

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER - 2023
SECOND SEMESTER**

MCA 204 - ADVANCED DATABASE MANAGEMENT SYSTEMS

(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)

(Common Paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART-A

Answer any **FIVE** of the following questions. Each question carries **4** marks. **(5×4=20)**

1.
 - a) What is meant by physical data independence?
 - b) What is a candidate key? How is it identified?
 - c) What is a weak-entity set?
 - d) What is a view? Explain with an example.
 - e) Explain group by and having clauses with examples.
 - f) What is ODBC? When is it used and How?
 - g) What is a persistent pointer?
 - h) Write about nesting and unnesting.
 - i) How is duplicate elimination done by sorting? Explain.
 - j) What are ACID properties? Explain their significance in database design.

PART - B

Answer **FIVE** questions choosing **ONE** question from each Unit. Each question carries **10** marks. **(5×10=50)**

UNIT - I

2.
 - i) Write about different levels of data abstraction. Explain with a neat diagram.
 - ii) What is DDL? What are the consistency constraints that can be implemented?

(OR)

3.
 - i) Write about natural join operation of two relations with an example.
 - ii) Consider the following relational schema.

Employee(empno, name, office, age)

Books(isbn, title, authors, publisher)

Loan(empno, isbn, date)

Write the following queries in relational algebra.

- a) Find the names of employees who have borrowed a book published by McGraw Hill.
- b) Find the names of employees who have borrowed all books published by McGraw Hill.
- c) Find names of employees who have borrowed more than five books of that publisher.
- d) For each publisher, find names of employees who have borrowed more than five books of that publisher.

UNIT - II

4. i) How are null values handled? Explain.
- ii) Write about any five aggregate operations in SQL.

(OR)

5. i) What is a trigger? Discuss its implementation with an example for inserting a record into a table.
- ii) What is embedded SQL? Discuss the circumstances in which you use embedded SQL instead of SQL only.

UNIT - III

6. i) Discuss about array and multi-set types in SQL.
- ii) Write about persistency of objects with examples.

(OR)

7. i) Write about XML Document Schema.
- ii) Explain about querying and transformation.

UNIT - IV

8. i) Explain hash join algorithm.
- ii) Explain how to evaluate an expression using multiple operations in Query processing.

(OR)

9. i) Write about selection size and join size estimations.
- ii) Discuss about cost-based optimisation.

UNIT - V

10. i) Write the state diagram of a transaction and explain.
- ii) How do you handle the effect of transaction failures during concurrent execution.

(OR)

11. i) Explain Two phase locking protocol.
- ii) Explain about deadlock detection and recovery.

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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER - 2023
SECOND SEMESTER**

MCA 203 - DATA COMMUNICATION AND COMPUTER NETWORKS
(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)
(Common Paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART-A
(Compulsory)

Answer any **FIVE** of the following questions. Each question carries 4 marks. **(5×4=20)**

1. a) List the ordered layers of OSI model.
- b) Write the features of SONET.
- c) What is error detection and correction? Explain about error correction.
- d) Describe the differences between 3G and 4G.
- e) What do you mean unicast routing?
- f) Write the purpose of ICMP protocol.
- g) Explain briefly about process-to-process delivery.
- h) What is QoS? Explain about QoS in switched networks.
- i) What is Socket interface? What are its benefits.
- j) Give the essential features of SMTP.

PART - B

Answer **Five** questions, choosing **ONE** question from each Unit. Each question carries 10 marks. **(5×10=50)**

UNIT - I

2. With a neat diagram explain about the FDM, WDM and TDM.

(OR)

3. Compare and Contrast between Analog signals and Digital Signal and transmission mechanisms.

UNIT - II

4. Explain about the Stop and wait, Go-back-n protocols.
(OR)

5. i) Discuss about Wireless LAN's in detail.
ii) Briefly explain about frame relay.

UNIT - III

6. Explain about IPv6 protocol with a neat sketch.
(OR)

7. Describe the BGP in detail.

UNIT - IV

8. Explain about the Kerberos protocol.
(OR)

9. Explain about the e-mail security.

UNIT - V

10. Explain about the Distribution of name space and DNS in the Internet.
(OR)
11. Explain about the FTP and HTTP.
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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER - 2023**

SECOND SEMESTER

MCA 205A - E- COMMERCE

(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)

(Common Paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART-A

Answer any **FIVE** of the following questions. Each question carries 4 marks. (5×4=20)

1. a) What is smart card? Discuss its benefits.
- b) What is B2B commerce? What are the challenges?
- c) Explain in brief about Mercantile models.
- d) What is MIME used for? Explain.
- e) Give the challenges in using Electronic Cash.
- f) What is M-Commerce? Explain.
- g) What is the role of E-Commerce in SCM?
- h) What do you mean by E-Mail personalization. Explain.
- i) Write in brief about Internet Governance.
- j) What is PCI? Explain its use.

PART - B

Answer **FIVE** questions, choosing **ONE** question from each Unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. i) Explain the anatomy of E-Commerce applications.
- ii) Write about the network infrastructure required in an organization for using E-Commerce.

(OR)

3. i) Write about the Global Information Distribution.
- ii) Write about E-Commerce and Media Convergence.

UNIT - II

4. i) Give an overview of Internet applications.
- ii) Explain about globalization of academic Internet.

(OR)

5. i) Discuss about WWW in the E-Commerce Architecture.
- ii) Explain about Consumer oriented E-Commerce Models.

UNIT - III

6. i) What is EDI? Explain. How is EDI implemented? What are the challenges?
- ii) Explain about VANs and their applications.

(OR)

7. i) Discuss about Digital token based e-payment systems.
- ii) Discuss about various components related to Inter-Organisational Commerce.

UNIT - IV

8. i) Discuss about Intra-organization E-Commerce and customization.
- ii) Explain about workflow automation and coordination.

(OR)

9. i) Write about Document library types and issues with them.
- ii) Write about various Email based marketing strategies.

UNIT - V

10. i) Compare and contrast E-Commerce and M-Commerce.
- ii) Discuss about various payment methods used in M-Commerce. Discuss the challenges.

(OR)

11. i) Write about Mobile app based marketing. Explain with examples.
- ii) Write about various M-Commerce based transaction models.

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER - 2023
SECOND SEMESTER**

MCA 202 - DATA STRUCTURES USING JAVA
(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)
(Common Paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART-A
(Compulsory)

Answer any FIVE of the following questions. Each question carries 4 marks. (5×4=20)

1. a) What is Abstract Data Type? Explain.
- b) Write about the complexity of isempty, isfull, push and pop operations in Stack.
- c) Write algorithm for inorder traversal without recursion.
- d) What is the difference between a binary tree and a binary search tree?
- e) What is the maximum height of any AVL Tree with 7 nodes? Assume that the height of a single node is 0.
- f) What is a Red Black tree? Explain.
- g) Write any five features of B+ Trees.
- h) What is radix sort? Explain with an example.
- i) Write an algorithm for Binary search. What is the worst case complexity?
- j) Is a B-Tree self balancing tree? Justify your answer with an example.

PART - B

Answer Five questions, choosing ONE question from each Unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. i) Discuss about best, average and worst case complexities of selection sort algorithm.
- ii) Convert $A+B*C/D-E+F$ into postfix notation. Explain the procedure and data structures used.

(OR)

3. i) Write an algorithm for polynomial addition using linked lists.
- ii) Discuss atleast two applications each of stacks and queues.

UNIT - II

4. i) Write a program to construct a binary tree for a given set of 'n' nodes.
ii) Write an algorithm for traversing a binary tree in inorder and postorder.

(OR)

5. i) Write the Dijkstra's algorithm for Single Source Shortest Path Problem.
ii) Write about UNION-FIND operations.

UNIT - III

6. i) How is an AVL tree different from B-Tree?
ii) Discuss various operations in Splay Trees with an example.

(OR)

7. i) Discuss about Binary Heap with examples.
ii) Write about implementation of priority queue using binary heap.

UNIT - IV

8. i) Discuss Merge sort algorithm with an example.
ii) Write a recursive algorithm for quicksort.

(OR)

9. i) Describe the procedure of K-way merging with example.
ii) What is the complexity of K-Way merge.

UNIT - V

10. i) Write about Cylinder surface Indexing.
ii) What is Hash Table? What are its applications?

(OR)

11. i) Explain about different operations on B+ Trees.
ii) Write Linear search algorithm and explain with an example. Also explain its worst case complexity.
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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
JANUARY - 2022**

SECOND SEMESTER

PAPER MCA 201 : COMPUTER ORIENTED OPERATIONS RESEARCH
(Under C.B.C.S. New Regulations w.e.f. 2020-21 and 2016-2017)
(Common Paper to University and all Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART - A

(Compulsory)

Answer any **FIVE** of the following questions. Each Question carries 4 marks.
(5×4=20)

1.
 - a) What are the essential characteristics of a linear programming model?
 - b) What is unbound solution, and how does it occur in graphical method?
 - c) Differentiate between Optimal solution and feasible solution.
 - d) Discuss the variations in assignment problem.
 - e) Explain the shortest route problem with an example.
 - f) Write down the steps used in solving Network Model using Fulkerson's Rule.
 - g) Explain the basic elements of Game Theory.
 - h) Write the assumptions made in game theory.
 - i) Discuss the rules for Network Construction.
 - j) A car park contains 5 cars. The arrival of cars in Poisson at a mean rate of 10 per hour. The length of time each car spends in the car park is exponential distribution with mean of 5 hours. How many cars are in the park on the average?

PART - B

Answer **FIVE** questions, choosing **ONE** question from each Unit. Each question carries **10** marks. (5×10=50)

UNIT - I

2. Solve the following linear programming problem by simplex method

$$\text{Maximize } Z = 5x_1 + 3x_2$$

Subject to constraints $3x_1 + 5x_2 \leq 15$,

$$5x_1 + 2x_2 \leq 10 \text{ and } x_1, x_2 \geq 0$$

(OR)

3. Solve the following by Graphical Method

- a) Min $Z = 20x_1 + 10x_2$ Subject to the Constraints

$$x_1 + 2x_2 \leq 40, 3x_1 + x_2 \geq 30, 4x_1 + 3x_2 \geq 60 \text{ and } x_1, x_2 \geq 0.$$

- b) Maximize $Z = 5x_1 - 4x_2 + 3x_3$

Subject to

$$2x_1 + x_2 - 6x_3 = 20$$

$$6x_1 + 5x_2 + 10x_3 \leq 76$$

$$8x_1 - 3x_2 + 6x_3 \leq 50$$

$$x_1, x_2, x_3 \geq 0$$

UNIT - II

4. a) Obtain an initial basic feasible solution to the following TP using VAM.

	D_1	D_2	D_3	D_4	Supply
O_1	11	13	17	14	250
O_2	16	18	14	10	300
O_3	21	24	13	10	400
Demand	200	225	275	250	950

- b) Briefly Discuss about N-Jobs K Machines Problems.

(OR)

5. What is the unbalanced Assignment Problem? How is it solved by the Hungarian method?

UNIT - III

6. Calculate the earliest start, earliest finish, latest start and latest finish of each activity of the project given below and determine the critical path of the project.

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration	8	7	12	4	10	3	5	10	7	4

(OR)

7. a) Discuss about Floyd's Algorithm with example.
b) What is Maximal Flow Problem? Explain.

UNIT - IV

8. What do you mean by two-person zero sum game? And explain about pure strategy and mixed strategy in game theory with example.

(OR)

9. Explain Arithmetic Model for $n \times n$ Games with example.

UNIT - V

10. Arrivals of a telephone booth are considered to be poisson with an average time of 10 min. between one arrival and the next. The length of a phone call is assumed to be distributed exponentially with mean 3 min.

- a) What is the probability that a person arriving at the booth will have to wait?
b) The telephone department will install a second booth, when convinced that an arrival has to wait on the average for at least 3 min. for phone. By how much the flow of arrivals should increase in order to justify a second booth?

- c) What is the average length of the queue that forms time to time?
- d) What is the probability that it will take him more than 10 minutes altogether to wait for the phone and complete his call?

(OR)

11. a) In detail discuss various Queuing Models.
- b) Demonstrate Critical Path analysis with Suitable example.
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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
JANUARY - 2022**

SECOND SEMESTER

PAPER MCA 202 : DATA STRUCTURES USING JAVA

(Under C.B.C.S. New Regulations w.e.f. 2020-2021 and 2016-2017)

(Common paper to University and all Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART - A

(Compulsory)

Answer any **FIVE** of the following questions. Each question carries **4** marks.

(5×4=20)

1. a) Explain Big Oh Notation. With example.
- b) What is STACK? Write and explain algorithm for PUSH & POP.
- c) Discuss threaded binary trees.
- d) Explain Union and Find operations.
- e) What is AVL tree? Explain.
- f) Explain Binary Heap with example.
- g) Write an algorithm to implement insertion sort with suitable example.
- h) Apply selection sort on the following elements : {21, 11, 5, 78, 49, 54, 72, 88}
- i) Give a brief notes on hash tables.
- j) Write short note on Hash Index.

PART-B

Answer **FIVE** questions, choosing **ONE** question from each Unit Each question carries **10 marks** (5×10=50)

UNIT-I

2. Write algorithm for insert and delete a node from doubly linked list.

(OR)

3. a) List the applications of stack ? Explain recursion for finding a factorial of a number brief.
b) Explain how Queues can be implemented using linked list.

UNIT-II

4. Explain the tree traversal techniques with an example.

(OR)

5. Discuss about Minimum cost spanning tree using Kruskal's Algorithm and Dijkstra's algorithm for single source shortest path problem.

UNIT-III

6. Explain the Splay tree insertion and deletion with suitable example.

(OR)

7. Discuss Red-Black Trees insertion and deletion with examples.

UNIT-IV

8. Write a Routine for sorting elements using quick sort method. Explain the working the routing with an example.

(OR)

9. Describe the procedure of K-Way merge sort with example.

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UNIT-V

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10. What do you mean by Searching? Explain linear search and Binary search with help of example.

(OR)

11. Explain B+-Tree and Prefix B+- Trees. With differences.
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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
JANUARY - 2022**

SECOND SEMESTER

**PAPER MCA 203 : DATA COMMUNICATION AND COMPUTER
NETWORKS**

(Under C.B.C.S. New Regulations w.e.f. 2020-2021 and 2016-2017)

(Common paper to University and all Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART - A

(Compulsory)

Answer any **FIVE** of the following questions. Each question carries **4** marks.

(5×4=20)

1. a) List and define different network topologies.
- b) Define Logical, Physical and port addresses.
- c) What is Virtual LAN? What are its advantages?
- d) Write a brief note on ATM.
- e) Compare IPV4 and IPV6.
- f) Define Unicast routing and Multicast routing.
- g) Compare Flow control and Error control.
- h) Define a Public key and Private key.
- i) What is meant by Tunneling ? Explain.
- j) What is FTP? Explain it in brief.

PART-B

Answer **FIVE** questions, choosing **ONE** question from each Unit Each question carries
10 marks (5×10 = 50)

UNIT-I

2. a) Describe the characteristics of layered architecture.
- b) Write a brief note on SONET.

(OR)

3. Describe about types of transmission media with their merits and demerits.

UNIT-II

4. What are the different types of error detection methods? Explain.

(OR)

5. What is high level data link control (HDLC)? Explain HDLC frame format in detail.

UNIT-III

6. Write a detailed note on services expected from the network layer.

(OR)

7. Describe in detail the operation of OSPF protocol by considering a suitable network.

UNIT-IV

8. a) Explain the features and applications of UDP.
b) Elucidate congestion control in datagram subnets.

(OR)

9. a) Write a note on Web security.
b) Explain any one of the Symmetric-key ciphers in brief.

UNIT-V

10. What is DNS? What is the purpose of it? Describe DNS in the internet.

(OR)

11. Explain about World wide Web Architecture in detail.
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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
JANUARY - 2022**

SECOND SEMESTER

PAPER MCA 204: ADVANCED DATABASE MANAGEMENT SYSTEMS

(Under C.B.C.S. New Regulations w.e.f. 2020-2021 and 2016-2017)

(Common paper to University and all Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART - A

(Compulsory)

Answer any **Five** of the following questions. Each question carries **4** marks. (5×4=20)

1. a) What is the purpose of Database Systems?
- b) Define Data Model. List the categories of data models.
- c) What is the use of SQL DDL?
- d) Define Embedded SQL.
- e) Define structured types. Give an example.
- f) List few applications of XML.
- g) Briefly discuss the steps involved in query processing.
- h) Write about Hybrid Merge Join.
- i) List the properties of the transactions.
- j) Write about deadlock detection and recovery.

PART - B

Answer **Five** questions, choosing **One** question from each Unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. a) What do you mean by database design? Illustrate how a database for a university college could be designed.
- b) Discuss the design issues in Entity Relationship database schema.

(OR)

3. a) Explain with examples the structure of relational databases.
- b) How to represent weak entity sets? Discuss.

UNIT - II

4. a) Explain with suitable examples the queries on a single relation and multiple relation.
- b) Explain with examples the mechanism of nested subqueries.

(OR)

5. a) How many aggregate functions are supported in SQL? List them and specify the purpose.
- b) Define integrity constraint. Give examples.

UNIT - III

6. a) With examples explain object identity and reference types in SQL.
- b) Explain about XPath and XQuery language.

(OR)

7. a) What is the purpose of persistent programming languages? How it can be distinguished from languages with embedded SQL?
- b) Briefly discuss the commonly used API's for XML and specify the purpose of it.

UNIT - IV

8. a) Explain with an example External sort-merge algorithm.
b) Give pictorial representation of equivalences.

(OR)

9. a) Explain with an example Nested loop join operation.
b) Write about join size estimation.

UNIT - V

10. a) Explain about transaction atomicity and durability.
b) What is multi-version schemes? Explain briefly Multiversion timestamp ordering and multiversion two phase locking.

(OR)

11. a) Briefly discuss about lock based protocols.
b) How to handle deadlocks? Explain in detail.
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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
JANUARY - 2022**

SECOND SEMESTER

PAPER :MCA 205B - CYBER SECURITY

(Under C.B.C.S. New Regulations w.e.f. 2020-2021 and 2016-2017)

(Common paper to University and all Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART - A

(Compulsory)

Answer any **Five** of the following questions. Each question carries **4** marks. **(5×4=20)**

1.
 - a) What is Cybercrime? Who are Cybercriminal? Explain.
 - b) Discuss Vulnerability assessments in cyber security.
 - c) Explain about Denial of service security attacks.
 - d) What is Cyber warfare?
 - e) Why is CIA Triad important for Cyber security?
 - f) What is access management in cyber security?
 - g) What is meant by VPN? Explain.
 - h) Write short notes on Antivirus.
 - i) Explain organizational implications of Cyber Security.
 - j) Discuss about Forensic best practices for organization.

PART - B

Answer **Five** questions, choosing **One** question from each unit. Each question carries **10** marks. **(5×10=50)**

UNIT - I

2. Discuss about various types of Cyber-attacks.

(OR)

3. Discuss how critical thinking is important in Cyber Security.

UNIT - II

4. Describe Network Security model with neat sketch.

(OR)

5. In detail discuss about Internet Security Threats.

UNIT - III

6. What is CIA Triad? Explain the three components of CIA triad with examples.

(OR)

7. a) Discuss about incidence response in cyber security.

- b) Briefly explain about cyber security frame works.

UNIT - IV

8. a) Discuss the use of Packet Filtering-Firewalls.
- b) Briefly explain about Penetration test Methodologies.

(OR)

9. a) Explain the importance of XML Gateway Firewall in cyber security.
- b) Discuss about Vulnerability Tests.

UNIT - V

10. In detail Discuss the Web Threats for Organizations with case studies.

(OR)

11. What is meant by Social Media Marketing? Explain different Social Media Marketing Tools.
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**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER - 2023
SECOND SEMESTER**

MCA 201 - COMPUTER ORIENTED OPERATIONS RESEARCH
(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)
(Common Paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

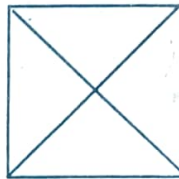
PART-A

Answer any **FIVE** of the following questions. Each question carries 4 marks. (5×4=20)

1. a) Explain slack, surplus and artificial variables with example.
- b) Write about weak dual property and strong dual property.
- c) Consider the transportation problem shown in table below, Find the Initial basic feasible solution using Northwest corner method.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

- d) Give the mathematical formulation of assignment problem.
- e) State and formulate linear programming model for maximal flow problem.
- f) What is spanning tree? Find all the spanning trees of a following graph.



- g) Define the terms Pay off, Value of game, Saddle point.

- b) Solve the game whose payoff matrix to the player A and B is given below

		B		
		I	II	III
A	I	1	7	2
	II	6	2	7
	III	5	2	6

- i) Define transient and steady state of queueing system.
 j) Define following terms with respect to CPM/PERT:
 i) event, ii) activity, iii) Processor activity iv) dummy activity.
- Answer FIVE questions choosing ONE question from each Unit. Each question carries 10 marks.

UNIT - I

- a) Solve the following LPP by graphical method
 $\text{Max } z = 9x_1 + 13y$
 Subject to constraint $2x + 3y \leq 18$
 $2x + y \leq 10$ and $x, y \geq 0$
- b) Solve the following LPP by simplex method
 Maximum $Z = 11x_1 + 4x_2$
 Subjected to $7x_1 + 6x_2 \leq 84$
 $4x_1 + 2x_2 \leq 32$ and $x_1, x_2 \geq 0$.

(OR)

3. Solve the following LPP using dual simplex method:

$$\begin{aligned} \text{Minimize } z &= 2x_1 + x_2 \\ \text{Subject to } 3x_1 + x_2 &\geq 3 \\ 4x_1 + 3x_2 &\geq 6 \\ x_1 + 2x_2 &\geq 3 \quad x_1, x_2 \geq 0 \end{aligned}$$

UNIT - II

4. Company has factories A_1, A_2 and A_3 which supply to warehouses at W_1, W_2 and W_3 . Weekly Factory capacities are 240, 200 and 130 units respectively. Weekly warehouses requirements are 190, 150 and 110 units respectively. Unit transportation in costs Rs. as follows:-

	W_1	W_2	W_3	Supply
A_1	16	20	12	240
A_2	14	8	18	200
A_3	26	24	16	130
Demand	190	150	110	450

Find initial basic solution by Vogel Approximation method and also optimum solution by MODI method.

(OR)

5.

Solve the assignment problem represented by the following matrix using Hungarian method.

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

UNIT - III

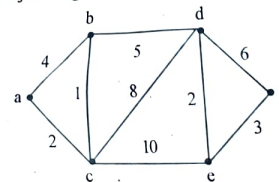
6. a) Write optimal equation of Floyd's algorithm and also solve for the digraph with weight matrix.

0	∞	3	∞
2	0	∞	∞
∞	7	0	1
6	∞	∞	0

- b) Write about the Maximal Flow Problem Algorithm

(OR)

7. a) Write about Prim's algorithm for constructing minimum spanning tree.
 b) Using Dijkstra algorithm to Find a Shortest Path from a to z.



UNIT - IV

8. Use dominance to reduce the pay-off matrix and solve the game with the following pay-off matrix.

	B_1	B_2	B_3	B_4
A_1	3	2	4	0
A_2	3	4	2	4
A_3	4	2	4	0
A_4	0	4	0	8

(OR)

9. Consider the following pay-off matrix and determine the optimal strategy

	B		
	I	II	III
A			
I	6	9	4
II	5	10	7
III	9	8	9

UNIT - V

10. a) Describe operating characteristics of queueing system.
 b) If for a period of 2 h in a day (8 - 10 am) trains arrive at the yard every 20 min, but the service time continues to remain 36 min and then Calculate average queue length on the assumption that the time capacity of the yard is limited to 4 trains only.

(OR)

11. A Project consists of the following activities the details of which are given below.

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
t_m	1	4	2	1	5	5	6
t_o	1	1	2	1	2	2	3
t_p	7	7	8	1	14	8	15

Draw a network diagram for this project. Find the critical path, the expected project completion time also. Determine the float and free float of each activity.

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER/OCTOBER - 2024
SECOND SEMESTER**

MCA 201 : COMPUTER ORIENTED OPERATIONS RESEARCH

(Under C.B.C.S Revised Regulations w.e.f. 2020-2021)

(Common paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

**PART - A
(Compulsory)**

Answer any Five of the following questions. Each question carries 4 marks.

(5×4=20)

1. a) What is degeneracy? How to resolve degeneracy in a LPP?

b) Use duality to solve the L.P.P: Minimize $Z = 2x_1 + 2x_2$

Subject to $2x_1 + 4x_2 \geq 1$
 $-x_1 - 2x_2 \leq -1$
 $2x_1 + x_2 \geq 1$ and $x_1, x_2 \geq 0$

c) Consider the transportation problem shown in table below, Find the initial basic Feasible solution using Northwest corner method.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

d) State the formulation of Assignment problem.

e) Describe significance of using CPM and PERT.

f) What is the strategy for branch and bound technique?

- g) Solve the game whose payoff matrix to the player A and B is given below.

		B		
		I	II	III
A	I	1	7	2
	II	6	2	7
	III	5	2	6

- h) What is 'dominance rule' in game theory? How can a 'two person-zero sum game' Problem be converted into LP problem?
- i) What are the assumptions of EOQ formula?
- j) Define transient and steady state of queueing system.

PART - B

Answer Five questions. Choosing One question from each unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. Solve the following LPP by simplex method
 Maximize $Z = 11x_1 + 4x_2$
 Subject to constraint $7x_1 + 6x_2 \leq 84$
 $4x_1 + 2x_2 \leq 32$ and $x_1, x_2 \geq 0$
 (OR)
3. Use Big - M method to solve the following LPP
 Minimize $Z = 4x_1 + 3x_2$
 Subject to $2x_1 + x_2 \geq 10$
 $x_1 + x_2 \geq 6$
 $-3x_1 + 2x_2 \leq 6$ and $x_1, x_2 \geq 0$

UNIT - II

4. Solve the following assignment problem:

		Machines				
Jobs		M1	M2	M3	M4	M5
	J1	11	17	8	16	20
	J2	9	7	12	6	15
	J3	13	16	15	12	16
	J4	21	24	17	28	26
	J5	14	19	12	11	13

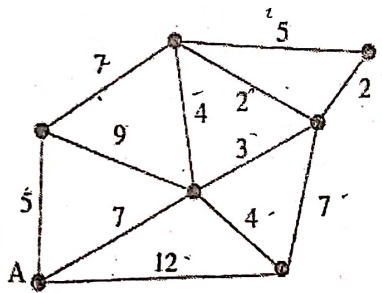
(OR)

5. Determine the optimal solution to the transportation problem and find the minimum Total cost of transportation.

		Destination				
		D ₁	D ₂	D ₃	D ₄	a _i
Source	A ₁	19	30	50	10	7
	A ₂	70	30	40	60	9
	A ₃	40	8	70	20	18
	b _j	5	8	7	14	

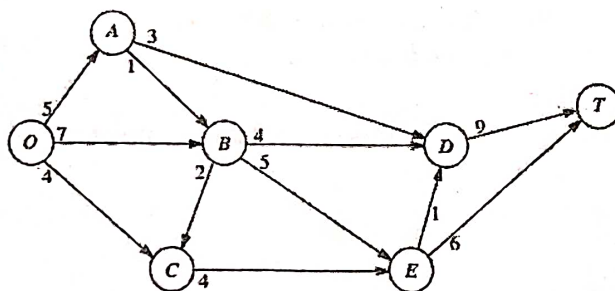
UNIT - III

6. Using Kruskal's algorithms construct minimum spanning for the following graph



(OR)

7. Formulate the maximum flow problem. Solve the following maximum flow problem.



UNIT - IV

8. a) Solve the following (2×3) game graphically

		Y1	Y2	Y3
		I	II	III
A	x1 I	1	3	11
	1-x1 II	8	5	2

- b) Consider the following pay-off matrix and determine the optimal strategy

		B		
		I	II	III
A	I	6	9	4
	II	5	10	7
	III	9	8	9

(OR)

9. Solve the below game theory problem with the concept of dominance method

		PLAYER B			
PLAYER A		I	II	III	IV
	I	3	5	4	2
	II	5	6	2	4
	III	2	1	4	0
	IV	3	3	5	2

UNIT - V

10. A Project consists of the following activities the details of which are given below.

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
t_m	1	4	2	1	5	5	6
t_0	1	1	2	1	2	2	3
t_p	7	7	8	1	14	8	15

Draw a network diagram for this project. Find the critical path, the expected project Completion time also. Determine the float and free float of each activity.

(OR)

11. Inventory control manager of a firm has collected the following data on one item.

- Minimum total cost per annum = Rs.16000
- Inventory holding cost per unit per year = Rs.4
- No of order per year = 10
- Price per unit = Rs. 25

Calculate annual demand of the item, procurement cost per order, inventory carrying cost as a percentage of average inventory investment and economic order quantity(EOQ).

[Total No. of Pages : 2

12-00-2-03R

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER/OCTOBER - 2024
SECOND SEMESTER**

MCA 203 - DATA COMMUNICATION AND COMPUTER NETWORKS
(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)
(Common Paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

**PART - A
(Compulsory)**

Answer any Five of the following questions. Each question carries 4 marks.

(5×4=20)

1. a) Write briefly about Analog and Digital signals. ✓
- b) Explain basic network topologies and its advantages.
- c) Explain the difference between Go-back-n and selective repeat protocols.
- d) Explain any three connecting devices used in the network. ✓
- e) Write briefly about ARP and ICMP protocols.
- f) Differentiate broadcasting and flooding.
- g) Write about congestion control in transport layer.
- h) Differentiate symmetric and Asymmetric cryptography.
- i) Write about DNS in the internet.
- j) Write briefly about World Wide Web.

12-00-2-03R

(1)

[P.T.O.]

PART - B

Answer Five questions. Choosing One question from each unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. Explain the OSI reference model in detail with neat layered architecture diagram.

(OR)

3. Explain about various Time Division Multiplexing methods.

UNIT - II

4. Explain about various services associated with data link control.

(OR)

5. Explain bluetooth in detailed with architecture diagram and its applications.

UNIT - III

6. Explain the differences between RIP and OSPF.

(OR)

7. Explain about IPV4 addressing in detail.

UNIT - IV

8. Describe briefly about TCP and UDP protocols in Transport layer.

(OR)

9. a) Explain about digital signature and its purpose.
b) Explain briefly about web security.

UNIT - V

10. Explain about application layers protocols HTTP, FTP in detail.

(OR)

11. Explain the design issues of application layer.

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER/OCTOBER - 2024**

SECOND SEMESTER

MCA 202 : DATA STRUCTURES USING JAVA

(Under C.B.C.S Revised Regulations w.e.f. 2020-2021)

(Common paper to University and All Affiliated Colleges)

Time : 3 Hours

PART - A

Max. Marks : 70

Answer any Five of the following questions. Each question carries 4 marks.

(5×4=20)

1.
 - a) Illustrate Big O and Omega(Ω) notation of algorithm with suitable example.
 - b) Consider an example where the size of the queue is four elements. Initially the queue is empty. It is required to insert symbols 'A', 'B' and 'C'. delete 'A' and 'B' and insert 'D' and 'E'. Show the trace of the contents of the queue.
 - c) Differentiate Breadth first search and Depth first search.
 - d) Write a note on Threaded binary trees.
 - e) Write a sub routine to insert element in an AVL tree.
 - f) Draw the B-tree of order 3 created by inserting the following data arriving in the Sequence: 92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78
 - g) What is Poly phase merge?
 - h) What is meant by collision? How to handle in hashing?
 - i) What happened when all the array elements are same in quick sort? Find the time complexity.
 - j) Write about Cylinder Surface Indexing.

PART - B

Answer Five questions. Choosing One question from each unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. Write down advantages of linked list over array. Describe different operations on single linked list.

(OR)

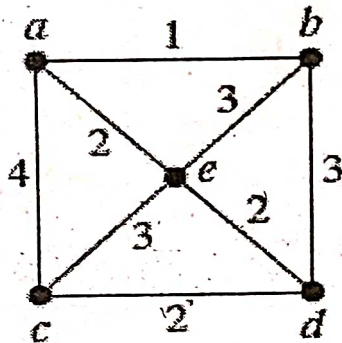
3. Write an algorithm to implement a circular queue using array with all necessary overflow and underflow checks.

UNIT - II

4. Explain how to represent the Binary tree with an example and describe the operations of binary tree.

(OR)

5. Using Kruskal's algorithm to find a minimum spanning tree for the given weighted graph.



UNIT - III

6. Give the properties of Heap Tree. Sort the following data using Heap Sort Method:

20, 50, 30, 75, 90, 60, 80, 25, 10, 40.

(OR)

7. Explain about Red-Black Trees and also specify different operations on them.

UNIT - IV

8. Write the MERGE SORT ALGORITHM and sort the following numbers.

12, 14, 25, 27, 11, 34, 13, 16, 45, 23, 52

(OR)

9. Write a procedure to perform Radix Sort technique.

UNIT - V

10. Explain about dynamic hashing and Extendible hashing with suitable example.

(OR)

11. Write an algorithm for binary search method.
-

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER/OCTOBER-2024
SECOND SEMESTER**

Paper - MCA 204 : ADVANCED DATABASE MANAGEMENT SYSTEMS
(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)
(Common paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

**PART - A
(Compulsory)**

Answer any Five questions from the following. Each question carries 4 marks.

(5×4=20)

1.
 - a) What is the purpose of database systems? Explain with examples✓
 - b) What are called weak entity sets? Discuss✓
 - c) Write the structure of SQL Query and explain✓
 - d) Differentiate between DDL and DML with examples✓
 - e) Give examples of Object-databases.
 - f) Explain about Object identity in SQL.
 - g) What is Query optimization? Explain.
 - h) Explain joint operation in SQL with examples✓
 - i) What is Serializability? Explain.
 - j) Write about concurrency control in DBMS.

PART - B

Answer Five questions, choosing One full question from each unit. Each question carries 10 marks.

(5×10=50)

UNIT - I

32. a) With a neat sketch, describe the database architecture.
b) Write the structure of relational databases and explain.

(OR)

43. a) Explain Entity-Relationship diagrams and its design issues.
b) With examples, explain relational algebra operations.

UNIT - II

44. a) Explain set operations used in SQL with suitable examples.
b) Discuss the importance of Cursors and Triggers and

(OR)

55. a) List and explain Aggregate functions used in SQL with suitable examples.
b) What are the control structures used in PL/SQL? Discuss.

UNIT - III

66. a) Explain about persistent programming languages.
b) Write the structure of XML and explain.

(OR)

7. a) What is inheritance in SQL? Explain about table inheritance in SQL with examples.
b) Explain the applications of XML and APIs in XML.

UNIT - IV

8. a) Discuss in detail about choices of evaluation plans in query optimization.
b) What are the various measures of query cost? Explain.

(OR)

9. a) Explain about the statistics of expression results in query optimization.
b) Describe the selection and sorting operations in query processing.

UNIT - V

10. a) How Atomicity and Durability are implemented? Discuss.
b) Explain about Time Stamp based protocols in detail.

(OR)

11. a) How deadlocks are handled in Transaction processing? Discuss.
b) Explain about concurrency in Index structures.

**MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATION,
SEPTEMBER/OCTOBER-2024
SECOND SEMESTER**

Paper - MCA 205A - E-COMMERCE
(Under C.B.C.S. Revised Regulations w.e.f. 2020-2021)
(Common paper to University and All Affiliated Colleges)

Time : 3 Hours

Max. Marks : 70

PART - A

(Compulsory)

Answer any Five questions from the following. Each question carries 4 marks.

- 1.** a) What are the applications of E-Commerce? Discuss.✓ **(5×4=20)**
b) Write about B2B Commerce.✓
c) What is hypertext publishing? Explain.✓
d) What is Web-Consumer-Oriented Electronic Commerce?
e) What is the purpose of smart cards?✓
f) Write about the risks in Electronic payment systems.✓
g) What are the issues behind Document Infrastructure?
h) Write about Supply Chain Management.✓
i) What are the advantages and disadvantages of Mobile commerce?✓
j) Write about transaction models of M-Commerce.✓

PART - B

Answer Five questions, choosing One full question from each unit. Each question carries 10 marks. (5×10=50)

UNIT - I

2. a) With a neat sketch, explain E-Commerce Framework.
b) Discuss the components of I-Way.

(OR)

3. a) What are the market forces influencing I-Way? Explain.
b) Explain the public policy issues shaping the I-way.

UNIT - II

4. a) Describe about NSFNET: Architecture and its Components.
b) Explain the case study of E-Commerce/High security(pci)

(OR)

5. a) Explain World Wide Web (WWW) as the Architecture.
b) Discuss in detail about Mercantile Process Models.

UNIT - III

6. a) Explain the Security and privacy issues of EDI.
b) What are the different electronic payment systems? Explain.

(OR)

7. a) Explain the software implementation of EDI.
b) Discuss about the case study of Social media marketing w.r.t.EDI.

UNIT - IV

8. a) Discuss about workflow automation and coordination in E-Commerce.
b) What are the dimensions of Internal Electronic Commerce Systems? Explain.

(OR)

9. a) Write a detailed note on Corporate data warehouses.
b) Explain the case study of Email personalization.

UNIT - V

10. a) What is M-Commerce? What are its limitations? Discuss.
b) Discuss in detail about mobile app marketing.

(OR)

11. a) What are the different payment methods used in mobile commerce? Explain.
b) With a neat sketch, describe the architecture of M-Commerce.