

FACULTY OF SCIENCE
M.C.A. II- SEMESTER REGULAR / BACKLOG EXAMINATIONS, AUG - 2024
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. What is DBMS? What is the purpose of designing database systems?
2. What is a primary key in a relational database? Give an example.
3. What is a schema in SQL? Briefly describe its purpose.
4. What is a bitmap index? In what scenarios is it most useful?
5. How does shadow paging work in database recovery?

Section – B

(5x10=50)

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

6. a) Describe the database design process in detail, from requirement analysis to physical design.

(CR)

- b) Explain the process of reducing an E-R diagram to relational schemas. Give an example.

7. a) Explain how null values are handled in SQL when performing aggregate functions.

(CR)

- b) Describe the selection and projection operations in relational algebra with examples.

8. a) Provide examples of poorly designed relational databases and explain how they can be improved.

(OR)

- b) What is Normal Form? Discuss the advantages of ensuring that a database schema is in First Normal Form.

9. a) Discuss the ACID properties of transactions in detail. Provide examples to illustrate each property.

(OR)

- b) Compare ordered indexing and hashing in terms of insertion, deletion, search operations, and space utilization.

10. a) Explain the impact of buffer management strategies on the performance of recovery mechanisms. Provide examples.

(OR)

- b) Discuss the principles of log-based recovery in detail. Explain the concepts of redo and undo logging with examples.

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FACULTY OF SCIENCE
M.C.A. II- SEMESTER REGULAR / BACKLOG EXAMINATIONS, SEP - 2024
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. What is the difference between List and Tuple? Write an example python code.
2. Write about Alpha Beta Pruning.
3. What is Natural Deduction System?
4. List out Shells and tools.
5. Write about Case Grammers.

Section - B

(5x10=50)

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

6. a) Explain Packages and Modules in Python? Write a python code illustrating package usage and module.

(OR)

- b) What is Artificial Intelligence? Explain Sub areas of AI and Applications.

7. a) Discuss about Heuristic Search Techniques in detail. Give one example.

(OR)

- b) Explain Bounded Look-ahead Strategy and use of Evaluation Functions?

8. a) How do axiomatic systems and semantic tables relate to AI? Explain their significance by providing examples of their applications in AI.

(OR)

- b) Explain the structure of semantic networks and their advantages in representing knowledge and provide examples of how they are applied in various AI systems.

9. a) What are the phases of Building Expert Systems? Explain Expert System Architecture.

(OR)

- b) What are Bayesian Belief Networks? How they are useful in AI and provide examples of their applications in AI Systems?

10. a) What is Semantic Web? Explain the key technologies and standards behind the semantic web.

(OR)

- b) What are the different types of Parsers used in Natural Language Processing and write the Significance of Universal Networking Knowledge.

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FACULTY OF SCIENCE
M.C.A. II- SEMESTER REGULAR / BACKLOG EXAMINATIONS, AUG - 2024
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. Write an algorithm of priority queue.
2. Discuss Convex Hull.
3. Write an algorithm to insert an element x into maxheap.
4. Explain the Hamiltonian Cycles.
5. What is NP-Hard Scheduling Problems?

Section - B

(5x10=50)

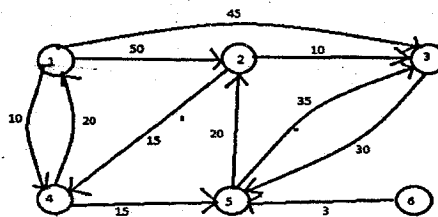
Answer the following questions in not more than **FOUR** pages each:

6. a) What is Queue data structure? Write the algorithm of insert and delete operation on queue.

(OR)

- b) Write an algorithm to delete an element X from binary search tree. Compute the Worst case time complexity of binary search algorithm.

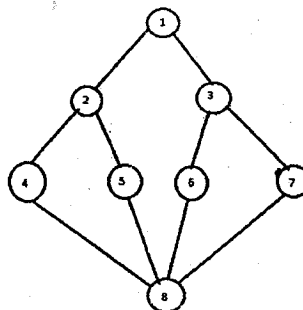
7. a) Use an algorithm of Single source Shortest Path to obtain in non-decreasing order the lengths of shortest paths from vertex 1 to all remaining vertices in the given directed graph.



(OR)

- b) Explain the Merge Sort algorithm and also find its average case time complexity.

8. a) Explain the DFS. Traverse the graph using DFS technique with its adjacency lists.



(OR)

- b) Explain 0/1 knapsack problem in dynamic programming.

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FACULTY OF SCIENCE
M.C.A. II- SEMESTER REGULAR / BACKLOG EXAMINATIONS, SEP - 2024
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 Define Joint Probability.
- ② Explain about partial least squares.
- ③ How linear discriminate analysis is used in machine learning for classification problem?
- ④ Explain about Hypothesis Test.
- ⑤ Explain about Gaussian Mixture Model Algorithm.

Section - B

(5x10=50)

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

6. a) What are the different concepts of statistical decision theory used for decision making learning algorithms? Explain.

(OR)

- b) Explain in detail about Bayesian Learning.

7. a) How Ridge Regression Works in Multiple Regression Model? Explain.

(OR)

- b) Explain the role of principal component analysis in dimensionality reduction.

8. a) How support vector machines are useful in classification problem? Explain.

(OR)

- b) Explain in detail about Naïve Bayes Classifiers.

9. a) Explain in detail about K-Means Clusters Algorithm.

(OR)

- b) What is Gradient Boosting Algorithm? Explain in detail.

10. a) Write in detail about Expectation Maximization.

(OR)

- b) How Bayesian Networks are used to solve uncertainty problems in machine learning? Explain in detail.

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FACULTY OF SCIENCE
M.C.A. II- SEMESTER REGULAR / BACKLOG EXAMINATIONS, SEP - 2024
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. Discuss different types of solutions you get in LPP.
2. Write the algorithm for solving a Transportation problem.
3. What is meant by unbalanced Assignment problem?
4. Elucidate the salient features of DPP
5. Explain the pay-off matrix

Section - B

(5x10=50)

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

- a) Discuss different types of constraints that occurs in LPP.

(OR)

- b) Find the minimum value of $Z = x_1 + 2x_2$
subject to :

$$3x_1 + x_2 \geq 3$$

$$4x_1 + 3x_2 \geq 6$$

$$\text{and } x_1, x_2 \geq 0$$

- a) With an example of your choice, explain the algorithm of Vogels approximation method to obtain IBFS in a TP.

(OR)

- b) Find the optimum cost for the following TP:

	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	12	18	13	20	50
O ₂	17	11	16	15	60
O ₃	11	10	14	13	40
Demand	20	25	10	35	

- a) Explain the procedure for integer programming formulations with the help of suitable example.

(OR)

- b) Find the assignment that minimizes total machining time with the help of following information:

	A	B	C	D
M 1	4	9	8	5
M 2	5	4	3	6
M 3	7	8	6	12
M 4	10	9	6	7

9. a) Explain the procedure for developing an optimal decision policy in Dynamic programming problem with suitable example.

(OR)

- b) Find the number of each of three items to be included in a package so that value of package will be maximum. Total weight of package must not exceed 5 kgs.

Item	Weight in Kgs	Value in rupees
1	2	60
2	6	160
3	4	130

10. a) Distinguish between the following and explain them with the help of example:

- Zero Sum game Vs. Non Zero sum game
- Two person Vs. Multi person game

(OR)

- b) Solve the following game:

	Player B	
Player A	2	5
	7	3

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FACULTY OF SCIENCE
M.C.A. II- SEMESTER REGULAR / BACKLOG EXAMINATIONS, AUG - 2024
OPERATING SYSTEMS
PAPER -I

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 about classic problems of synchronization.
2. Describe contiguous memory allocation.
3. Discuss about the WAFL file system.
4. Explain about language-based protection.
5. What are design principles of the Linux system?

Section -- B

(5x10=50)

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

6. a) What are operations on processes? Explain about inter process communication.
(OR)
b) What are system calls? Explain various types of system calls.
7. a) What is demand paging? Explain in detail.
(OR)
b) Briefly explain about page replacement algorithms with examples.
8. a) Define swap-space management. Explain about RAID structure.
(OR)
b) Give an overview of I/O systems. Explain about Kernel I/O Subsystem.
9. a) Explain about cryptography as a security tool in detail.
(OR)
b) What is access matrix? Explain about implementation of access matrix.
10. a) Discuss about memory management in the Linux system.
(OR)
b) Explain in detail about programmer interface in Windows 7.

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