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II/IV B.Tech (Supplementary) DEGREE EXAMINATION

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April, 2018   **Computer Science And Engineering**

Third Semester   **Discrete Mathematical Structures**

Time: Three Hours   **Maximum :** 60 Marks

Answer Question No.1 compulsorily.   (1X12 = 12 Marks)

Answer ONE question from each unit.   (4X12=48 Marks)

1. Answer all questions   (1X12=12 Marks)
   a) In how many ways can 12 of the 14 people be distributed into 3 teams of 4 each?
   b) Draw the truth table **~ P V ~ (~Q).**
   c) What is power set of A = {ø}?
   d) Write the following statements into symbols using predicate logic
      > Every husband argues with his wife.
      > `X' is A husband.
      > Therefore, `X' argues With his wife"
   e) How many ways can 10 people seated in a row so that certain pair of them next to each other.
   f) Compute the first four terms of sequence of $a_n = a_{n-1} + n,\ n \geq 1$ where $a_0 = 1$.
   g) Define Recurrence relation.
   h) Give an example to disprove every poset has a maximal element.
   i) Define Equivalence Relation.
   j) Define weighted graph.
   k) Define cycle and circuit.
   l) Define Directed path.

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UNIT I

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2. a) Determine whether the following is tautology or not:
   $$[p \rightarrow (q \rightarrow r)] \rightarrow [(p \rightarrow q) \rightarrow (p \rightarrow r)]$$ 6M
   b) Prove that by mathematical induction 3n < n! whenever n is a positive integer greater than 6?   6M

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(OR)

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3. a) State whether the argument given is valid or not. If it is valid identify the tautology on which it is based.
   > If Clifton does not live in France, then he does not speak French.
   > Clifton does not drive a Datsun.
   > If Clifton lives in France, then he rides a bicycle.
   > Either Clifton speaks French, or he drives a Datsun.
   > Hence, Clifton rides a bicycle.

      9M
   b) b) State the converse, opposite, and contrapositive to the Statement
   If triangle ABC is a right triangle, then $|AB|^2 + |BC|^2 = |AC|^2$.   3M

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UNIT II

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4. a) How many different five digit numbers can be formed from the digits 0,1,2,3 and 4?   6M
   b) There are 35 students and 04 teachers. In how many ways every student shakes hand with other students and all the teachers. [6M]   6M

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(OR)

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5. a) Find the coefficient of x^{16} in $(1 + x^4 + x^8)^{10}$.   6M
   b) How many integral solutions are there of $X_1 + X_2 + X_3 + X_4 + X_5 = 20$ where $x_1 \geq -3,\ x_2 \geq 0,\ x_3 \geq 4,\ x_4 \geq 2$ and $x_5 \geq 2$?   6M

UNIT III

6. a) Solve the Recurrence Relation $a_n - 7a_n-1 + 10a_n-2 = 0$ for $n \geq 2$. 6M

   b) Consider the relation R={(a,b),(b,c),(b,d),(d,a),(c,c)}.
      i. Draw a digraph for the relation R.
      ii. Draw a digraph for the relation inverse of R, R^{-1}.
      iii. Draw a digraph for the relation complement of R, R^c.
      Draw a digraph for the relation intersection of R and inverse of R, $R \cap R^{-1}$. 6M

(OR)

7. a) Find a solution to the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = n(n-1)$ using generating functions method. 6M
   b) State and explain the 6 special properties of a binary relation. 6M

UNIT IV

8. a) For the poset [$D_{30};|$] draw a poset diagram and determine all maximal and minimal elements and greatest and least elements if they exist. Also specify whether it is a lattice or not. 6M
   b) If G is a connected plane graph then prove that $|V| - |E| + |R| = 2$ 6M

(OR)

9. a) Define isomorphism? And explain isomorphism with suitable example? 6M
   b) Give the adjacency matrix of the digraph G { (a,b,c,d), R} where R = { (a,b),(b,c),(d,c),(d,a) }. 6M