DCCA111

Reg. No. | | | | | | | | |

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

COMPUTER SCIENCE

Discrete Structures

(SEP Scheme)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates:

Answer All the Sections.

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SECTION - A

I. Answer any Ten questions. Each question carries 2 mark. **(10×2=20)**

1. Find the intersection $A \cap B$ and set difference A - B if $A = \{1, 3, 5, 7, 9\}$ and $B = \{2, 3, 4, 5, 6, 8\}$.

2. Construct a truth table for $\sim (p \vee q)$.

3. Find A^{-1} if $A = \begin{bmatrix} 6 & 3 \\ 2 & 4 \end{bmatrix}$.

4. Find the value of

   a) $4P_3$ b) $6C_3$

5. Define Equivalence Relation.

6. Define Unit Matrix with example.

7. If $A = \begin{bmatrix} 2 & -1 \\ 4 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 2 \\ -3 & 2 \end{bmatrix}$ find 3A - 2B.

8. What is a minimum cost spanning tree?

9. Define the terms

   a) Graph b) Loop

[P.T.O]

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10. Define Binary Tree with example.

11. Define:
    a) Walk b) Path

12. Define complete graph. Draw K_5 graph.

SECTION - B

II. Answer any Six questions. Each question carries 5 marks. **(6×5=30)**

13. Find n, if ${}^nP_2 = 12$.

14. Define:
    a) One - to - one function.
    b) On - to function
    With example.

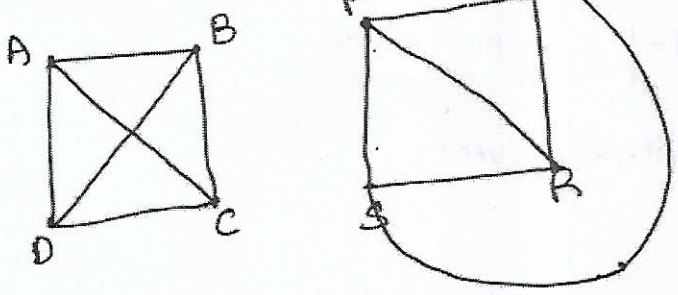
15. Show that the preposition $\sim (p \leftrightarrow q) \equiv \sim [(p \rightarrow q) \wedge (q \rightarrow p)]$.

16. Prove by Mathematical Induction $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$, $\forall$ positive integer n.

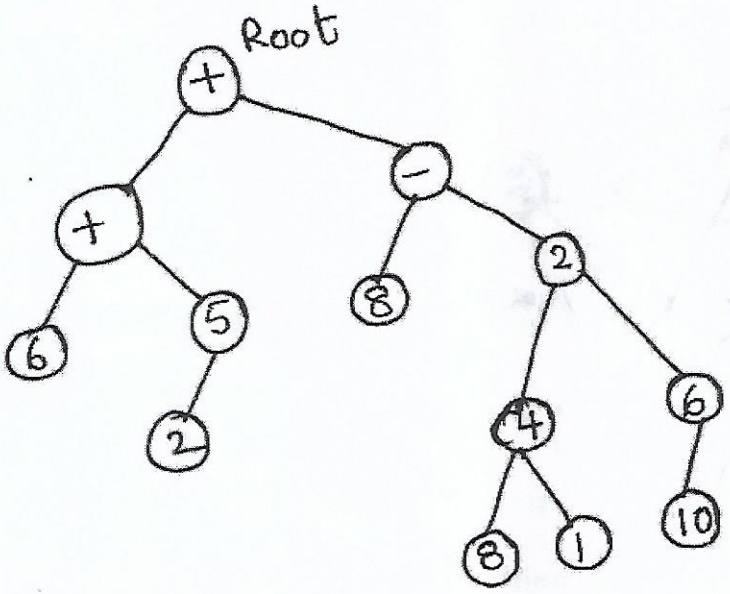
17. Find the Inverse of the matrix $\begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$.

18. Solve the system of equations
    $x + y + z = 7$
    $2x + 3y + 2z = 17$
    $4x + 9y + z = 37$

19. Examine whether the following graphs are Isomorphic (or) not.



20. Traverse the following tree in Preorder, Postorder and Inorder.



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SECTION - C

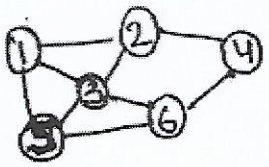
III. Answer any Three questions. Each question carries Ten marks. **(3×10=30)**

21. Consider the function $f \& g : R \to R$ defined by $f(x) = x^2 + 5$ and $g(x) = 5x - 2$. Find the composite function

    a) fog b) gof

22. Define Permutation. How many 4 digits numbers can be formed with the digits 0, 1, 2, 3, 5? (Repetition not being allowed). How many of these are greater than 2000?

23. What is a Hamilton Circuit? Check whether the following graph contains Hamiltonian Circuit. Justify your answer.



24. Define Binary Search Tree. Construct binary search tree.

    56, 38, 10, 65, 72, 44, 50

[P.T.O]

25. Find the minimum weight spanning tree by PRIM's algorithm.

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