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CSE208

Enrol. No. A239520448

[ET]

END SEMESTER EXAMINATION : APRIL-MAY 2022

**DISCRETE MATHEMATICAL STRUCTURES**

*Time : 3 Hrs.*

*Maximum Marks : 60*

**Note:** *Attempt questions from all sections as directed.  
Use of Scientific calculator is allowed.*

**SECTION – A (24 Marks)**

*Attempt any **four** questions out of **five**.*

*Each question carries **06** marks.*

1. Define the following terms with appropriate truth table
  - (i) Conjunction
  - (ii) Disjunction
  - (iii) Conditional
  - (iv) Negation
2. A tree has two vertices of degree 2, one vertex of degree 3 and three vertices of degree 4. How many vertices of degree 1 does it have?

P.T.O.

3. Let  $A = \{1, 2, 3, 4, 5, 6\}$  and let  $R$  be the relation  $x$  divides  $y$ .
- (i) Write  $R$  as a set of ordered pairs.
  - (ii) Draw its directed graph.
4. Prove that the fourth roots of unity  $1, -1, i, -i$  form an abelian multiplicative group.
5. Obtain POS of the following formulas
- $$(P \wedge Q \wedge R) \vee (\sim P \wedge R \wedge Q) \vee (\sim P \wedge \sim Q \wedge \sim R)$$

**SECTION – B** (20 Marks)

*Attempt any two questions out of three.*

*Each question carries 10 marks.*

6. Find the Chromatic number of the following graphs
- (a) Complete Graph ( $K_3$ )
  - (b) Complete Bipartite Graph ( $K_{2,3}$ ) R18
  - (c) Regular Graphs ( $K_3$ )

7. (a) A committee of 5 is to be formed out of 6 gents and 4 ladies. In how many ways this can be done when (i) at least 2 ladies are included (ii) at most 2 ladies are included. (5)
- (b) Draw the Hasse diagram representing the positive divisors of 45. (5)
8. Define Boolean Algebra. Check whether the Lattice of posets  $\{(1, 3, 6, 9), D\}$  and  $\{(1, 5, 25, 125), D\}$  are Boolean Algebra or not. Justify your claim.

**SECTION – C****(16 Marks)***(Compulsory)*

9. (a) A total of 1232 students have taken a course in Spanish, 879 have taken a course in French and 114 have taken a course in Russian. Further 103 have taken courses in both Spanish and French, 23 have taken courses in both Spanish and Russian and 14 have taken courses in both French and Russian. If 2092 students have taken at least one Spanish, French and Russian, how students have taken a course in all three languages? (6)

P.T.O.

(b) Discuss Ring and Fields with suitable examples.

(5)

(c) If  $S_n$  is the set of all divisors of the positive integer  $n$  and  $D$  is the relation of 'division', prove that  $(S_{30}, D)$  is a lattice. Find also all the sublattices of  $(S_{30}, D)$  that contain six or more elements.

(5)