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DCCA101

Reg. No. 

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I Semester B.C.A. Degree Examination, December/January - 2025/26

## COMPUTER APPLICATIONS

Discrete Structure

(NEP Scheme Repeater)

Time : 2½ Hours

Instructions to Candidates:

Answer All the Sections.



Maximum Marks : 60

## SECTION - A

I. Answer any Four questions. Each question carries 2 marks. (4×2=8)

1. Define Power set with an example.
2. If  $(2x, x+y) = (8, 4)$  find  $x$  and  $y$ .
3. Define Tautology.
4. Define Diagonal Matrix.

5. Find  $x$  if  $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$

6. What is minimum spanning tree?

## SECTION - B

II. Answer any Four questions. Each question carries 5 marks. (4×5=20)

7. If  $A = \{1, 2\}$ ,  $B = \{2, 3\}$ ,  $C = \{3, 4\}$   
Find a)  $A \times (B \cup C)$  b)  $(A \times B) \cap (A \times C)$
8. Give an example of a relation which is
  - a) Reflexive but not symmetric.
  - b) Symmetric but not reflexive and not transitive.
9. Show that  $(p \wedge q) \wedge \sim (p \vee q)$  is a contradiction.
10. State and prove pigeonhole principle.

11. Find the inverse of  $A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$

12. Construct Binary search tree.  
56, 38, 10, 65, 72, 44, 50.

[P.T.O.]



## SECTION - C

III. Answer any Four questions. Each question carries 8 marks. (4×8=32)

13. Let  $f:R \rightarrow R$  is defined by  $f(x)=2x+5$  prove that 'f' is invertible and find  $f^{-1}$ .

14. Prove that  $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1} \forall Z^+$

15. Find the value of 'n'

a)  ${}^n P_2 = 12$

b)  ${}^n C_9 = {}^n C_8$

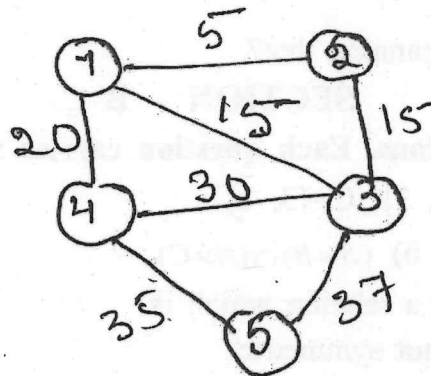
16. Solve using cramer's rule

$$x+y+z = 7$$

$$2x+3y+2z=17$$

$$4x+9y+z = 37$$

17. Find the minimum weight spanning tree by prim's algorithm.



18. Define

a) Walk

b) Path

c) Trail

d) Circuit with example.