

St. Philomena's College (Autonomous), Mysore
II Semester MCA – C1 Internal Assessment Test : August - 2025
Subject : Advanced Database Management Systems

Time: 75 Mins

Max Marks: 30

PART - A

Answer the following :

2 × 10 = 20

1. a. Explain the 3-tier ANSI / SPARC DBMS architecture with a neat diagram.
Also, differentiate between schema and instance.

CO1 6

- b. Discuss any four characteristics of a DBMS.

CO1 4

OR

2. a. Explain the structure and functioning of Client-Server DBMS architecture.
How is it different from a centralized DBMS?

CO1 6

- b. Write short notes on:

i) Data Independence and ii) Cloud-based DBMS

CO1 4

3. a. Draw an ER diagram for a university system that includes entities like Student, Course, Instructor, and Department. Show cardinality and relationship types clearly.

CO2 6

- b. Define Referential Integrity. Why is it important in relational database design?

CO2 4

OR

4. a. Convert the following ER components to relational schema

Entity: Student(SID, Name, Dept)

Entity: Course(CID, Title)

Relationship: Enrolled(SID, CID, Date)

Show the resulting relations with primary and foreign keys.

CO2 6

- b. What are the different types of keys in a relational database? Explain each with suitable examples.

CO2 4

PTO

St Philomena's College (Autonomous), Mysuru
I Semester MCA – C1 Internal Assessment Test : March - 2025
Subject: MCA
Title: Computer Networks

Time: 75 Minutes

Max Marks: 30

PART – A

I. Answer the following:

2 x 10 = 20

1. Explain OSI network architecture with a neat diagram.

CO1 10

OR

2. Discuss the causes for transmission impairment in computer networks.

CO1 10

3. Explain different approaches in packet switched networks.

CO2 10

OR

4. Explain Leaky Bucket algorithm with suitable diagram.

CO2 10

PART – B

II. Answer the following :

2 x 5 = 10

5. Differentiate between circuit switched & packet switched networks.

CO1 5

OR

6. Differentiate between Analog and Digital signals.

CO1 5

7. Explain the three types of addresses in Link layer addressing.

CO2 5

OR

8. Generate the CRC codeword for the dataword 1001 & verify if the generated codeword is corrupted or not. Take the divisor as 1011.

CO2 5

St. Philomena's College (Autonomous), Mysore**I Semester MCA - C1 Internal Assessment Test : March - 2025****Subject : Data Structure and Problem Solving Using C****Time: 75 Minutes****Max. Marks: 30****PART A****Answer the following :****2 x 10 = 20**

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|---|----|--|-----|----|
| 1 | a. | Explain logic and arithmetic operators with example. | CO1 | 10 |
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OR

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| 2 | a. | Explain different data types in C. | CO1 | 6 |
| | b. | Discuss various categories of functions. | CO1 | 4 |
| 3 | a. | Write a note on DMA. Explain different dynamic memory allocation functions with syntax and example. | CO2 | 10 |

OR

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|---|----|--|-----|----|
| 4 | a. | Write a note on ADT. | CO2 | 04 |
| | b. | Explain the following
i) Sequences as Value Definitions
ii) Array as ADT | CO2 | 06 |

PART B**Answer the following :****2 x 5 = 10**

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| 5 | | Write a C program to solve a quadratic equation and find its roots. | CO1 | 5 |
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OR

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| 6 | | Differentiate structure and union with example. | CO1 | 5 |
| 7 | | Explain String as ADT with syntax. | CO2 | 5 |

OR

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| 8 | | Explain ADT for Varying-Length Character Strings with syntax. | CO2 | 5 |
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			Code:MCA24A104	
ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE				
I- MCA - C1 Internal Assessment, March - 2025				
<u>Subject:</u> Computer Organisation & Architecture				
Time: 75 Minutes			Max. Marks: 30	
PART A				
Answer the following			2 x 10 = 20	
1	a.	Perform subtraction of the given unsigned number using the 10's complement & 9's complement method. (a) 6428 - 3409 (b) 125 - 1800	CO1	6
	b.	Draw logic diagrams to implement the following simplified Boolean expressions : (a) $Y = A + B + B'(A + C')$ (b) $Y = A[B \text{ (xor) } D] + C'$ (c) $Y = A + CD + ABC$ (d) $Y = [A \text{ (xor) } C]' + B$	CO1	4
OR				
2	a.	Represent the decimal number 5137 in (a) BCD (b) Excess 3 code. (c) 2421 code. and (d) 6311 code.	CO1	6
	b.	Convert the hexadecimal number 68BE to Binary, and then convert it from binary to octal & Decimal.	CO1	4
3	a.	Explain the different forms of representing Boolean functions with examples.	CO2	4
	b.	Simplify the following Boolean function to the specified number of literals. i) $[(CD)' + A]' + A + CD + AB$ 3 Literals	CO2	6
OR				
4	a.	Express the following function in sum of minterms & product of maxterms. $F(A,B,C,D) = D(A' + B) + B'D$	CO2	7
	b.	What are the steps followed in designing a combinational logic circuit	CO2	3

PART B			
Answer the following			2 x 5 = 10
5	Simplify the following Boolean expression using K MAP $F(x, y, z) = x'y + yz' + y'z'$	CO1	5
OR			
6	Simplify the following Boolean expression using four-variable map: $F = A'B'C'D' + AC'D' + B'CD' + A'BCD + BC'D$	CO1	5
7	Design & Implement Full Adder using 2 half adders	CO2	5
OR			
8	Derive the Boolean functions in General notation For a 2 bit Magnitude comparator for all the 3 cases.	CO2	5

St Philomena's College (Autonomous), Mysuru
I Semester MCA – C1 Internal Assessment Test : March - 2025

Subject: MCA

Title: Operating System and Linux

Time: 75 Minutes

Max Marks: 30

PART – A

I. Answer the following:

2 x 10 = 20

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| 1. | a. What is cache memory? Explain single and three level cache memory. | CO1 | 5 |
| | b. List five services provided by an operating system. Explain how each provides convenience to the users. | CO1 | 5 |

OR

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| 2. | a. What is multiprocessor system? Explain its advantages and types. | CO1 | 7 |
| | b. Explain the concept of batch system. | CO1 | 3 |
| 3. | a. Briefly explain the five state process model. | CO2 | 6 |
| | b. What common events lead to the creation of a process? | CO2 | 4 |

OR

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| 4. | a. Explain the following : i) Interrupts ii) Trap | CO2 | 5 |
| | b. Explain any five reasons that causes process termination. | CO2 | 5 |

PART – B

II. Answer the following :

2 x 5 = 10

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| 5. | What are the five major activities of an operating system in regard to process management? | CO1 | 5 |
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OR

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| 6. | Explain the I/O communication techniques. | CO1 | 5 |
| 7. | With a neat block diagram, explain PCB. | CO2 | 5 |

OR

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| 8. | What are the steps performed by OS to create a new process? | CO2 | 5 |
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			Code: MCA24A201	
ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE				
I Semester – MCA - C1 Internal Assessment, March - 2025				
<u>Subject</u> : Mathematical Foundations for Computer Science				
Time: 75 Minutes			Max. Marks: 30	
PART A				
Answer the following			2 x 10 = 20	
1	a.	Consider these relations on the set of integers: $R_1 = \{(a, b) \mid a \leq b\}$, $R_2 = \{(a, b) \mid a > b\}$, $R_3 = \{(a, b) \mid a = b \text{ or } a = -b\}$, $R_4 = \{(a, b) \mid a = b\}$, $R_5 = \{(a, b) \mid a = b + 1\}$, $R_6 = \{(a, b) \mid a + b \leq 3\}$. Which of these relations are reflexive, symmetric and transitive?	CO1	6
	b.	How many relations are there on a set with n elements?	CO1	4
OR				
2	a.	Define the following with suitable examples. (a) Function (b) Injuction (c) Surjection	CO1	6
	b.	Determine whether the function $f(x) = x^2$ from the set of integers to the set of integers is bijective?	CO1	4
3	a.	Define the composition of two functions. Show that composition of functions does not satisfy the commutative law.	CO2	6
	b.	If $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 & 1 \\ -1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$. Calculate AC, BC, (A + B) C. Also, verify that (A + B) C = AC + BC.	CO2	4
OR				

P.T.O

4	a.	State the Pigeonhole principle. What is the minimum number of students required in a discrete mathematics class to be sure that at least six will receive the same grade, if there are five possible grades A, B, C, D, and F?	CO2	6
	b.	Suppose that f is a one-to-one correspondence from the set A to the set B. Prove that $(f^{-1})^{-1} = f$.	CO2	4
PART B				
Answer the following			2 x 5 = 10	
5		What is inverse of a function? Let $f: \mathbf{Z} \rightarrow \mathbf{Z}$ be the function defined by $f(x) = x + 1$. Is f is invertible and if so what is it's inverse?	CO1	5
OR				
6		Show that function f from a set with $k + 1$ or more elements to a set with k elements is not one-to-one.	CO1	5
7		Discuss the properties of matrix addition.	CO2	5
OR				
8		If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, then show that $A^3 - 23A - 40I = O$.	CO2	5