Roll No. [   ]   Total No. of Pages: 02

Total No. of Questions: 09

MCA, Semester- 1st

DISCRETE STRUCTURES AND OPTIMIZATION

Subject Code: 25C2CAP-101

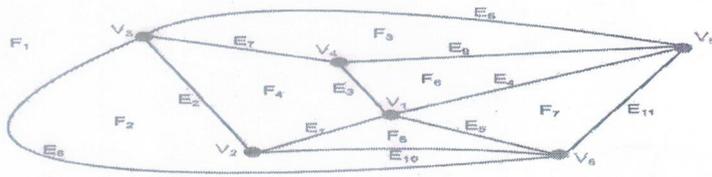### M.Code:

Date of Examination: 15-12-2025
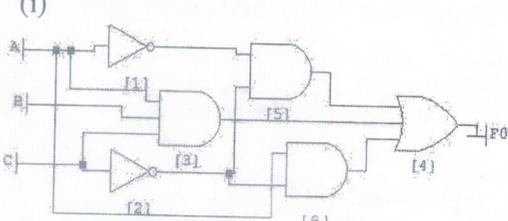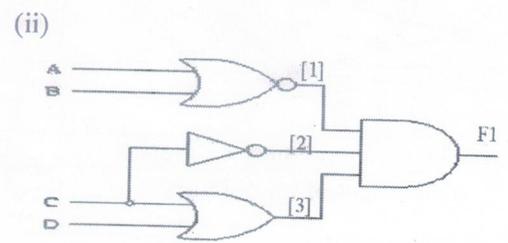
Time: 3 Hrs.   Max. Marks: 70

INSTRUCTIONS TO CANDIDATES:
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B & C have FOUR questions each.
3. Attempt any FIVE question of SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION B & C.

Q. No.	Question	Course Outcome	Bloom's Level
	SECTION-A		
1.	Answer briefly:		
a.	Define Inclusion-Exclusion Principle.	CO1	L1
b.	Differentiate proper subset and improper subset.	CO1	L2
c.	State any four elementary law of Boolean algebra.	CO2	L1
d.	Interpret the following sets in roaster form. (i) $C = \left\{x : \frac{x-2}{x-3} = 3, x \in R\right\}$ (ii) $B = \{x \in Z : \lvert x \rvert < 4\}$	CO2	L2
e.	State fundamental theorem of group homomorphism.	CO2	L1
f.	Show there exist a real number n such that P(9,5)+5P(9,4)=P(10,n) where P(.,.) is permutation.	CO3	L2
g.	Define permutation and combination.	CO3	L1
h.	Explain whether for the following graph satisfies the Euler's formula or not?	CO4	L2
i.	Define homomorphic graph and draw two homomorphic graphs.	CO4	L1
j.	Show that the set G= $\{1, \omega, \omega^2\}$ of cube root of unity forms a group under multiplication.	CO2	L2
	SECTION-B		
2.	Identify the truthiness of De Morgan's Law for $(A \cup B)^c$ and $(A \cap B)^c$ sets.	CO1	L3
3.	Examine the following statement: The subset S of all matrices of the form $\begin{bmatrix} x & 0 \\ 0 & y \end{bmatrix}$ with x and y integers forms a subring of 2*2 matrices with integer elements and further the S is neither a right ideal nor left ideal.	CO2	L4

4.	In a town of 10,000 families it was found that 40% of families buy newspaper A. 20% buy newspaper B and 10% buy newspaper C. 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the newspaper, find the number of families which buy (i) A only (ii) B only (iii) none of A, B and C.	CO1	L5

5.	Evaluate the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these
	    (i) Four cards of the same suit
	    (ii) Four cards belong to different suits
	    (iii) Are face cards
	    (iv) Two are red cards and two are black cards
	    (v) Cards are of the same colour
		CO3	L5

SECTION-C

6.	Apply the concept of permutation to find the number of different signals that can be made by arranging at least three flags in order on a vertical pole if 6 different flags are available.	CO3	L3
7.	Analyse the following algebraic expressions to construct the tree (i) $3 - \left(x + \left(6 \times \left(4 + (2 - 3)\right)\right)\right)$ (ii) $\left(2 - (3 \times x)\right) + \left((x - 3) - (2 + x)\right)$	CO4	L4
8.	A salesman wants to visit cities E, F, G and H. He does not want to visit any city twice before completing the tour of all the cities and wishes to return to his home city cost of going from one city to another in rupees is given. Find the least cost route. $$\begin{array}{c} \;\; E \quad F \quad G \quad H \\ \begin{array}{c} E \\ F \\ G \\ H \end{array} \begin{bmatrix} 0 & 3 & 8 & 5 \\ 4 & 0 & 14 & 3 \\ 4 & 5 & 0 & 2 \\ 7 & 8 & 13 & 0 \end{bmatrix} \end{array}$$	CO4	L5
9.	Construct the Boolean expression of output with systematic progress at each step. (i) (ii) 	CO2	L3

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Total No. of Pages: 01

Total No. of Questions: 09

MCA, Semester-1st
PROGRAMMING IN PYTHON
Subject Code: 25C2CAP-102
M.Code:
Date of Examination: 19-12-2025

Max. Marks: 70

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B & C have FOUR questions each.
3. Attempt any FIVE question of SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION B & C.

Q. No.	Question	Course Outcome	Bloom's Level
	SECTION-A		
1.	Answer briefly:	CO1	L1
a.	What is a Python interpreter?	CO1	L2
b.	Contrast between arithmetic and comparison operators with examples in python.	CO2	L1
c.	List any two differences between static typing and dynamic typing with reference to Python.	CO2	L2
d.	Summarize how we can check the type of a variable in Python?	CO3	L1
e.	Name the three types of control structures in Python.	CO3	L2
f.	Explain how an if-else statement works in Python?	CO4	L1
g.	Why we use "def" keyword in python? Explain with suitable example.	CO4	L2
h.	Show how to create and use a custom exception class?	CO5	L1
i.	Define the "__init()__" function in Python.	CO5	L2
j.	Illustrate how to check if a file exists using Python.		
	SECTION-B		
2.	Apply arithmetic operators to perform addition, subtraction, multiplication and division in python.	CO1	L3
3.	Compare Python, C, C++ and Java in terms of syntax, memory management and library support.	CO2	L4
4.	Assess the usage of nested loops and Conditional statements in python.	CO3	L5
5.	Evaluate the advantages and disadvantages of Python's dynamic typing compared to statically typed languages.	CO1	L5
	SECTION-C		
6.	Develop a Python program that imports a custom module and calls one of its functions.	CO4	L3
7.	Examine the concept of exception handing in python with suitable examples.	CO5	L4
8.	Judge how we can use Default, Keyword (named), Positional and Arbitrary arguments In python functions.	CO4	L5
9.	Identify how polymorphism achieve in python ,also explain its types with suitable examples.	CO5	L3

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MCA, Semester- 1st

ADVANCED DATA STRUCTURES

Subject Code: 25C2CAP-103

M.Code:

Date of Examination: 17-12-2025

Time: 3 Hrs.   Max. Marks: 70

INSTRUCTIONS TO CANDIDATES:
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B & C have FOUR questions each.
3. Attempt any FIVE question of SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION B & C.

Q. No.	Question	Course Outcome	Bloom's Level
	SECTION-A		
1.	Answer briefly:		
a.	How to Differentiate between best case and worst case analysis.	CO1	L1
b.	Classify the Heap Sort.	CO1	L2
c.	What is an algorithm?	CO2	L1
d.	Demonstrate the Hash Table.	CO2	L2
e.	Define the types of rotations in AVL Trees.	CO3	L1
f.	Explain the collision in Hashing.	CO3	L2
g.	What is a Binomial Heap?	CO4	L1
h.	Outline the Minimum Spanning Tree.	CO4	L2
i.	What is the difference between directed and undirected graphs?	CO5	L1
j.	Explain the string in data structures.	CO5	L2
	SECTION-B		
2.	Identify the linear and non-linear data structures with appropriate diagrams and explain their key characteristics.	CO2	L3
3.	Classify the limitations of Direct Address Tables and how Hash Tables overcome them.	CO1	L4
4.	Examine and analyse the algorithm for quick sort and apply the same on following sequence : 8 5 7 3 2 1 6 4 9	CO2	L5
5.	Explain the Splay Tree and splaying operation and rotations with examples.	CO3	L5
	SECTION-C		
6.	Compare Binomial Heaps and Fibonacci Heaps in detail with example.	CO4	L4
7.	Classify a graph in the context of data structures and explain the key characteristics that differentiate various terminology of graphs.	CO5	L5
8.	Analyse the minimum spanning tree. Explain the Kruskal's algorithm used to find out the minimum spanning tree of a graph with the help of a suitable example.	CO4	L4
9.	Compare the KMP with Brute Force and Rabin–Karp algorithms in terms of time complexity and practical usage.	CO5	L5

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Total No. of Questions: 09

MCA, Semester- 1st
TECHNICAL COMMUNICATION
Subject Code: 25C2CAP-105
M.Code:
Date of Examination: 23-12-2025

Time: 3 Hrs.   Max. Marks: 70

INSTRUCTIONS TO CANDIDATES:
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B & C have FOUR questions each.
3. Attempt any FIVE question of SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION B & C.

Q. No.	Question	Course Outcome	Bloom's Level
	SECTION-A		
1.	Answer briefly:		
a.	List the main elements involved in effective communication.	CO1	L1
b.	Interpret the process of email etiquette in brief.	CO1	L2
c.	Define technical proposals briefly.	CO2	L1
d.	Illustrate the importance of letters in professional communication.	CO2	L2
e.	Recall notice and its uses in an organization.	CO3	L1
f.	Explain the importance of tone in verbal communication.	CO3	L2
g.	Define resume briefly.	CO4	L1
h.	Explain the importance of feedback in communication process.	CO4	L2
i.	Recall the differences between intrapersonal and interpersonal communication.	CO5	L1
j.	Illustrate the importance of technical communication in professional journey.	CO5	L2
	SECTION-B		
2.	Appraise a flowchart to explain Shannon–Weaver's model.	CO1	L5
3.	Analyze how communication impacts customer satisfaction.	CO3	L4
4.	Identify the uses of 7C's of communication in effective communication. Give appropriate example for each of them.	CO4	L3
5.	Criticize various types of barriers to communication and infer how to handle them.	CO5	L5
	SECTION-C		
6.	Explain the steps of report writing to draft a technical report.	CO4	L5
7.	Compare between APA and MLA styles of references. Give appropriate example, and also infer the importance of referencing in research work.	CO5	L4

8	Classify the steps of formal letter writing with an example.	CO2	L4
9.	Identify effective non-verbal communication during an interview.	CO3	L3

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Total No. of Questions: 09

MCA, Semester- 1ˢᵗ
TECHNICAL COMMUNICATION
Subject Code: PGCA1905
M. Code: 79039
Date of Examination: 6-12-2025

Time: 3 Hrs.   Max. Marks: 70

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B & C have FOUR questions each.
3. Attempt any FIVE questions of SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION B & C.

Q. No.	Question	Course Outcome	Bloom's Level
	SECTION-A		
1.	Answer briefly:		
a.	Identify any two benefits of intra-communication.	CO2	L1
b.	Explain the value of Minutes of Meeting /MOM in an office.	CO2	L2
c.	What is group communication? Give example.	CO1	L1
d.	Recall the structure of a formal report.	CO1	L1
e.	Differentiate between solicited and unsolicited proposal.	CO3	L2
f.	Define the 'process of communication'.	CO3	L1
g.	Name any two qualities of effective communication.	CO2	L1
h.	Classify different types of letters.	CO3	L2
i.	Compare circular and memorandum.	CO3	L2
j.	Infer the social communication.	CO5	L2
	SECTION-B		
2.	Justify documentation in academic research.	CO2	L5
3.	Apply letter-writing skills in a leave application.	CO3	L3
4.	Develop a flowchart to explain Shannon–Weaver's model.	CO5	L3
5.	Compare formal letter with informal letter.	CO3	L4
	SECTION-C		
6.	Evaluate the role of resume in your selection process.	CO4	L5
7.	Examine the value of formal etiquette in global businesses.	CO4	L4
8.	Develop a letter for the CEO of your company to request him for free medical service for your family as you are an old employee of the company.	CO5	L3
9.	Explain the process for professional meeting in an office.	CO1	L5

NOTE: Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the student.

Total No. of Questions: 09

MCA,Semester- 1st
ADVANCED DATA STRUCTURES
Subject Code: PGCA1952
M.Code: 79037
Date of Examination:11-12-2025

Time: 3 Hrs.   Max. Marks: 70

INSTRUCTIONS TO CANDIDATES:
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B & C have FOUR questions each.
3. Attempt any FIVE question of SECTION B & C carrying TEN marks each.
4. Select at least TWO questions from SECTION B & C.

Q. No.	Question	Course Outcome	Bloom's Level
	SECTION-A		
1.	Answer briefly:		
a.	List two examples of primitive data structures.	CO1	L-1
b.	What is Big-O notation?	CO1	L-1
c.	Illustrate the pivot element and its importance.	CO2	L-2
d.	Explain the collision in Hashing.	CO2	L-2
e.	Name any types of rotations in AVL Trees.	CO3	L-1
f.	Where are B-Trees commonly used?	CO3	L-1
g.	Interpret the Disjoint Set.	CO4	L-2
h.	Compare the directed and undirected graphs.	CO4	L-2
i.	Define the one real-world application of string operations.	CO5	L-1
j.	Classify the main idea of the Rabin-Karp algorithm.	CO5	L-2
	SECTION-B		
2.	Make use of best case,worst case,average case and amortized time complexity of an algorithm.	CO1	L-3
3.	Analyze the Max heap from the following sequence of nodes and apply heap sort.Show all the intermediate steps. 3, 5, 9, 6, 8, 20, 10, 12, 18, 9	CO2	L-4

4.	Identify the Hash Function. Explain the properties of a good Hash Function.	CO2	L-3
5.	Discover the Red -black trees?Construct a red black tree for the following list with proper rotations and coloring . 7 , 5 , 6 , 3 , 9 , 14 , 15	CO3	L-4
	SECTION-C		
6.	Classify how graphs are represented in memory? Explain in detail.	CO4	L-4
7.	Analyze the maximum flow problem. Explain the Ford–Fulkerson method with an example.	CO4	L-4
8.	Evaluate the different applications of string operations in real-world scenarios such as text editors, search engines, and bioinformatics.	CO5	L-5
9.	Construct the average-case and worst-case complexities of Brute Force and Rabin–Karp algorithms.	CO5	L-5

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Total No. of Questions: 09

MCA, Semester- 1st
ADVANCED DATABASE MANAGEMENT SYSTEM
Subject Code: PGCA 1953
M.Code: 79038
Date of Examination: 13-12-2025

Time: 3 Hrs.   Max. Marks:70

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B & C have FOUR questions each.
3. Attempt any FIVE question of SECTION B & C carryingTEN marks each.
4. Select at least TWO questions from SECTION B & C.

Q. No.	Question	Course Outcome	Bloom's Level
	SECTION-A		
1.	Answer briefly:		
a.	What is the need for database administration?	CO-2	L-1
b.	List any two limitations of traditional file storage systems.	CO-1	L-1
c.	Recall the query optimization?	CO-5	L-1
d.	Show the transaction in DBMS?	CO-3	L-1
e.	Compare hierarchical and relational models.	CO-3	L-2
f.	Illustrate the heuristic optimization?	CO-4	L-2
g.	Classify the difference between data independence and data redundancy.	CO-1	L-2
h.	Explain the impact of concurrency control on system performance.	CO-4	L-2
i.	Compare inter-query and intra-query parallelism.	CO-5	L-2
j.	List types of integrity constraints and explain any one briefly.	CO-2	L-1
	SECTION-B		
2.	Justify that backup and recovery strategies for a large-scale enterprise database is essential.	CO-3	L-5
3.	Explain Relational Algebra as a procedural query language. Describe the following operators with suitable examples: i) Selection (σ) ii) Projection (π) iii) Join (⋈)	CO-3	L-5
4.	Identify the different types of architecture of a DBMS with a neat diagram.	CO-1	L-3
5.	Examine the normalization and its forms with example.	CO-2	L-4

	SECTION-C		
6.	Analyze Spatial Databases by explaining spatial data types and methods of spatial data storage.	CO-5	L-4
7.	Apply SQL queries to implement constraints like primary key, foreign key, and check.	CO-5	L-3
8.	Evaluate the need for Big Data technologies, focusing on NoSQL databases.	CO-4	L-5
9.	Analyze the types of parallelism used in parallel databases.Differentiate between I/O Parallelism, Inter-query Parallelism, and Intra-query Parallelism.	CO-4	L-4