OPERATIONS RESEARCH
PAPER –VI

Time: 3 Hours]   [Max. Marks: 70

Note: Answer all the following questions from Section – A and Section – B

Section – A   (5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Explain Sensitivity Analysis in Linear Programming Problems.
2. Explain Maximization in Transportation Problems.
3. Define the Mathematical Model of an Assignment Problem.
4. Explain Belmann's Optimality Principle in Dynamic Programming Problems.
5. With an example, define dominance property in game theory.

Section – B   (5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Use Simplex method to maximize

$$Z = 3x_1 + 2x_2 + 5x_3$$

Subject to the constraints $x_1 + 2x_2 + x_3 \leq 430$;

$$3x_1 + 2x_3 \leq 460;$$
$$x_1 + 4x_3 \leq 420;$$
$$x_1, x_2, x_3 \geq 0.$$

(OR)

b) Use Two-Phase Method to Maximize

$$Z = 3x_1 - x_2$$

Subject to the constraints $2x_1 + x_2 \geq 2$;

$$x_1 + 3x_2 \leq 2;$$
$$x_2 \leq 4;$$
$$x_1, x_2, x_3 \geq 0.$$

7. a) Explain Vogel's Approximate Method of Solving Transportation Problems.

(OR)

b) Solve the following Transportation Problem.

		D_1	D_2	$D_{3,}$	D_4	Availability
	O_1	6	1	9	3	70
Origins	O_2	11	5	2	8	55
	O_3	10	12	4	7	90
	Requirements	85	35	50	45	

Destination

8. a) Explain Branch-and –Bound Technique in Solving an Integer Programming Problem.

(OR)

P.T.O

b) Solve the Assignment Problem.

Persons

$$\text{Jobs} \quad \begin{array}{c} A \\ B \\ C \\ D \end{array} \begin{bmatrix} 8 & 7 & 9 & 10 \\ 7 & 9 & 9 & 8 \\ 10 & 8 & 7 & 11 \\ 10 & 6 & 8 & 7 \end{bmatrix} \begin{array}{c} \\ \\ \\ \end{array}$$

$$\begin{array}{cccc} W & X & Y & Z \end{array}$$

9. a) Explain Forward Pass Computations in Dynamic Programming Problems.

(OR)

b) Use dynamic Programming to Maximize

$$Z = y_1; y_2; y_3$$

Subject to the constraints $y_1 + y_2 + y_3 = 5$;

$$y_1, y_2, y_3 \geq 0$$

10. a) Solve the following 3x3 game.

Player -B

$$\text{Player-A} \begin{bmatrix} 2 & -1 & -2 \\ 1 & 0 & 1 \\ -2 & -1 & 2 \end{bmatrix}$$

(OR)

b) Solve the following game by Linear Programming Techniques.

Player -B

$$\text{Player-A} \begin{bmatrix} 2 & -2 & 3 \\ -3 & 5 & -1 \end{bmatrix}$$

--oOo--

MACHINE LEARNING
PAPER –V

Time: 3 Hours]   [Max. Marks: 70

Note: Answer all the following questions from Section – A and Section – B

Section – A   (5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Write about Liner Algebra.
2. Write shot notes on Lasso.
3. What are the functions used in decision tree.
4. What is boosting?
5. Short notes on GMMs.

Section – B   (5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Which disciplines have their influence on Machine learning? Explain with examples.

(OR)

   b) Explain the features of Bayesian learning methods.

7. a) Explain about Principle Component Analysis in detail.

(OR)

   b) Explain about Linear regression in detail.

8. a) Describe in detail about neural networks role in machine learning.

(OR)

   b) Explain in detail about Kernel Perceptron.

9. a) Explain about K-Means algorithm with an example.

(OR)

   b) With an example explain Hierarchical clustering?

10. a) Discuss about Bayesian Networks.

(OR)

   b) What is expectation maximization?

--oOo--

DESIGN AND ANALYSIS OF ALGORITHMS
PAPER –III

Time: 3 Hours]   [Max. Marks: 70

Note: Answer all the following questions from Section – A and Section – B

Section – A   (5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Explain Dictionaries.
2. Explain Strassen's Matrix Multiplication.
3. Explain General Method of Dynamic Programming.
4. Discuss about Graph Coloring.
5. Give examples for NP Hard Problems and explain.

Section – B   (5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Explain Algorithm Specifications and Performance analysis.

(OR)

   b) Explain Stacks and queues.

7. a) Explain Binary search with Divide and Conquer method.

(OR)

   b) Explain minimum cost spanning tree with Greedy Method.

8. a) Explain All pairs shortest path problem using Dynamic Programming.

(OR)

   b) Explain various methods of Graph traversals. '

9. a) Explain 4-Queens Problem with Back Tracking.

(OR)

   b) Explain 0/1 Knapsack Problem with Branch and Bound.

10. a) Explain Cook's Theorem.

(OR)

   b) Discuss about NP Hard and NP Complete Problems.

--oOo--

DATABASE MANAGEMENT SYSTEM
PAPER –II

Time: 3 Hours]   [Max. Marks: 70

Note: Answer all the following questions from Section – A and Section – B

Section – A   (5x4=20)

Answer the following questions in not more than **ONE** page each:

1.   Write the Applications of Database System.
2.   Describe the basic Structure of SQL Query.
3.   Write a short note on Embedded SQL.
4.   Specify ACID Properties.
5.   Write a short note on Buffer Management.

Section – B   (5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a)   Describe the Phases of Database Design.

(OR)

  b)   Define ER Model. Explain how to enforce different Constraints on ER Diagram.

7. a)   Explain the Fundamental Relational Algebra Operations with example Queries.

(OR)

  b)   Describe the Aggregate Functions in SQL with example Queries.

8. a)   Explain how to enforce Integrity Constraints on Database Schema.

(OR)

  b)   Define Functional Dependency. Explain the Decomposition using Functional Dependencies.

9. a)   Differentiate Static Hashing and Dynamic Hashing.

(OR)

  b)   What is Serializability? Describe the Testing for Serializability.

10. a)   What is Concurrency Control? Describe Time Stamp based Protocols.

(OR)

  b)   Define Recovery. Explain Log Based Recovery.

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Time: 3 Hours]   [Max. Marks:
70

Note: Answer all the following questions from Section – A and Section – B

<u>Section – A</u>   (5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Define multi threaded programming.
2. Explain Demand Paging.
3. Explain Allocation Methods.
4. Define Access Matrix.
5. Explain Design Principles of LINUX.

<u>Section – B</u>   ·   (5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Explain process concept and its states along with inter process
    communication.

(OR)

   b) Explain process scheduling algorithms with an example.

7. a) Explain Page Replacement Algorithms.

(OR)

   b) Explain Memory Management Strategies with example.

8. a) Describe directory implementation of file systems.

(OR)

   b) Define different file access methods in detail.

9. a) Explain program threats and user authentication in system security.

(OR)

   b) Discuss the Access Control and Access Rights of System Protection.

10. a) Explain Kernel Modules of LINUX System.

(OR)

   b) Describe Windows -7 Design Principles.

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ARTIFICIAL INTELLIGENCE
PAPER –IV

Time: 3 Hours]   [Max. Marks: 70

Note: Answer all the following questions from Section – A and Section – B

Section – A   (5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Explain Functions and Files of Python.
2. Discuss Alpha Beta Pruning.
3. Explain, how Propositional logic is useful in AI?
4. Explain list of shells and tools available to develop expert systems.
5. Explain semantic web.

Section – B   (5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Demonstrate Python data types in detail.

(OR)

   b) Discuss History, Sub areas and Applications of Artificial Intelligence.

7. a) Define problem as state space search and explain Characteristics of problem.

(OR)

   b) Explain any Heuristic Search Techniques.

8. a) i. Explain applications of Resolution.
     ii. Discuss Logic Programming with Python.

(OR)

   b) Explain various methods of representing Knowledge.

9. a) Explain different Phases of developing expert systems. Compare Expert systems with Traditional Systems.

(OR)

   b) Explain Bayesian Belief Networks.

10. a) Explain advanced Knowledge Representation Techniques.

(OR)

   b) Discuss about sentence analysis phases and types of Parsers.

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