

7. (a) Explain Algebraic structure 'Ring' with example. 7.5

(b) Convert the given function in conjunctive normal form : 7.5

$$f(x, y, z) = x + x'yz + xy'z'$$

#### UNIT – IV

8. (a) Define the following terms of graph :

(i) Planar graph and Bipartite graph

(ii) Cut point and Bridge

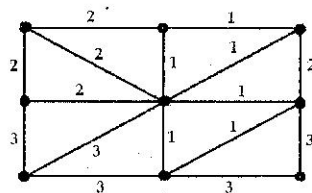
(iii) Connected graph and Complete graph 7.5

(b) (i) Give an example of a graph which is Eulerian but non-Hamiltonian. 7.5

(ii) Give an example of a graph which is Hamiltonian but not Eulerian. 7.5

9. (a) Define spanning tree and explain an algorithm to find minimal spanning tree. 7.5

(b) Find a minimal spanning tree T of the weighted graph G : 7.5



**3085**

### B. Tech. 4th Semester (CSE) Examination – July, 2021

#### DISCRETE MATHEMATICS

Paper : PCC-CSE-202-G

Time : Three Hours ]

[ Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Answer the following :

$$6 \times 2.5 = 15$$

(a) Let  $f: R \rightarrow R$  be a function defined by  $f(x) = 2x - 3$ . Now ' $f$ ' is one-to-one and onto. Hence ' $f$ ' has an inverse function. Find formula for  $f^{-1}$ .

(b) Define quantifier and mention its types.

- (c) State fundamental theorem of arithmetic with example.
- (d) What do you mean by Isomorphism of Groups ? Quotient example.
- (e) Consider the set 'Q' of rational numbers and let \* be the operation on Q defined by  $a * b = a + b - ab$ .
- (i) Find  $7 * \left(\frac{1}{2}\right)$ .
- (ii) Find identity element.
- (f) Define Graph and its applications.

### UNIT - I

2. (a) (i) Prove that  $A \times (B \cup C) = (A \times B) \cup (A \times C)$ . 3.5
- (ii)  $(A \cap B)^C = A^C \cup B^C$ . 4
- (b) Consider the set Z of integers and an integer  $m(>1)$ . We say that 'x' is congruent to y modulo 'm' written as  $x \equiv y \pmod{m}$  if 'x - y' is divisible by 'm'. Show that this defines an equivalence relation on Z. 7.5
3. (a) Prove that if f and g are one-one and onto functions. Then prove that 'gof' is also one-one and onto function. 7.5
- (b) Determine the validity of the following argument : 7.5

if 7 is less than 4, then 7 is not a prime number.  
 7 is not less than 4  


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 7 is a prime number

### UNIT - II

4. (a) A History class contains 8 male and 6 female students. Find the number 'n' of ways that the class can elect : 7.5
- (i) one class representative
- (ii) 2 class representatives, 1 male and 1 female
- (b) Find the minimum number of students needed to guarantee that four of them : 7.5
- (i) were born on the same day of the week,
- (i) were born in the same month.

5. (a) Solve the recurrence relation :

$$a_n + 5a_{n-1} + 6a_{n-2} = 3n^2 - 2n + 1. \quad 7.5$$

- (b) Solve the recurrence relation using the concept of generating function :

$$a_n = 3a_{n-1} + 1; n \geq 2 \text{ with } a_0 = 1, a_1 = 1.$$

### UNIT - III

6. (a) (i) Define cyclic group with example.
- (ii) Define normal subgroup with example. 7.5
- (b) Prove that order of a subgroup is a divisor of order of group. 7.5