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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.****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]



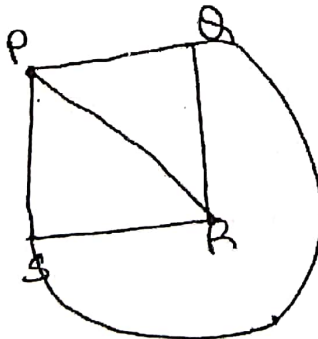
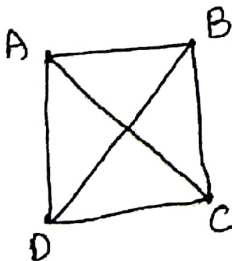
10. Define Binary Tree with example.
11. Define:
a) Walk b) Path
12. Define complete graph. Draw K_5 graph.

SECTION - B

II. Answer any Six questions. Each question carries 5 marks.

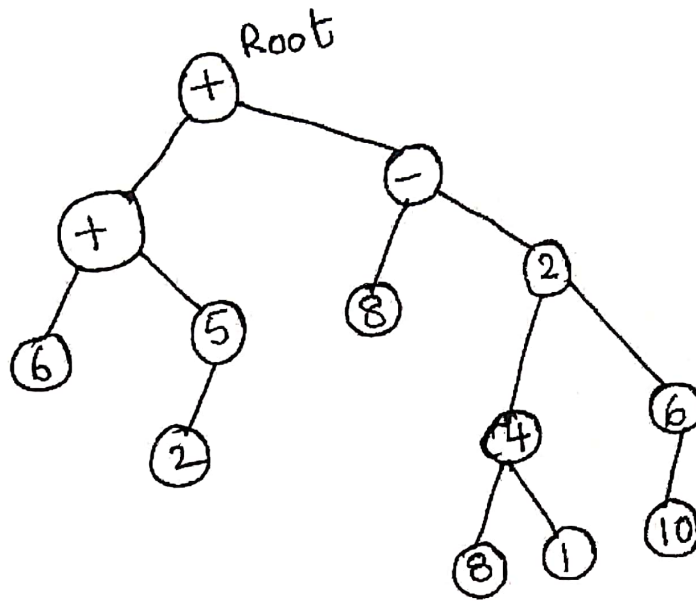
(6×5=30)

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 $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$, $\forall$ 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.



SECTION - C

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

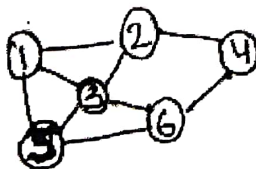
21. Consider the function f & $g : R \rightarrow R$ defined by $f(x) = x^2 + 5$ and $g(x) = 5x - 2$. Find the composite function

a) $f \circ g$

b) $g \circ f$

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]



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

