Total No. of Questions : 4]

SEAT No. :

PC407

[Total No. of Pages : 2

[6359]-527

S.E. (Information Technology Engineering) (Insem)

DISCRETE MATHEMATICS

(2019 Pattern) (Semester - III) (214441)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Verify whether the following compound propositions are tautologies or contradictions or Contingency? **[5]**

$$((p \to q) \wedge (q \to r)) \to (p \to r)$$

b) What is Multiset? Let A and B be the multisets [1, 1, 3, 3, 3, 4] and [1, 2, 2, 4, 5, 5], respectively. Obtain Union, Intersection, and Difference of two multisets A and B. **[5]**

c) Prove by Mathematical Induction that for $n >= 1$:

$1.1! + 2.2! + 3.3! + \ldots + n.n! = (n + 1)! - 1$. **[5]**

OR

Q2) a) State the converse, inverse, and contrapositive of the following conditional statements: **[5]**

i) If a function is differentiable then it is continuous.

ii) If the surface area decreases then the pressure increases.

b) Among a group of students, 49 studied C, 37 studied C++, and 21 studied Java. If 9 of these students study C and C++, 5 study C++ and Java, 4 study C and Java, and 3 study C, C++, and Java, find the number of students in the group. **[5]**

c) Explain with example, the notation used and mathematical expression to describe the following terms : **[5]**

i) Union of Sets

ii) Intersection of Sets

iii) Powerset

P.T.O.

Q3) a) A bag contains 3 red, 6 white and 7 blue balls. What is the probability that two balls drawn are white and blue? **[5]**

b) Four persons are chosen at random from a group of 3 men, 2 women and 4 children. Show that the chance that exactly two of them will be children is 10/21. **[5]**

c) In the word 'MANORAMA'. **[5]**

i) Find the number of permutations formed taking all letters.

ii) Out of these the number of permutations with all A's together.

OR

Q4) a) Consider a group of 36 students. Suppose that A and B are two properties that each student either has or does not have. The events are

A : Student has blue eyes

B : Student is a male

Out of 36, there are 12 male and 24 female students and half of them in each has blue eyes. Are these events independent? **[5]**

b) In a simultaneous toss of two coins, find the probability of **[5]**

i) getting 2 heads.

ii) getting 1 head and 1 tail.

c) Find the number of ways in which 5 prizes can be distributed among 5 students such that **[5]**

i) Each student may get a prize.

ii) There is no restriction to the number of prizes a student gets.

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