

Roll No.

Total Pages : 03

BT-3/D-25

43216

MATHEMATICS FOR BIG DATA AND
OPTIMIZATION
BS-CS-AIDS-201 A

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) If $f(x) = x + x^2$ for $-\pi < x < \pi$, determine the Fourier series of the function $f(x)$. 7.5
- (b) Obtain the Fourier Series for the function $f(x) = 2x - x^2$ in $(0, 3)$. 7.5

2. (a) Find the Fourier transform of $f(x) = \begin{cases} 1, & \text{for } |x| \leq 1 \\ 0, & \text{for } |x| > 1 \end{cases}$,

Hence Evaluate $\int_0^{\infty} \frac{\sin x}{x} dx$. 7.5

- (b) Find the Fourier sine transform of $f(x) = x^{n-1}$, $n > 0$. 7.5

Unit II

3. (a) Solve the differential equation $\cos^2 x \frac{dy}{dx} + y = \tan x$. 7.5
- (b) Solve $(y \sin 2x)dx - (1 + y^2 + \cos^2 x)dy = 0$. 7.5
4. (a) Solve $(D^2 + D)y = x^2 + 2x + 4$. 7.5
- (b) Solve by the method of variation of parameters
 $(D^2 + 1)y = 2 \cos x$. 7.5

Unit III

5. (a) Find a root of the equation $x^3 - 4x - 9 = 0$, using the bisection method correct to three decimal places. 7.5
- (b) Find the positive root of $x^4 - x = 10$ correct to three decimal places, using Newton-Raphson method. 7.5
6. (a) Find the missing values in the following table : 7.5

$x :$	45	50	55	60	65
$y :$	3.0	-	2.0	-	-2.4

(b) Find $f'(0)$ from the following data : 7.5

X : 3 5 11 27 34

F(x) : -13 23 899 17315 35606

Unit IV

7. Using Kuhn-Tucker conditions, find the value(s) of β for which the point $x_1^* = 1$, $x_2^* = 2$ will be optimal to the problem : 15

$$\text{Maximize } f(x_1, x_2) = 2x_1 + \beta x_2$$

$$\text{Subject to } g_1(x_1, x_2) = x_1^2 + x_2^2 - 5 \leq 0, g_2(x_1, x_2)$$

$$= x_1 + x_2 - 2 \leq 0$$

8. Minimize the function $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ with the starting point $(0, 0)$. 15



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43217

OBJECT ORIENTED PROGRAMMING

PC-CS-AIDS-203A

Time : Three Hours]

[Maximum Marks : 75

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

Unit I

1. Define Class and Object. Write a C++ program to implement a class called Bank Account that has private member variables for account number and balance. Include member functions to deposit and withdraw money from the account. 15
2. What is object oriented programming ? Explain various features of object oriented programming. Write a program in C++ to explain features of object oriented programming. 15

Unit II

3. (i) Define static data members and static member functions. 5
- (ii) Define Inheritance. Explain various types of inheritance. 10
4. Define constructors. Explain various types of constructors. Write a program in C++ to explain Copy constructor and default constructor. 15

Unit III

5. Explain Operator Overloading. List rules of operator overloading. Create a class Polar which describes a point in the plane using polar coordinates radius and angle. Use the overloaded + operator to add two objects of class Polar. 15
6. Define Polymorphism. Explain various types of polymorphism. Develop a program to implement the concept of virtual functions. 15

Unit IV

7. (a) Write a program in C++ to copy contents of file ABC.txt to file XYZ.txt. 8
- (b) Define templates. Develop a program in C++ to implement class template. 7
8. Explain Exception Handling in C++. Write a program in C++ to explain concept of exception handling. Also explain concept of multiple catch blocks. 15



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BT-3/D-25

43218

DATA STRUCTURES AND ALGORITHMS

PC-CS-AIDS-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) Define Data Structures. Explain their applications in computer science. 7
- (b) Differentiate between Best Case, Worst Case and Average Case Analysis with suitable examples. 8
2. (a) Explain the algorithm for Binary Search with an example. 8
- (b) Explain parse Matrices and Radix Sort. 7

Unit II

3. (a) Define Stack. Explain the implementation of a stack using arrays. 10
- (b) Convert the following Infix expression into Postfix and Prefix forms :
- $(A + B) * (C - D)/E.$ 5
4. (a) Explain the working of Quick Sort with an example. 8
- (b) Write a short note on Circular Queue and its applications. 7

Unit III

5. (a) What is a Linked List ? Explain the insertion and deletion operations in a Singly Linked List. 8
- (b) Differentiate between Static and Dynamic Data Structures. 7
6. (a) Explain the implementation of Doubly Linked List with an example. 8
- (b) Write an algorithm to implement Stack using Linked List. 7

Unit IV

7. (a) Explain Preorder, Inorder and Postorder traversals of a Binary Tree with an example. 8
- (b) Represent the following expression using a binary tree :
$$((A + B) * (C - D))/E.$$
 7
8. (a) Define AVL Trees. Explain their role in efficient searching. 8
- (b) Differentiate between BFS and DFS graph traversal algorithms. 7



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Total Pages : 03

BT-3/D-25

43219

**INTRODUCTION TO ARTIFICIAL
INTELLIGENCE
PC-CS-AIDS-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. Discuss various problem-solving methods in AI, such as state space search, production systems and constraint satisfaction problems. 15
2. Explain heuristic-based search techniques in detail : 15
 - (i) Hill climbing
 - (ii) Best-first search
 - (iii) Branch and bound.

Unit II

3. (a) Describe the Alpha-Beta Cutoff algorithm and explain how it optimizes the Minimax process. 8

- (b) Explain the process of knowledge representation using predicate logic with examples of unification and resolution. 7
4. (a) Explain the Minimax algorithm used in game playing. 7
- (b) Discuss various methods of knowledge representation in AI. 8

Unit III

5. (a) Define knowledge engineering. Explain the role of first-order logic in knowledge representation. 7
- (b) Discuss the inference mechanisms in first-order logic, including forward and backward chaining. 8
6. (a) Differentiate between probabilistic reasoning and fuzzy logic. 6
- (b) Explain how uncertainty is handled in AI using probabilistic reasoning, certainty factors and fuzzy logic. 9

Unit IV

7. (a) Explain various learning techniques : 10
- (i) Supervised

- (ii) Unsupervised
- (iii) Reinforcement learning.
- (b) Write a short note on the MYCIN expert system. 5
- 8. (a) Discuss the architecture, working and applications of expert system. 9
- (b) Write a short note on genetic algorithms. 6



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Total Pages : 04

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43220

PROGRAMMING LANGUAGE

PC-CS-AIDS-209A

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 essential characteristics of a good programming language. Explain, how these characteristics influence readability, writability, reliability, and maintainability of software systems. Provide suitable examples. 8
- (b) Explain the concept of elementary data types in programming languages. Discuss, how data objects, variables and constants are defined and implemented in languages such as C or C++ ? 7

2. (a) What is syntax and semantics in programming languages ? Distinguish between the two and describe, how syntax errors and semantic errors differ with practical examples. 8

- (b) Write short notes on the following : 7
- (i) Numeric data types
 - (ii) Enumerations
 - (iii) Booleans and characters.

Unit II

3. (a) Explain the concept of structured data objects and structured data types. Discuss, how they differ from elementary data types and how they improve program organization and modularity ? 8
- (b) Explain the implementation and operations on variable-size data structures. How do languages like C or C++ manage dynamic data objects such as linked lists or dynamically allocated arrays ? 7
4. (a) Discuss the declaration and type checking of structured data structures. How does compile-time type checking prevent logical errors in programs involving arrays and records ? 8
- (b) What are subprograms and programmer-defined data types ? Explain, how concepts such as abstraction, encapsulation and information hiding are applied in their design ? 7

Unit III

5. (a) Differentiate between implicit and explicit sequence control. Explain, how both affect the execution order of statements with suitable programming examples ? 8
- (b) Define and differentiate static and dynamic scope. Write an example to show how variable referencing differs under static and dynamic scoping. 7
6. (a) What are exceptions and exception handlers ? Describe their role in sequence control and show, with an example, how structured exception handling improves program reliability. 8
- (b) Explain the concept of shared data in concurrent programming. Explain the concepts of local and global referencing environments and how they affect name visibility and lifetime of variables ? 7

Unit IV

7. (a) Explain the major runtime elements requiring storage in program execution. Describe the role of code, static data area, stack, and heap segments in a typical program's memory layout with a neat diagram. 8

- (b) Explain the key differences between procedural and object-oriented programming. How do abstraction, encapsulation, inheritance, and polymorphism change the way programs are designed and maintained ? 7
8. (a) Describe the principles of static, stack-based, and heap-based storage management. Explain, how each strategy handles memory allocation and deallocation during program execution ? 8
- (b) What are the major issues associated with runtime storage management ? Discuss problems like memory fragmentation, memory leaks, and dangling pointers, along with preventive measures used in modern programming languages. 7



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43221

BUSINESS INTELLIGENCE AND
ENTREPRENEURSHIP
HM-902-A

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. Examine the key determinants influencing entrepreneurial growth in India. Discuss both economic and non-economic factors. Illustrate your analysis with relevant examples from India's MSME ecosystem and emerging startup sector.
2. Elaborate on the concept, structure, and relevance of Entrepreneurial Development Programmes (EDPs). Assess how EDPs facilitate capacity building, skill enhancement, and the promotion of entrepreneurship among youth, women and rural communities in India.

Unit II

3. Discuss the significance and methodology of conducting feasibility studies and marketing research prior to establishing a new enterprise. Analyse, how industry analysis, competitor analysis, market segmentation and positioning serve as vital inputs for strategic decision making in entrepreneurship.
4. Elaborate on the significance of project planning and scheduling in entrepreneurial ventures. Analyse, how management tools such as PERT and CPM facilitate efficient time, cost, and resource management. Illustrate their application through a practical example from a real or simulated entrepreneurial project.

Unit III

5. Identify and critically analyze the major challenges faced by Small-Scale Industries (SSIs) and Micro, Small and Medium Enterprises (MSMEs) in India. Examine issues related to finance, marketing, technology, infrastructure, human resources and regulatory frameworks and suggest appropriate policy measures for overcoming these constraints.

6. Assess the contribution of Small-Scale Industries (SSIs) and MSMEs to India's economic growth and development. Discuss their role in employment creation, innovation, and fostering self-reliance. Review key policy initiatives such as the MSME Development Act, cluster development programs and digital enablement schemes.

Unit IV

7. Analyze the legal considerations involved in forming different types of business entities in India. Compare the procedures, merits, and limitations of proprietorships, partnerships, limited liability partnerships (LLPs) and private/public limited companies from an entrepreneurial standpoint.
8. Evaluate the role of institutional support, regulatory frameworks and entrepreneurial innovation in the success of Indian small enterprises. Using case studies analyse how strategic management, institutional backing, and innovation contributed to their sustainability and growth. Highlight lessons for aspiring entrepreneurs.



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Total Pages : 3

45261

BT-5/D-25

THEORY OF COMPUTATION

Paper : PC-CS-AIDS-301A

Time : Three Hours]

[Maximum Marks : 75

Note : Students will be required to attempt *five* questions in all selecting at least *one* question each from Unit- I to Unit-IV. All questions carry equal marks.

UNIT-I

1. (a) Explain the basic concepts of finite automata. Distinguish between Deterministic Finite Automata (DFA) and Non-Deterministic Finite Automata (NFA) with suitable examples.
(b) Describe the construction and working of NFA with ϵ -transitions. How can an NFA with ϵ -transitions be converted into an equivalent DFA. (8+7=15)

2. (a) Define Regular Expressions (RE). Explain the algebraic laws of regular expressions and how regular expressions can be used to describe regular languages.

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- (b) Discuss the process of converting a Regular Expression to an NFA and vice versa. Explain the minimization procedure of finite automata with an example. (8+7=15)

UNIT-II

3. (a) Define Context-Free Grammar (CFG). Explain the construction of parse trees and illustrate ambiguity in grammars with suitable examples.
(b) Discuss the Chomsky Hierarchy of languages. Explain the normal forms of context-free grammars—Chomsky Normal Form and Greibach Normal Form. (8+7=15)
4. (a) Explain the Pumping Lemma for context-free languages. How can it be used to prove that certain languages are not context-free?
(b) Write notes on the closure properties of Context-Free Languages (CFLs). Discuss recursive languages and the minimization of finite automata. (8+7=15)

UNIT-III

5. (a) Define Moore and Mealy Machines. Explain their structure and operation. Show the equivalence between Moore and Mealy machines with an example.

- (b) Define Pushdown Automata (PDA). Describe the construction of PDA for a given Context-Free Grammar (CFG). (8+7=15)
6. (a) Explain the difference between Deterministic Pushdown Automata (DPDA) and Non-Deterministic Pushdown Automata (NPDA). Discuss their equivalence with examples.
- (b) Discuss the applications of Pushdown Automata in compiler design and language recognition. (8+7=15)

UNIT- IV

7. (a) Explain the concept of Turing Machine (TM). Discuss its construction, transition function, and the concept of instantaneous description with examples.
- (b) Describe the Universal Turing Machine. Explain the concept of restricted Turing machines and their equivalence to general Turing machines. (8+7=15)
8. (a) Discuss Decidability and Undecidability in the context of Turing Machines. Explain Post's Correspondence Problem (PCP) and Rice's Theorem.
- (b) Explain Time and Tape Complexity of Turing machines. Describe the classes P, NP, and NP-completeness with suitable examples. (8+7=15)

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45262

BT-5/D-25

DESIGN AND ANALYSIS OF ALGORITHMS

Paper : PC-CS-AIDS-303A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. Write Algorithm for Quick Sort and explain it with the help of an example. (15)
2. (a) What are Asymptotic notations and explain all notations. (7.5)
(b) Write Master Theorem for solving Recurrence. (7.5)

UNIT-II

3. Write Algorithm for finding Longest common subsequence and explain it. (15)
4. (a) What are Red-Black trees. Write its properties. (7.5)
(b) Explain the concept of Huffman codes. (7.5)

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UNIT-III

5. Differentiate between BFS and DFS and write algorithm for Depth first search. (15)
6. Explain the concept of Relaxation and write Bellman ford algorithm. (15)

UNIT-IV

7. Explain the Following :
 - (a) Zero One Principle.
 - (b) Comparison Network. (15)
8. Explain the concept of Flow Networks, Residual Networks and Augmenting Path. (15)

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45263

BT-5/D-25

COMPUTER NETWORK

Paper-ES-CS-AIDS-305A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. (i) Differentiate LAN, MAN and WAN. Discuss various topologies used in networks. (7)
- (ii) Explain ATM architected in detail. (8)
2. (i) Explain OSI layered architecture. Differentiate TCP/IP and OSI architecture. (8)
- (ii) Discuss the working of Wi-Fi communication. (7)

UNIT-II

3. (i) Explain the working of FDDI with header diagram. (8)
- (ii) Differentiate TDMA and CDMA. (7)

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4. (i) Explain Bit stuffing and character stuffing with suitable example. (7)
- (ii) Define ALOHA. Differentiate Pure and slotted ALOHA. (8)

UNIT-III

5. (i) Explain the working of DHCP protocol with help of header diagram. (7)
- (ii) Differentiate DVR and LSR algorithm. Write steps involved in LSR algorithm. (8)
6. (i) Distinguish IPv4 and IPv6 with header diagram. (8)
- (ii) Differentiate ARP and RARP with header diagram. (7)

UNIT-IV

7. (i) Discuss various types and modes of Cryptography. List various algorithms used in different Cryptography. (8)
- (ii) Differentiate SNMP and SMTP. (7)
8. (i) Distinguish TCP and UDP with header diagram. (8)
- (ii) Differentiate Leaky bucket and token bucket algorithm. Write token bucket algorithm. (7)

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Total Pages : 3

45264

BT-5/D-25

MACHINE LEARNING WITH USING PYTHON

Paper : PC-CS-AIDS-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) Describe the primary differences between Python's Set and List data structures regarding order and duplicate elements.
(b) Write a Python expression that uses slicing to extract the middle five characters from a string variable named data that is known to have at least 15 characters.

2. (a) What is a Dictionary? Describe two different ways to iterate through a Python Dictionary.
(b) Explain the difference between Local Variables and Global Variables within the context of a Python function.

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UNIT-II

3. (a) Differentiate between a Pandas Series and a Pandas DataFrame in terms of structure, dimensionality, and data type homogeneity.
(b) Explain the purpose of using the Python statement with `open('file.txt', 'r')` as `f`: instead of simply using `f = open('file.txt', 'r')`.
4. (a) Describe the steps involved in loading a comma-separated values (CSV) file into a Pandas DataFrame
(b) Define and differentiate between Supervised Learning and Unsupervised Learning.

UNIT-III

5. (a) Describe the K-Nearest Neighbor (K-NN) algorithm's mechanism for making a prediction (both for classification and regression).
(b) Describe the operational process of building a Decision Tree for classification.
6. (a) Explain the difference between Accuracy and the F1-Score as model evaluation methods for a classification problem.
(b) Explain the core objective of a Support Vector Machine (SVM).

UNIT-IV

7.
 - (a) Describe the primary function of the MLContext object in the context of using SystemML within an Apache Spark ecosystem.
 - (b) List and briefly describe two significant open-source alternatives to SystemML for large-scale, distributed machine learning.

 8.
 - (a) Describe the steps, using Scala and MLContext, required to load data and make it available for processing within a SystemML script.
 - (b) Explain how SystemML's built-in matrix operations and handling of sparse data contribute to its efficiency.
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45265

BT-5/D-25

COMPUTER ARCHITECTURE

Paper : ES-CS-AIDS-309A

Time : Three Hours]

[Maximum Marks : 75

Note : There are eight questions in this question paper.

Students are required to attempt any *five* questions.

1. (a) What do you mean by computer architecture and organization? Devise an algorithm for division of two integers using restoring method. (8)

(b) Explain Booth's algorithm for multiplication. (7)

2. (a) What is Memory Hierarchy? Discuss the concept of Associative Memory. (8)

(b) Explain the concept of virtual memory. (7)

3. (a) What are typical registers in computer organization? Explain their purpose. (8)

(b) Explain register reference and memory reference instructions. (7)

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4. (a) What is control memory? How addressing sequencing is done in microprogrammed control unit? (8)

(b) Discuss the format of a microinstruction. (7)

5. Explain different addressing modes with the help of a suitable example. (15)

6. Write short notes on following :

(a) Instruction level parallelism. (8)

(b) Vector Processing. (7)

7. (a) Explain the process of source-initiated handshaking with timing diagram. (8)

(b) What is priority interrupt? Explain working of daisy chain. (7)

8. Write short note on following :

(a) DMA controller. (8)

(b) Input output processor. (7)

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45266

BT-5/D-25

ARTIFICIAL NEURAL NETWORKS

Paper : PC-CS-AIDS-311A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. (a) Discuss various activation functions used in ANNs.
(b) Differentiate between feedforward and feedback networks.
2. (a) Differentiate between the Error-Correction Learning rule and the Hebbian Learning rule.
(b) State the Hebbian Postulate and its significance in modelling biological learning.

UNIT-II

3. (a) Discuss the two major phases involved in the design and training of an RBF network.

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- (b) Discuss the Universal Approximation Theorem and how it justifies the MLP's capability to approximate any continuous function given sufficient hidden neurons.
4. (a) Discuss the local minima problem of Backpropagation learning and explain why the RBF network often avoids this issue.
- (b) Compare the primary activation function used in the hidden layer of a RBF Network with the Sigmoid function used in a standard MLP.

UNIT-III

5. (a) Differentiate between Linear Association and Pattern Association in the context of associative memories.
- (b) Describe the mechanism of the Delta Rule for pattern association.
6. (a) Explain the Architecture of the BAM network, highlighting the distinction between the F_A (input) layer and the F_B (output) layer.
- (b) Describe the architecture of a Recurrent Autoassociative Memory network.

UNIT-IV

7. (a) Describe the fundamental separability limitation of the original single-layer Perceptron network.
(b) Explain the core concept of Unsupervised Learning of Clusters in a Self-Organizing Map (SOM).

 8. (a) Contrast the Single-Layer Perceptron architecture with the Multi-Layer Perceptron (MLP) structure.
(b) Describe the winner-take-all learning process in an SOM.
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Total Pages : 3

47393

BT-7/D-25

**BUSINESS INTELLIGENCE AND
DATA VISUALIZATION**

Paper : HM-CS-AIDS-401A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. (a) Critically analyze the framework for Business Intelligence (BI) and explain how governance challenges affect BI maturity in large organizations. (8)
- (b) Discuss the key differences between Transaction Processing Systems (TPS) and Analytical Processing Systems (OLAP) with suitable business use cases. (7)
2. (a) Propose a BI implementation strategy for a multinational retail chain focusing on analytics-driven decision support. (8)
- (b) Evaluate how Big Data Analytics extends the capabilities of traditional BI platforms. (7)

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UNIT-II

3. (a) Design a multi-layer data warehouse architecture for a banking application. Justify each component. (8)
- (b) Explain the major implementation challenges faced in real-time data warehousing. (7)
4. (a) Critically examine the role of ETL in ensuring data quality during data integration. (8)
- (b) Discuss the security issues in data warehouse administration with examples. (7)

UNIT-III

5. (a) Explain how stream analytics can be applied in fraud detection in financial transactions. (8)
- (b) Compare the roles of Data Scientist and Data Engineer in big data environments. (7)
6. (a) Evaluate the advantages and limitations of Hadoop-based big data technologies in handling unstructured data. (8)
- (b) Explain how big data vendors differentiate themselves in the analytics market. (7)

UNIT-IV

7. (a) Construct a detailed comparison between Business Reporting and Business Performance Management. (8)

- (b) Discuss the role of balanced scorecards in linking corporate strategy with performance measurement. (7)

 - 8.
 - (a) Evaluate the emergence of visual analytics as a paradigm shift from traditional dashboards. (6)
 - (b) Justify with examples the selection of appropriate charts for large-scale sales analytics. (9)
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47394

BT-7/D-25

UNIVERSAL HUMAN VALUES-II :
UNDERSTANDING HARMONY

Paper-HSS-403A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. Define value education and skill education. Discuss their order of priority in your life. Discuss the guidelines for value education. (5+5+5=15)

2. What does a fulfilling life mean to you? List out the top five desires which comes to your mind while thinking of fulfilling life. Connect these desires to your basic aspirations. (7+8=15)

UNIT-II

3. List your 10 desires and classify them based on Self or body. Differentiate between various sources of imagination. Classify your desires based on the source of their imagination. (5+5+5=15)

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4. Discuss your program of self regulation in detail with suitable examples. Discuss the harmony of self also. (10+5=15)

UNIT-III

5. Discuss the concept of right, over and under evaluation within self. How this evaluation leads to harmony/disharmony in human self? Discuss the feeling of trust as foundation value of the relationship.

(8+7=15)

6. Write short notes on :

(a) Affection and Care.

(b) Love as complete value.

(c) Justice in relationship.

(5+5+5=15)

UNIT-IV

7. Discuss the concept of existence as coexistence. Discuss the strategy to achieve universal human order through human values.

(8+7=15)

8. Discuss the various orders of nature with their properties. Discuss the harmony between them and role of human being in maintaining this harmony.

(8+7=15)

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47395

BT-7/D-25

CYBER LAW AND ETHICS

Paper : OE-CS-AIDS-401

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. (i) Discuss the evolution of computer system. 7
- (ii) What are various terms and conditions related to web development agreement? 8
2. (i) Discuss the working of courts with help of court hierarchy. 8
- (ii) Differentiate real approach and doctrinal approach with example. 7

UNIT-II

3. (i) Explain the structure of the cyber appellate tribunal. 8
- (ii) Differentiate between the legal recognition of electronic record and digital signature. 7

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4. (i) Discuss various amendments and limitations of IT Act, 2000? 8
(ii) Differentiate public and private cryptography with example. 7

UNIT-III

5. (i) Discuss various law related to employees and internet. 7
(ii) Describe important sections in criminal procedural code. 8
6. (i) Differentiate ADR and ODR with example. 7
(ii) Discuss important sections in Indian panel code. 8

UNIT-IV

7. (i) Discuss various ethics in information society. 7
(ii) Explain the architecture of block chain? Discuss its various applications. 8
8. (i) What are the Principles of Ethical AI. Discuss Common ethical challenges in AI. 8
(ii) Describe the need of cyber regulation and ethics. 7

47400

BT-7/D-25

DATA MINING & PREDICTIVE MODELLING

Paper-PE-CS-AIDS-417A

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) Define Data Mining. Explain its functionalities and importance in the real world. (7)
- (b) Explain the classification of Data Mining systems. (8)
2. Differentiate between Data Mining and KDD. Explain the KDD process model in detail. (15)

UNIT-II

3. (a) What is Nearest Neighbour Classification? How does it work? (8)

(b) What is Tree Pruning in Decision Trees? Why is it important? (7)

4. Describe clustering in Data Mining. Explain various clustering methods in detail. (15)

UNIT-III

5. (a) What is Data Partitioning? Why is it important in model development? (8)

(b) Describe the process of Model Selection. What techniques are used? (7)

6. What are Bayesian Networks? Explain their structure and use in probabilistic reasoning. (15)

UNIT-IV

7. Explain the process of model evaluation and deployment in detail. Why are these steps crucial in a data science project? (15)

8. Describe the rule induction method using CHAID. How does it work and what are its advantages and limitations? (15)

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Total Pages : 3

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BT-7/D-25

HUMAN AI INTERACTION

Paper-PE-CS-AIDS-425A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. (a) Explain the concept of Human-AI interaction. What are the various key aspects of Human-AI interaction? (7.5)
- (b) How accurate are AI-based prediction models compared to traditional statistical methods? (7.5)
2. (a) Discuss the ethical factors to be considered while implementing cognitive services? (7.5)
- (b) Describe the pros and cons of using black box models in AI applications. (7.5)

UNIT-II

3. (a) What is meant by concrete human interaction design? How does it differ from other interaction design approaches? (7.5)

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- (b) Discuss the challenges and opportunities arise in maintaining transparency and trust in human-machine collaborative decision making? (7.5)
4. How does machine learning enable more personalized and adaptive user interactions? What are some common machine learning techniques used in designing interactive AI systems? (15)

UNIT-III

5. (a) How can AI systems be designed to minimize the potential risks and disasters associated with their use? (7.5)
- (b) What are the key challenges and limitations of using interactive visual analytics in machine learning? What strategies can be employed to overcome them? (7.5)
6. What ethical issues arise in the design and deployment of AI systems? Explore how principles like fairness, equity, and accountability can be incorporated into AI development, particularly in critical fields such as criminal justice and healthcare. (15)

UNIT-IV

7. (a) How are AI-driven chatbots and virtual assistants improving customer support and interaction on social media channels? (7.5)

- (b) In what ways have sentiment analysis and natural language processing (NLP) been applied to social media platforms to analyze public opinion and identify emerging trends? Give example? (7.5)

8. Analyze a case study demonstrating the following (any *two*) :
- (a) Technology's impact on safety and transportation efficiency of autonomous vehicles.
 - (b) Use of AI-powered facial recognition technology to strengthen security at an airport or public event.
 - (c) Application of autonomous drones in precision agriculture for monitoring and managing crops. (2×7.5=15)
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Total Pages : 2

BT-8/D-25

48400

REINFORCEMENT LEARNING

Paper-PC-CS-AIDS-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. What is reinforcement learning? Explain the elements of reinforcement learning with real world examples. 15
2. (a) Explain the history of reinforcement leaning in detail.
- (b) Discuss the problems of reinforcement learning. 15

UNIT-II

3. What is the difference between state value function and state-action value function? 15
4. Define Markov decision process. Explain the properties of finite Markov decision process with example. 15

UNIT-III

5. Justify the concept of Monte Carlo methods in reinforcement learning. 15

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6. What is the goal of Q-learning? Compare all variants of Q-Learning. 15

UNIT-IV

7. Discuss Gradient MC and Semi-gradient TD(0) algorithms in detail. 15
8. What is the role of experience replay in deep Q-learning? 15

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Total Pages : 2

BT-8/D-25

48402

AGILE SOFTWARE ENGINEERING

Paper-OE-CS-AIDS-408

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) Explain the principles of Agile and discuss how Agile differs from traditional software development approaches? 7
- (b) Describe the role of testing plans in Agile and explain how they help in linking testing, roles and key techniques. 8
2. How does Agile help in building quality software? Explain with principles, roles and techniques. 15

UNIT-II

3. Explain in detail the Agile Product Management process with reference to estimation, targeting, motivating the team and handling escalation issues. 15

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P. T. O.

4. Discuss the process of managing Agile projects using Scrum. 15

UNIT-III

5. Explain the process of managing Agile requirements with the help of tools and techniques. 15
6. Explain Agile Testing techniques in detail and compare them with traditional testing approaches. 15

UNIT-IV

7. Explain how Agile Measurement and Agile Retrospectives improve Software quality and team performance? 15
8. (a) Explain the significance of automated build tools in Agile environments. 8
- (b) Discuss the benefits of continuous integration and automated tools in Agile. 7