TB251901D

Reg. No :.....

Name :.....

BACHELOR'S DEGREE EXAMINATION, OCTOBER 2025

2025 ADMISSIONS REGULAR

SEMESTER I - MAJOR (COMPUTER APPLICATIONS)

CP1DSC04B24 - Discrete Mathematics

Time : 2 Hours

Maximum Marks : 70

Part A

Answer all question from the bunch of CO1. Each question carries 2 mark. (2x1=2)

1. Explain proper set and power set with suitable example. [CO1,Understand]

Part A

Answer all question from the bunch of CO2. Each question carries 2 mark. (2x1=2)

2. Write the contrapositive, converse, inverse of the conditional statement "The home team wins whenever it is raining.?"

[CO2,Apply]

Part A

Answer all questions from the bunch of CO3. Each question carries 2 mark. (2x3=6)

3. Define a directed graph and loop. Give one example. [CO3,Understand]

4. Define symmetric and antisymmetric. [CO3,Remember]

5. Define (i) Equivalence relations (ii) Equivalent related by *a* and *b* (iii) Equivalence class (iv) Representative . [CO3,Remember]

Part B

Answer any 2 questions from the bunch of CO3. Each question carries 6 mark. (6x2=12)

6. Suppose the relations R_1 and R_2 on a set *A* are represented by the matrices $M_{R_1} = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$ and $M_{R_2} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$. Explain what are the matrices representing $R_1 \cup R_2$ and $R_1 \cap R_2$? [CO3,Analyse]

7. Establish the relation { 1,2,3,4) with a matrix {(2,4),(3,1),(3,2),(3,4)} [CO3,Apply]

8. Let *R* be the relation on the set of real numbers such that *aRb* iff *a-b* is an integer. Is *R* an equivalence relation? Explain. [CO3,Analyse]

Part B

Answer any 3 questions from the bunch of CO4. Each question carries 6 mark. (6x3=18)

9. Express $\begin{bmatrix} 3 & 3 & -7 \\ -8 & 11 & 4 \\ 15 & -14 & 6 \end{bmatrix}$ as the sum of a lower triangular matrix with zero leading diagonal and an upper triangular matrix. [CO4,Apply]

10. Explain the difference between singular and non-singular matrices with examples. [CO4,Understand]

11. Express the matrix A as the sum of a symmetric and skew-symmetric matrix where A = $\begin{bmatrix} 4 & 2 & -3 \\ 1 & 3 & -6 \\ -5 & 0 & -7 \end{bmatrix}$.

[CO4,Apply]

12. Explain the concept of invertible matrices. State the condition for the existence of the inverse of a square matrix. [CO4,Understand]

Part C

Answer any 1 question from the bunch of CO1. Each question carries 15 mark. **(15x1=15)**

13. Show that $\overline{A \cap B} = \bar{A} \cup \bar{B}$. [CO1,Understand]

14. i) Define the composition of a function using a diagram.
    ii) Let f and g be the functions from the set of integers to the set of integers defined by f(x) = 2x + 3 and g(x) = 3x + 2. Determine the composition of f and g? Also determine the composition of g and f ? [CO1,Apply]

Part C

Answer any 1 question from the bunch of CO2. Each question carries 15 mark. **(15x1=15)**

15. Examine $\sim(p \leftrightarrow q)$ and $p \leftrightarrow \sim q$ are logically equivalent. [CO2,Apply]

16. Construct a truth table for each of these compound propositions.

    i. $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$

    ii. $\sim p \oplus \sim q$

[CO2,Apply]