

Roll No.

Total Pages : 03

BT-3/D-25

43138

PRINCIPLES OF PROGRAMMING

LANGUAGES

ES-227/205A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Discuss the importance of readability, reliability and efficiency in the design of a programming language. 8
- (b) Describe numeric data types in detail along with their implementation issues. 7
2. (a) Explain formal methods of describing syntax using Backus-Naur Form (BNF) and syntax diagrams. 7
- (b) Describe, how syntax and semantics together ensure correctness in a programming language. 8

Unit II

3. (a) What are structured data objects ? Explain the specification and implementation of structured data types. 7
- (b) Discuss the declaration, initialization and accessing of array elements in a programming language. 8
4. (a) Explain, how variable-size arrays are implemented using pointers ? 5
- (b) Explain abstraction, encapsulation and information hiding and how they contribute to modern programming paradigms ? 5
- (c) How do subprograms promote code reuse and modularity ? Explain. 5

Unit III

5. (a) Compare static and dynamic scoping. How do they affect variable accessibility and lifetime ? 8
- (b) How is sequence control managed within compound statements and control structures ? 7
6. (a) Describe the process of subprogram invocation and return. How is the call stack utilized ? 7
- (b) Compare different parameter transmission scheme : call-by-value, call-by-reference, call-by-name and call-by-result. 8

Unit IV

- 7. (a) Discuss the phases of storage management and their impact on program reliability. 7
- (b) Explain, how stack-based storage supports function calls and recursion ? 8
- 8. (a) Analyse the implications of using variable-sized elements in terms of memory fragmentation and access speed. 8
- (b) How does C++ enhance the capabilities of C through object-oriented features ? 7



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DATA STRUCTURE AND ALGORITHMS
PC-CS-201A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Explain Selection Sort, Insertion Sort and Bubble Sort with examples and discuss their complexities. **15**
2. (a) Write the algorithm for Linear and Binary Search and compare them. **8**
(b) Explain the difference between built-in and user-defined data structures with suitable examples. **7**

Unit II

3. (a) Write algorithm of Quick Sort and Merge Sort and explain with suitable examples. **10**

- (b) Define stack and write a algorithm to insert elements into stack. 5
4. (a) Elaborate Infix, Prefix and Postfix expression and show conversion between them with example. 10
- (b) Explain the working of a Circular Queue. 5

Unit III

5. (a) Write algorithms for insertion and deletion in a singly linked list. 8
- (b) Explain the need of dynamic data structures. Compare static and dynamic memory allocation. 7
6. (a) Explain the dynamic implementation of stacks using linked lists. 7
- (b) Discuss different types of linked lists with suitable examples. 8

Unit IV

7. (a) What are Graphs ? Explain Breadth-First Search (BFS) and Depth-First Search (DFS) algorithms with examples. 8

- (b) Define Binary Search Trees (BST). Write algorithms for insertion and deletion in BST. 7
8. (a) Explain Minimum Spanning Tree and Warshall's Algorithm with suitable example. 7
- (b) Explain B+ Trees and AVL Trees with examples. 8



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43140

DIGITAL ELECTRONICS

ES-207A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) State and Prove the De-Morgan theorem. Prove the following expressions : 8

$$AB + CD = \overline{\overline{AB} \cdot \overline{CD}}$$

$$\overline{A}BC + A\overline{B}C + AB\overline{C} + ABC = AB + BC + CA.$$

- (b) Perform the following operations in binary number system :

(i) $23 + 15$

(ii) $16-36$ (using 1's compliment)

(iii) $17-9$ (using 2's compliment).

7

2. (a) Reduce the following expressions using K-Map :
 $f = \Sigma (0, 1, 4, 5, 7, 13, 14, 15) + d(2, 9, 10, 12)$.
 Realise the obtained expressions using NAND/NOR logic. 8
- (b) Explain working of CMOS NAND gate. 7

Unit II

3. (a) Design a full adder using two half adders. 7
- (b) What is Encoder ? Design decimal to BCD priority encoder ? 8
4. What is Multiplexer ? Explain working of 8 : 1 Multiplexer. How can 16: 1 MUX be designed using 8 : 1 Mux and OR gate ? Implement the function $f = \Sigma (1, 2, 6, 9, 13, 14, 15)$ using 8 : 1 Mux. 15

Unit III

5. (a) Explain working of JK flip-flop. Explain race around condition of JK flip-flop. Also describe how is it removed by master slave flip-flop ? 10
- (b) Convert D flip-flop to T flip-flop. 5
6. (a) Design mod 6 asynchronous counter. 7
- (b) Design a bidirectional shift register. Explain its working. 8

Unit IV

7. (a) Mention specifications of DACs. Explain working of weighted register D/A converter. 8
- (b) Explain the working of dual slope ADC. 7
8. (a) Write a note on SRAM. Draw a CMOS SRAM memory cell. Discuss read and write operation. 7
- (b) Design a 4-input,5-output combinational circuit using PLA. Input variables are A, B, C and D : 8
- $Y1 = \Sigma m(0, 3, 5, 6, 9, 10, 12, 15)$, $Y2 = \Sigma m(0, 1, 2, 3, 11, 12, 14, 15)$, $Y3 = \Sigma m(0, 4, 8, 12)$, $Y4 = \Sigma m(0, 2, 3, 5, 7, 8, 12, 13)$, $Y5 = \Sigma m(0, 1, 3, 4, 5, 6, 11, 13)$.



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43141

OBJECT ORIENTED PROGRAMMING
PC-CS-203A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

Unit I

1. (a) Explain the structure of a C++ program. Describe the role of header files and namespaces. **8**
- (b) Define Object-Oriented Programming (OOP). Describe in detail the four fundamental OOP concepts (encapsulation, abstraction, inheritance, polymorphism) with real-world examples. **7**
2. (a) Discuss access specifiers in C++. Explain class scope and accessing class members. Explain, why and when const methods and const data members are important. **8**

- (b) Explain function overloading and operator overloading at a conceptual level. How overload resolution works ? 7

Unit II

3. (a) Explain this pointer in C++. Describe dynamic memory management in C++: new and delete, new[] and delete[]. Explain memory leaks, dangling pointers. 8
- (b) Explain constructors in detail: default, parameterized, copy constructor and destructors. Illustrate with code that shows how copy constructor and destructor behave when a base-class object is copied into a derived-class object. 7
4. Describe types of inheritance in C++ (single, multiple, multilevel, hierarchical, hybrid). Explain access control (public, protected, private inheritance) and how it affects member accessibility in the derived class. Write a program showing the difference between public and private inheritance. 15

Unit III

5. (a) Define polymorphism in C++ and distinguish between compile-time (static) and run-time (dynamic) polymorphism. Write a program showing a base Shape class and derived Circle/Rectangle classes demonstrating virtual area(). 8
- (b) Explain virtual functions, pure virtual functions, and abstract base classes. Describe the concept of virtual destructors and why are they necessary. 7
6. (a) Discuss operator overloading rules and best practices. Implement a C++ class Complex supporting : 8
- (i) Member overloads for unary
- (ii) Non-member overloads for binary + and << (ostream).
- (b) Explain when to implement operator overloads as member functions *versus* non-members/friends and demonstrate exception safety considerations. 7

Unit IV

7. Describe the C++ stream model: istream, ostream, fstream, ifstream, ofstream. Explain manipulators (like setw, setprecision) and formatted input/output. Write a program that reads a CSV file of student records (name, id, marks), formats and prints it to the console using stream manipulators. 15

8. (a) Explain exception handling in C++: try, throw, catch, multiple catches, re-throwing exceptions and exception specifications. 8
- (b) Describe templates in C++ function templates, class templates, template specialization and non-type template parameters. 7



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43142

MATHEMATICS-III

BS-205A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Each question carries equal marks.

Unit I

1. (a) Discuss the convergence of the sequence

$$a_n = \frac{2n-7}{3n+2}.$$

- (b) Test the convergence of the series

$$\sum_{n=1}^{\infty} [(n+1)^{1/3} - n^{1/3}].$$

2. (a) Find the Fourier series expansion for

$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$

- (b) Obtain the Fourier series for $f(x) = \pi x$, for $0 \leq x \leq 2$.

Unit II

3. (a) Solve the differential equation :

$$\frac{dy}{dx} + y \sec x = \tan x.$$

- (b) Solve the differential equation :

$$(xy^2 + x)dx + (yx^2 + y)dy = 0.$$

4. (a) Solve :

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$$

- (b) Solve by the method of variation of parameters :

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} = e^x \sin x$$

Unit III

5. (a) Find the smaller of the areas bounded by the ellipse $4x^2 + 9y^2 = 36$ and the straight line $2x + 3y = 6$.

(b) Evaluate :

$$\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} dy dx$$

by changing the order of integration.

6. (a) Sketch the region of integration and evaluate $\iint_R (x^2 + y^2) dx dy$, where R is the region in the first quadrant bounded by $x^2 - y^2 = a$, $x^2 - y^2 = b$, $2xy = c$, $2xy = d$, $0 < a < b$, $0 < c < d$.

- (b) Find, by triple integration, the volume of the sphere $x^2 + y^2 + z^2 = 1$.

Unit IV

7. (a) Explain the Physical interpretation of Curl.

- (b) Find the directional derivative of

$$\phi = 5x^2y - 5y^2z + \frac{5}{2}z^2x \text{ at the point } P(1, 1, 1) \text{ in}$$

the direction of the line $\frac{x-1}{2} = \frac{y-3}{-2} = \frac{z}{1}$.

8. (a) Using Green's theorem, evaluate $\int_C (x^2 y dx + x^2 dy)$, where C is the boundary described counter clockwise of the triangle with vertices $(0, 0)$, $(1, 0)$, $(1, 1)$.
- (b) If $\vec{F} = 3y\hat{i} - xz\hat{j} + yz^2\hat{k}$ and S is the surface of the paraboloid $2z = x^2 + y^2$ bounded by $z = 2$; evaluate $\iint_S (\nabla \times \vec{F}) \cdot d\vec{S}$ using Stoke's theorem.



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**BUSINESS INTELLIGENCE AND
ENTREPRENEURSHIP
HM-902A**

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. All questions carry equal marks.

Unit I

1. Elaborate the concept of Entrepreneurial Personality and types of Entrepreneurs with examples. Which type of entrepreneurship do you think most suitable for India ?

15

2. Answer/explain the following questions in short : **15**

- (a) The skills and qualities of a successful entrepreneur
- (b) No-economic factors affecting entrepreneurship
- (c) Linkages between the Entrepreneurship development and Economic development.

Unit II

3. What is Business Opportunity ? Explain the criteria to select a product and the steps involved in identification of business opportunity. 15
4. Discuss the purpose of marketing, financial and technical feasibility studies. What are the issues evaluated in these studies ? Describe the steps involved in the preparation of project report. 15

Unit III

5. Answer the following questions in short : 15
 - (a) What is procedure for SSI's Registration ?
 - (b) What are the formalities for getting NOC from Pollution Board ?
 - (c) What factors are considered in Selection of Machinery for a small industry ?
6. Explain the schemes launched for promotion of small-scale units and start-ups in India. What kind of difficulty is faced in availing benefits of the schemes of MSMEs ? Also write a brief note on methods and tools used in project planning, scheduling and appraisal. 15

Unit IV

7. Describe the functions and role of the following institutions in promotion and growth of small and medium enterprises :
(a) SIDBI, (b) SIDO, (c) NABARD and (d) DIC. **15**

8. What is venture capital ? What are the venture capital schemes of financial institutions in India ? Describe also briefly the requirements for formation of Public Private Partnership firms. **15**

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BT-5/D-25

MICROPROCESSOR AND INTERFACING

Paper : ES-301A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt any *five* questions in all, selecting at least *one* question from each section.

SECTION-I

1. (a) Draw and explain the block diagram of the 8086 microprocessor, clearly highlighting the functions of the Bus Interface Unit (BIU) and the Execution Unit (EU). 10
- (b) Express how the physical address generated in 8086? 5
2. (a) Examine the Pin configuration for the 8086 processor and explain all the signals. 10
- (b) How is the clock signal generated for 8086? Explain in detail. 5

SECTION-II

3. (a) Draw the timing diagram for Read and write cycle in maximum mode operation and explain?

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- (b) Describe the maximum mode configuration of 8086 with a neat diagram and explain it in detail. 7

4. (a) Interface the 8086 microprocessor with two 16Kx8 EPROM chips and two 16Kx8 RAM chips. Draw the necessary block diagram for the support of your calculations? 10
- (b) Give the cell structures of PROM memory? 5

SECTION-III

5. (a) Generate the HEX codes for the following instructions :
(i) Mov CX, [D1]
(ii) Mov AX, [BX] [SI] [2000H] 8
- (b) Define Addressing Modes and explain all the valid addressing modes for 8086 microprocessor? 7
6. (a) Write an 8086 assembly program to find the largest number from an array of numbers. 8
- (b) Mention an example for the 8086 instructions: TEST, CMP, RCL, ROR, LEA, DAS, MOV 7

SECTION-IV

7. (a) Interface a typical 12-bit DAC with 8255 and write a program to generate a Square waveform of period 10 ms. The CPU runs at 4 MHz clock frequency. 8
- (b) Draw & explain the pin configuration and the internal architecture of 8255? Write a BSR mode control word subroutine to set bits PC7 & PC3 and reset them after 10 milli seconds. The port address selected is 83h. 7
8. (a) With the help of a block diagram explain the functioning of Intel 8259 chip? 7
- (b) Write down the steps involved when an interrupt INT 32h is encountered in the main program and calculate address of ISR for this interrupt? 8
-

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45169

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DATABASE MANAGEMENT SYSTEMS

Paper : PC-CS-301A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, by selecting at least *one* question from each unit. All questions carry equal marks.

UNIT-I

1. (a) Describe and compare Network, Hierarchical, and Relational data models. Illustrate each model with an example. (8)
- (b) Discuss the roles and responsibilities of a Database Administrator (DBA). (7)
2. (a) Discuss the Three-Schema Architecture of a DBMS. Draw a clear diagram showing the interaction between the internal, conceptual, and external levels. (8)
- (b) Explain simple, composite, derived and multi-valued attributes with suitable examples. (7)

UNIT-II

3. Explain the following :

(i) Aggregate functions.

(ii) Joins.

(iii) Database Constraints. (15)

4. (a) Differentiate between DDL, DML, and DCL commands in SQL. Provide suitable examples of each and explain their roles in database management. (8)

(b) Differentiate between Relational Algebra and Relational Calculus. (7)

UNIT-III

5. (a) What is normalization? Explain insertion, deletion, and updation anomalies that can occur in poorly designed databases. Illustrate each with an example. (8)

(b) How is 3NF different from BCNF? Justify your answer using suitable example. (7)

6. (a) Explain the different types of physical data storage structures used in RDBMS. (8)

(b) What is lock-based protocols? Explain two-phase locking (2PL) technique with suitable example. (7)

UNIT-IV

7. (a) Explain the different recovery techniques used in RDBMS. How do these techniques help in maintaining database consistency after failures? (8)
- (b) What is serializability? Explain serial and non-serial schedules with example. (7)
8. Write short notes on :
- (i) Concurrency control.
 - (ii) ACID properties.
 - (iii) Transaction states. (15)
-

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45170

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FORMAL LANGUAGE AND AUTOMATA THEORY

Paper : PC-CS-303A

Time : Three Hours]

[Maximum Marks : 75

Note : All questions carry equal marks and attempt any *five* questions out of eight questions by selecting atleast *one* question from each Unit.

UNIT-I

1. What are algebraic laws of regular expression and Design a DFA that accepts binary strings divisible by 3. 15
2. What is difference between non-deterministic finite automata (NFA) and Deterministic finite automata with epsilon transition and without Epsilon transition (DFA) and also write application of DFA automata. 15

UNIT-II

3. What do you mean by context sensitive grammar and show that the language $L = \{a^n b^n \mid n \geq 0\}$ is context-free but not regular. 15

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4. What are sequential steps to convert context free grammar to chomsky normal form. This is given CFG

$S \rightarrow ASB$

$A \rightarrow aAS \mid a \mid \epsilon$

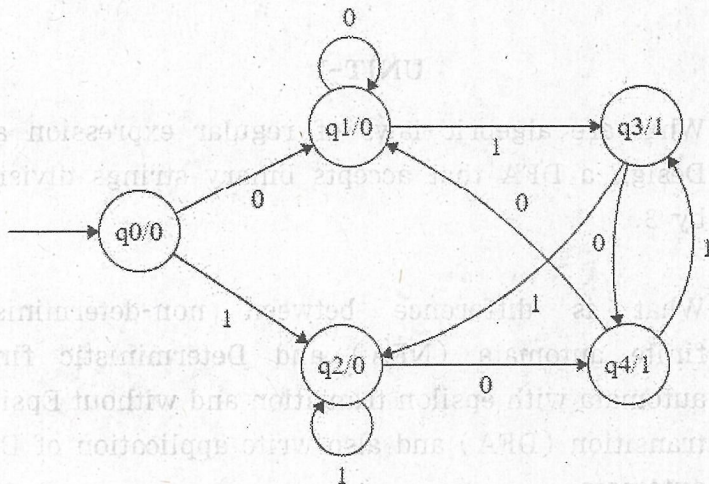
$B \rightarrow SbS \mid A \mid bb.$

15

UNIT-III

5. Define Moore Machines and write its states. Write steps to Convert From following Moore to Mealy Machine.

15



6. What is deterministic push down automata. And also Construct a PDA for palindromes over $\{a, b\}$ with center marker.

15

UNIT-IV

7. What is Turing machine and Construct a Turing Machine that adds 1 to a binary number. 15
 8. What is P-NP class and also explain Rice's problem with the help of an example. 15
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45171

BT-5/D-25

ESSENTIAL OF INFORMATION TECHNOLOGY

Paper-PC-CS-305A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions by selecting at least *one* question from each Unit.

UNIT-I

1. (a) Differentiate JDK, JRE and JVM. (5)
(b) What is the role of **labelled break** and **labelled continue** statements in Java? Explain with examples. (10)
2. (a) Explain the use of the **final** keyword in Java with suitable examples. How is it different when used with (a) variables, (b) methods, and (c) classes? (10)
(b) What is an interface in Java? Explain its significance with an example. (5)

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UNIT-II

3. (a) Explain the features of Swing in Java. Describe any **five commonly used Swing components** with suitable examples. (7)
- (b) What is **event handling** in Swing? Write a program to demonstrate **ActionListener** for a button click. (7)
4. (a) What are **layout managers** in Java Swing? Explain **FlowLayout**, **BorderLayout**, and **GridLayout** with examples. (8)
- (b) Write a Swing program to design a simple calculator interface using layout managers. (7)

UNIT-III

5. (a) Explain how a servlet handles **HTTP GET** and **HTTP POST** requests. Write a short servlet code that reads parameters from an HTML form (e.g., name and email) and displays them. (10)
- (b) Explain the **lifecycle of a servlet** with the help of a neat diagram. (5)
6. (a) What are **cookies** in servlets? Explain how to create, add, and retrieve cookies in a servlet program. (7)

- (b) Explain **session tracking techniques** in servlets. Write a servlet program that uses **HttpSession** to maintain a user's login information across multiple pages. (8)

UNIT-IV

7. What is JDBC? Write its simple steps to connect a Java program to a database. Write a Java program to **connect to a database** and display all records from a table Student. (15)
8. What are **List** and **Map** in Java? Give one example of each. (7)
9. Write a Java program to :
- (a) Store 5 student names in a **List**.
 - (b) Store their marks in a **Map**.
 - (c) Display the names and marks. (8)
-

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45172

BT-5/D-25

COMPUTER ORGANIZATION AND ARCHITECTURE

Paper : PC-CS-307A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT-I

1. (a) Discuss the Von Neumann Architecture with a neat diagram. Explain its main components and the flow of data and instructions during program execution. (8)
- (b) Describe fixed-point representation of numbers. Distinguish between sign-magnitude, 1's complement, and 2's complement representations. (7)
2. (a) Explain with an example how Booth's algorithm performs multiplication of signed binary numbers? (8)
- (b) What is virtual memory? Explain how it allows a computer to run programs larger than the physical memory? (7)

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UNIT-II

3. (a) Describe the concept of stored program organization. How are instruction codes represented and executed in this model? (7)
- (b) Describe the working principle of a common bus system and explain how it enables data transfer between CPU registers? (8)
4. (a) Differentiate between register reference and memory reference instructions using suitable example. (8)
- (b) Describe the interrupt handling process in a CPU. How does the system ensure smooth program execution after servicing the interrupt? (7)

UNIT-III

5. (a) Describe the stack organization in a CPU. Explain how the stack is used for procedure calls, expression evaluation, and interrupt handling, with examples? (8)
- (b) Discuss the immediate, direct, and indirect addressing modes in a CPU. Illustrate each mode with examples and discuss their impact on instruction execution time. (7)
6. Explain the different instruction formats with examples. Discuss the advantages and disadvantages of each format. (15)

UNIT-IV

7. (a) Differentiate between I/O Bus and Memory Bus. Explain the significance of separate buses for data transfer and control in a computer system. (8)
- (b) Describe asynchronous serial transfer. How does it differ from parallel data transfer? (7)
8. Write short notes on :
- (a) DMA Controller.
- (b) Priority interrupt.
- (c) Input/Output Processor (IOP). (15)
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45176

BT-5/D-25

ADVANCED ALGORITHMS

Paper : PE-CS-T307A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions selecting at least *one* question from each unit.

UNIT-I

1. (i) Explain Master Theorem with suitable example. 7
- (ii) List various binary tree used for algorithms. Explain the working of any one with example. 8
2. (i) Find the time complexity (all case) of any one sorting technique. 8
- (ii) Discuss the role of Pseudo code convention in algorithms. 7

UNIT-II

3. (i) Define Hiring Problem. Discuss its probabilistic analysis. 8

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- (ii) Explain matrix chain multiplication with example. 7
4. (i) Discuss Knapsack Problem and its solution. 7
(ii) Write short note on activity selection problem. 8

UNIT-III

5. (i) What is relaxation. Discuss its significance in Minimum spanning tree. 7
(ii) Differentiate Kruskal and Prim algorithms with example. 8
6. (i) Write and explain All pair shortest path-Floyd Warshall Algorithm. 7
(ii) Explain DFS with suitable example. What is the degree and height of DFS? 8

UNIT-IV

7. Discuss various steps in String matching with finite automata in detail. 15
8. (i) Explain Rabin-Karp Algorithm with example. 7
(ii) Write and discuss Knuth-Morris-Pratt Algorithm. 8

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BT-7/D-25

**SOFTWARE VERIFICATION AND
VALIDATION AND TESTING**

Paper : PE-CS-D-403A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT-I

1. (a) Differentiate between Verification and Validation with suitable examples. (7)
(b) Explain the Software Development Life Cycle (SDLC) and its relation to testing. (8)
2. (a) Explain the process of software testing with a neat diagram. (7)
(b) What are test cases and test oracles? Explain their roles in the testing process. (8)

UNIT-II

3. (a) Explain Decision Table Based Testing with an example. (8)
(b) What is Mutation Testing? Describe its process and purpose. (7)

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4. (a) Explain the importance of Structural Testing. (7)
- (b) Explain DD-Paths, Cyclomatic Complexity, and Graph Metrics with suitable diagrams. (8)

UNIT-III

5. (a) Explain Risk Analysis and its role in testing. (7)
- (b) Discuss the various prioritization guidelines for reducing the number of test cases. (8)
6. (a) Discuss Debugging and Domain Testing in detail. (7)
- (b) Describe the process of reducing the number of test cases with suitable guidelines and techniques. (8)

UNIT-IV

7. (a) Discuss Stress Testing and its significance. (7)
- (b) Write short notes on ISO-9000 and CMM. (8)
8. Explain various software quality models such as McCall, Boehm, and ISO-9000 in detail. (15)

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47246

BT-7/D-25

NEURAL NETWORKS AND DEEP LEARNING

Paper : PE-CS-D-411-A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt five questions in all, selecting one question from each unit.

UNIT-I

1. (a) Explain the fundamental differences between a biological neural network and an artificial neural network with suitable examples. (8)
(b) Discuss supervised, unsupervised, and reinforcement learning methods with suitable applications. (7)
2. (a) Define and explain the role of weights, bias, threshold and learning rate in neural networks. (7)
(b) Neural networks are said to evolve over time. Explain the evolution of neural networks along with their major applications. (8)

UNIT-II

3. (a) Explain the Hebb network theory and describe the training algorithm with example. (8)
(b) Describe the architecture and working of the Back Propagation Network along with its training algorithm. (7)
4. (a) Write short notes on Hopfield networks with their architecture. (7)
(b) Discuss the architecture and training process of Adaptive Resonance Theory (ART) Networks. (8)

UNIT-III

5. (a) Explain the Kohonen self-organizing feature map and its training algorithm. (7)
(b) Describe the architecture and functioning of Boltzmann Machine. (8)
6. (a) Write a short note on Neocognitron Networks and their applications. (8)
(b) Explain optical neural networks with reference to electro-optical multipliers and holographic correlators. (7)

UNIT-IV

7. (a) Explain the challenges of underfitting and overfitting in machine learning with suitable examples. (7)

- (b) Discuss the architecture and applications of Convolutional Neural Networks (CNNs). (8)
8. (a) What are Deep Forward Networks? Explain with an example. (8)
- (b) Write a detailed note on applications of Deep Learning in Natural Language Processing (NLP). (7)
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Roll No.

Total Pages : 2

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BT-7/D-25

CYBER LAW AND ETHICS

Paper : OE-CS-401A

Time : Three Hours]

[Maximum Marks : 75

Note : There are total eight questions. Each question carries equal marks. Attempt only five questions, by selecting one question from each unit.

UNIT-I

1. (a) Differentiate doctrinal approach and real approach with example. 8
(b) Discuss the pros and cons of Internet in field of cyber crime. 7
2. Write down short note on following :
 - (a) Cyber jurisprudence.
 - (b) Legal and technological significance of domain name.
 - (c) Importance of Cyber law in India. 5×3=15

UNIT -II

3. Discuss in detail main features, amendments and limitation of IT Act 2000. 15

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4. (a) Write and explain various steps involved in Cryptographic algorithm. 8
(b) Discuss the role of Electronic governance in cyberspace. 7

UNIT-III

5. (a) Enlist the main features of Indian Patent Act. 8
(b) Discuss in brief various methods used for protection of electronic database. 7
6. Discuss in detail sections of criminal procedure code and Indian Penal code which are relevant with IT Act. 15

UNIT -IV

7. Write down a detailed note on importance of cyber ethics along with ethics in information societies. 15
8. Write down short note on following :
(a) How AI can play an important role in Cyber ethics?
(b) Block chain ethics.
(c) Ethical issues in Artificial Intelligence.

(5×3=15)

Roll No.

Total Pages : 3

BT-8/D-25

48245

CLOUD COMPUTING

Paper-PE-CS-A402A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT-I

1. (a) What factors should an organization consider while choosing a Cloud Service Provider? Explain in detail with reference to performance, cost and security. 8
(b) Discuss the differences between cloud, and grid computing in terms of system architecture. 7
2. Differentiate between Distributed Computing and Utility Computing. Write a detailed note on how each model works, their advantages and disadvantages and provide suitable examples where they are applied? 15

UNIT-II

3. (a) Discuss how open-source technologies contribute to the development and management of Cloud infrastructures, highlighting their impact on scalability, flexibility and costeffectiveness? 7

- (b) Discuss the significance of Web services in Cloud computing and explain how they facilitate seamless integration and interoperability between multiple Cloud platforms? 8
4. What are different Cloud deployment models, including public, private, hybrid and community clouds? Describe the key features of each model and explain their benefits and drawbacks. 15

UNIT-III

5. (a) Discuss the economic benefits of Cloud-based scaling and provide examples of how organizations can leverage Cloud elasticity for Cost optimization? 7
- (b) Explain how Databases and Data stores are designed for large-scale Data processing and the role of Cloud management tools in automating these processes? 8
6. Compare the features and service management of Eucalyptus, Microsoft Azure and Amazon EC2. Discuss how each platform handles scalability, resource allocation, data processing and meeting diverse user requirements? 15

UNIT-IV

7. (a) What are the main layers of Cloud security and how do they work together to keep the cloud safe? 8
- (b) What are the challenges of Data privacy in Cloud computing and how do Jurisdictional issues related to Data location affect security? 7

8. (a) Discuss how Identity and Access Management (IAM), authentication and access control contribute to security in Cloud environments? 8
- (b) What does DROPS mean and how does it make Cloud data safer and quicker to access? 7

Roll No.

Total Pages : 2

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48249

CYBER SECURITY

Paper-OE-CS-402A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT-I

1. Discuss the nature and scope of cyber-crime in the digital era. Describe crime against property and drug trafficking as a cyber-enabled crime. 15
2. (a) Describe the block cipher modes of Operation in detail (ECB, CBC, CFB, OFB, CTR). 8
(b) Compare and contrast DES, Triple DES and AES in terms of structure, key length, and security. 7

UNIT-II

3. (a) Compare MD5 and SHA algorithms in terms of security and efficiency. 8
(b) Explain the working of Digital Signature Algorithm (DSA) with an example. 7

4. (a) Write note on X.509 Certificate format. 8
- (b) Explain the Architecture of Pretty Good Privacy (PGP).
How does it provide confidentiality and authentication
in Email security? 7

UNIT-III

5. (a) Describe security technology framework involving
firewalls, VPNs and intrusion detection systems. 8
- (b) Explain the process of Archival storage and disposal
of Data. 7
6. (a) Write a detailed note on Web security challenges
and solutions, focusing on SSL/TLS protocols. 8
- (b) Explain system security in detail with respect to
intruders, viruses and trusted systems. 7

UNIT-IV

7. Describe the Digital forensic life cycle with neat stages.
Discuss the importance of Computer forensic science in
Cybercrime investigations. 15
8. What are the Cybercrime punishments under Indian law?
Explain in detail the Legal perspectives of Cybercrimes,
focusing on both National and International frameworks. 15

Roll No.

Total Pages : 2

BT-8/D-25

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WEB AND INTERNET TECHNOLOGY

Paper-OE-CS-410A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT-I

1. Describe different types of Navigation and Search systems on the Internet. How would you design a user-friendly search interface for a Website? 15
2. Discuss the growth and evolution of the Internet, including the role of ARPANET and the history of the World Wide Web. 15

UNIT-II

3. Differentiate between HTML5 and XHTML with examples. Explain basic text markup, images, lists and forms in HTML. 15
4. Discuss various Internet services such as E-mail and News Firewall. Also explain the role of Communication media, clients and servers. 15

UNIT-III

5. Write a program in Python that Demonstrates creation, insertion and deletion of elements in strings, tuples, lists and dictionaries. Explain the differences among them. 15
6. Discuss the concepts of functions and scoping in Python. What are Global variables and how are they used? 15

UNIT-IV

7. Describe file handling in Python. Write a program that demonstrates reading from and writing to a file, along with exception handling. 15
8. (a) Discuss the concepts of Inheritance, Encapsulation, and Information hiding in Python with appropriate examples.
(b) Explain Object-Oriented Programming (OOP) in Python. Describe classes, objects and abstract Data types with examples. 15