

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

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

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

UNIT - IV

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

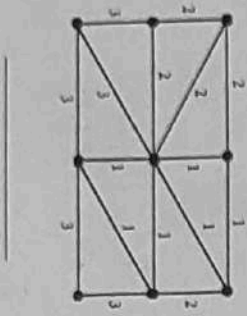
- (i) Planar graph and Bipartite graph
- (ii) Cut point and Bridge
- (iii) Connected graph and Complete graph 7.5

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

(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



Roll No.

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? Quote an example.
- (e) Consider the set ' \mathcal{Q} ' of rational numbers and let $*$ be the operation on \mathcal{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 ' $g \circ f$ ' 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
 7 is a prime number

$$3085-2750-(P-4)(Q-9)(21) \quad (2)$$

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,
- (ii) were born in the same month.
5. (a) Solve the recurrence relation : 7.5
- $$a_n + 5a_{n-1} + 6a_{n-2} = 3n^2 - 2n + 1.$$
- (b) Solve the recurrence relation using the concept of generating function : 7.5
- $$a_n = 3a_{n-1} + 1, \quad n \geq 2 \text{ with } a_0 = 1, a_1 = 1.$$

UNIT - III

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

$$3085-2750-(P-4)(Q-9)(21) \quad (3)$$