**Code: 15A05302**



**R15**

B.Tech II Year I Semester (R15) Regular & Supplementary Examinations November/December 2018

# DISCRETE MATHEMATICS

(Common to CSE and IT)

Time: 3 hours  Max. Marks: 70

## PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) What are basic logical operations? Define them.

(b) Find the minimum number of persons selected so that at least eight of them will have birthdays on the same day of week.

(c) Obtain the dual of the $wx(y'z + yz') + w'x'(y' + z)(y + z')$ of the Boolean expression.

(d) Represent the relation R = {(1,2), (1,3), (1,4), (2,3), (4,4)} by a diagraph.

(e) Find the order of the elements of $(Z_8, +_8)$.

(f) State Lagrange's theorem.

(g) Prove that the identity of a subgroup is same as the group.

(h) What is spanning tree?

(i) Obtain the recurrence relation satisfying the equation $y_n = A(2)^n + B(-3)^n$.

(j) Arrange the numbers 30, 36, 17, 20, 22, 58, 19, 15, 50, 11 as a totally ordered set by building a binary search tree.

## PART – B

(Answer all five units, 5 X 10 = 50 Marks)

### UNIT – I

2 Show that among any $n + 1$ numbers one can find 2 numbers so that their difference is divisible by n.

**OR**

3 A relation 'S' is defined by a S b. If $a^2 + b^2 = 4$ represent them as sets, find D(S) and R(S) if S is a relation: (i) from N to N. (ii) from N to $Z^+$. (iii) from Z to N.

### UNIT – II

4 In a Lattice (L.≤), prove that $x \vee (y \wedge z) \leq (x \vee y) \wedge (x \vee z)$.

**OR**

5 (a) What is binary relation? Give properties of binary relation.

(b) If P(A) be the power set of any non-empty set A then prove that the relation I of set inclusion is not an equivalence relation.

### UNIT – III

6 Explain groups, subgroups and normal subgroups with suitable examples.

**OR**

7 (a) How many arrangements can made out of the letters of the word 'Mathematics'?

(b) 36 cars are running between two places P and Q. In how many ways can a person go from P to Q and return by a different car.

### UNIT – IV

8 Use the generating function, solve the following equation:

$$y_{n+2} + 4y_{n+1} + 4y_n = 0,\ y_1 = 0 \text{ and } y_0 = 2.$$

**OR**

9 Solve the recurrence relation, S(n) = S(s-1) +2 (n-1) with S(0))=2, S(1)=1 by finding its generating function.

### UNIT – V

10 (a) Explain Kruskal's algorithm with example.

(b) When it can be said that two graphs G1 and G2 are isomorphic?

**OR**

11 (a) Explain DFS algorithm with an example.

(b) Discuss about the graph coloring.

*****