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II/IV B.Tech (Supplementary) DEGREE EXAMINATION

April, 2017

Third Semester

Time: Three Hours

Common for CSE & IT

Discrete Mathematical Structures

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)

- $(P \vee \sim P)$ is a tautology or contradiction?
- Give the generating function $A(X)$ for the sequence $a_n = (n+1)$?
- In how many ways can 10 people arrange themselves in a ring?
- Give the principle of Mathematical Induction?
- State the Euler's theorem?
- Give the chromatic number for Cycle if the length is even?
- What is meant by Bi-partite graph?
- What is the difference between tree and graph?
- What is meant by POSET?
- Show that 3 and 24 integers are congruent modulo 7?
- What is an Equivalence Relation?
- State the law of hypothetical syllogism?

UNIT I

1. Show that the following are equivalent formulas:

a) $[P \vee (P \wedge Q) \leftrightarrow P]$ (Using truth table) [6 M]

b) $[P \vee (\sim P \wedge Q) \leftrightarrow P \vee Q]$ (Using rules of propositions) [6 M]

(OR)

2. a) Use Principle of Mathematical Induction to Prove that : $3n^5 + 5n^3 + 7$ where n is divisible by 15 for each +ve integer. [6 M]

b) Prove (or) Disprove the validity of the following argument (Using Rules of Inference) [6 M]

Every living thing is a Plant or animal.

David's dog is alive and it is not a plant.

All animals have hearts.

Hence, David's dog has a heart.

UNIT II

3. a) Find the coefficient of X^{12} in [6 M]

$$\frac{1 - X^4 - X^7 + X^{11}}{(1 - X)^5}$$

b) Find the coefficient of X^{25} in $(X^2 + X^3 + X^4 + X^5 + X^6)^7$ [6 M]

(OR)

5. a) In How many ways can the committee of 5 teachers and 4 students be chosen from 9 teachers and 15 students if teacher A refuses to serve if student B is on the committee? [6 M]

b) In how many ways can 10 people arrange themselves i) In a row of 10 chairs? ii) In a row of 7 chairs? iii) In a circle of 10 chairs? [6 M]

UNIT III

6. Solve the following recurrence relations:

a) $a_n = a_{n-1} + n$ where $a_0 = 2$. (using substitution method) [6 M]

b) $a_n - 6a_{n-1} = 0$ where $a_0 = 1$. (Using Generating Functions Method) [6 M]

(OR)

7. a) Define the terms: i) lattice? [4 M]

ii) Join – semi lattice

iii) Meet – semi lattice

iv) TOSET

b) Draw the Hasse – diagram for the poset $[D_{12}; /]$. Where $'/'$ is the divisibility relation.

Determine this POSET is lattice or not [8 M]

UNIT IV

8. a) Find the Chromatic – Number for the “Wheel” graph? [6 M]
b) State and explain Euler’s Formula for planar graph? [6 M]
(OR)
9. a) What is meant by Adjacency – Matrix? Give the adjacency matrix $K_{3,3}$. [6 M]
b) What is meant by Isomorphism? Discuss with suitable examples. [6 M]