovation and risk-taking in entrepreneurship • Apply entrepreneurial principles to real-world problems		
SYLLABUS		
Unit-I: Introduction to Entrepreneurship: - Definition and importance of entrepreneurship, Types of entrepreneurship ,Entrepreneurial mindset and skills		
Unit-II: Identifying and Evaluating Business Opportunities: Opportunity recognition and assessment, Market research and analysis, Feasibility study and business idea generation		
Unit-III: Business Planning and Pitching: Business plan components ,Pitching and presenting business ideas, Funding options and sources		
Unit-IV: Innovation and Risk -Taking in Entrepreneurship: Role of innovation in entrepreneurship, Types of innovation, Risk management and mitigation strategies		
Unit-V: Entrepreneurial Mindset and Skills: Entrepreneurial mindset and characteristics,- Skills required for entrepreneurship , Developing an entrepreneurial mindset		
SUGGESTED BOOKS		
1. "The Lean Startup" by Eric Ries 2. "Entrepreneurship: Successfully Launching New Ventures" by Bruce R. Barringer and Duane Ireland 3. "The Startup Owner's Manual" by Steve Blank and Bob Dorf 4. "Entrepreneurship" by T N Chhabra 5. "Indian Entrepreneurship: Cases and Materials" by S S Khanka		

Value Aided Course (VAC)
EVSVC25003T: Environmental Studies
(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
(2L + 1T) Credits	3 Hours	45 Hours
Course Outcome: On successful completion of the course, the students will be able to: • Understand the scope, multidisciplinary nature, and importance of environmental studies. • Demonstrate knowledge of ecological principles and ecosystem dynamics. • Analyze natural resources and associated environmental issues. • Identify different types of environmental pollution and propose control measures. • Explain biodiversity concepts and conservation strategies.		
SYLLABUS		
Unit-I: Introduction to Environmental Studies: Multidisciplinary nature, Scope & importance. Concepts: sustainability, sustainable development.		
Unit-II: Ecology & Ecosystems: Ecology vs. ecosystem, structure & function, Energy flow: food chains, webs, ecological pyramids, Succession, Case studies: forest, grassland, desert, aquatic (ponds, rivers, oceans, estuaries), mountain ecosystems.		
Unit-III: Natural Resources: Renewable vs. non-renewable resources, Land: land use change, degradation, soil erosion, Desertification, Forest resources: deforestation, Afforestation, Water resources: overuse, floods, droughts, inter-state/international Issues, Energy resources: conventional (coal, oil, nuclear) and alternative (solar, wind, biogas, geothermal, hydrogen).		
Unit-IV: Environmental Pollution: Types: air, water, soil, noise pollution; nuclear/thermal hazards, Causes, effects & control measures, Solid and industrial waste—management & disposal, Climate change topics: global warming, ozone depletion, acid rain.		
Unit-V: Biodiversity & Conservation: Levels of biodiversity: genetic, species, Ecosystem, Biodiversity patterns: hotspots, India as mega-diverse nation .Threats: habitat loss, poaching, human–wildlife conflict, invasive species Conservation strategies: in-situ and ex-situ, ecosystem services (ecological, ethical, economic, social, informational, aesthetic).		
SUGGESTED BOOKS		
1. "Textbook of Environmental Studies for Undergraduate Courses" by AninditaBasak 2. "Environmental Science" by S.C. Santra 3. "Fundamentals of Ecology" by Eugene P. Odum& Gary W. Barrett 4. "Environmental Studies" by ErachBharucha		

Value Aided Course (VAC)

SSDVC26006P: Specialized Skill Development Through Project

(40 CIA + 160 EoSE. = Max. Marks: 200)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	6 Hours	90 Hours
GENERAL GUIDELINES		
1. Project Selection and Proposal		
• Students must propose a project idea (web app, mobile app, system software, etc.) • Individual or team of max 3 students • Proposal should include: • Title • Problem statement • Objectives • Scope • Tools/Technologies planned • Expected Outcome • Faculty guide will be assigned		
2. System Analysis and Design		
• Feasibility Study • Requirement Gathering and Specification (SRS Document) • UML Diagrams (Use Case, Class, Sequence, Activity) • Data Flow Diagrams (DFD) • ER Diagram (if DBMS is used)		
3. Development and Implementation		
• Coding using appropriate front-end and back-end tools • Integration of modules • Database Design and Implementation • Version Control (e.g., Git) – recommended		

- Use of frameworks and APIs if applicable

4. Testing and Deployment

- Unit testing, Integration testing, System testing
- Bug fixing and validation
- Deployment on local server/cloud platform (Heroku, Firebase, etc.)
- User Manual or Help Guide preparation

5. Final Report and Presentation

□ Project Report Documentation Guidelines

Formatting

- A4 size, Times New Roman, 12pt, 1.5 line spacing
- Justified alignment, 1" margin on all sides
- Header/Footer with page numbers

Content Structure

- Cover Page (Project Title, Student Info, College Name, Guide Name, Year)
- Certificate from Institution
- Declaration by Student
- Acknowledgment
- Abstract (200–300 words)
- Table of Contents
- Chapters:
 - Chapter 1: Introduction
 - Chapter 2: System Analysis (Problem, Objectives, SRS, Feasibility)
 - Chapter 3: System Design (DFD, ERD, UML diagrams)
 - Chapter 4: Implementation (Tools, Code snapshots, UI)
 - Chapter 5: Testing and Validation

- Chapter 6: Conclusion and Future Enhancement

- Bibliography / References
- Appendix (if needed: code, extra screenshots)

□ **Presentation Guidelines**

- **Duration:** 10–15 minutes
- **Mode:** PowerPoint or Google Slides
- **Suggested Slides:**
 - Title Slide
 - Problem Statement
 - Objectives
 - Tools/Tech Stack
 - System Architecture & Design
 - Screenshots / Demo
 - Testing Highlights
 - Conclusion & Future Work