B. Tech DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Second Year)

COMPUTER SCIENCE

Paper - IV : Discrete Mathematical Structures

Time : 3 Hours   **Maximum Marks : 75**

Answer question No.1 is compulsory   *(15)*

Answer ONE question from each unit   *(4 × 15 = 60)*

1) Write short notes on :

     a)   Properties of Relations.

     b)   Write converse inverse & contrapositive of the statement "Δ ABC is equilateral then it is isosceles".

     c)   Define Recurrence Relation.

     d)   Define Permutation with example.

     e)   Draw a Hasse diagram for the poset (A, 1), where A = {2, 3, 6, 12, 24, 36} and 'I' de notes the divisibility relation.

UNIT - I

2) a)   Construct a truth table for the following statement: $\sim P \leftrightarrow \sim Q \leftrightarrow Q \rightarrow R$.   **(7)**

     b)   Show that the following statements are logically equivalent :

         $P \rightarrow Q \wedge P \rightarrow R \Leftrightarrow P \rightarrow (Q \wedge R)$ **(8)**

OR

3) a)   Show that $P \rightarrow Q \rightarrow R , Q \rightarrow R \rightarrow S \Rightarrow P \rightarrow Q \rightarrow S$.   **(7)**

     b)   Prove that $A - B \bigcap C = A - B \bigcup A - C$.   **(8)**

UNIT - II

4)   a)   State the Binomial theorem.   **(5)**

    b)   Show that the number of r-permutations of a set of n distinct elements is given by

$$P(n,r) = \frac{n!}{n-r\ !}.$$ **(10)**

<div align="center">OR</div>

5)   a)   Find the number of positive integers less than or equal to 2076 and divisible by 3 or 4.

    b)   Find the coefficient of $x^4 x^7$ in the expansion of $(x\text{-}y)^{11}$.   **(8)**
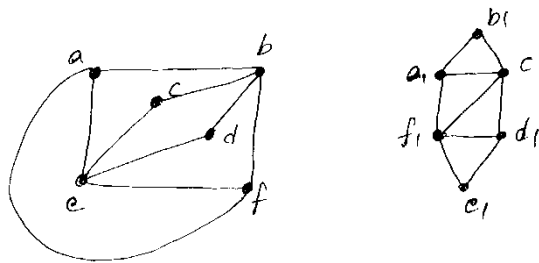
UNIT - III

6)   a)   Solve the recurrence relation an $- 7\ a_{n-1} + 12\ a_{n-2} = 0$ for n ≥ 2, $a_0 = 1$ & $a_1 = 2$.   **(8)**

    b)   Solve the recurrence relation of Fibonacci series.   **(7)**

<div align="center">OR</div>

7)   a)   Solve the recurrence relation $u_{n+2} + 4\ u_{n+1} + 3\ u_n = 5\ (-2)^n$, $u_0 = 1$, $u_1 = 0$. Using generating function.   **(8)**

    b)   Solve an $= a_{n-1} + n$ where $a_0 = 2$ by substitution.   **(7)**

UNIT - IV

8)   a)   Verify the following graphs are isomorphic or not?   **(7)**

    b)   Find the chromatic number of the following graphs :   **(8)**

        i)   Complete Graph (K_n)   ii)   Complete Bi-partite graph ($K_{m,n}$)   iii)   Cycle graph (C_n)

<div align="center">OR</div>

9)   a)   State and prove five color theorem.   **(8)**

    b)   Give the adjacency matrix and graph representation of the relation.   **(7)**

        R = {(a, a), (a, c), (b, a), (b, b), (b, d), (c, b) (c, c), (c, d), (d, a), (d, b), (d, d)} on set A = {a, b, c, d}.

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