Total No. of Questions : 4]

SEAT No. : ____

PA-25

[Total No. of Pages : 2

[5931]-35

S.E. (Information Technology)

DISCRETE MATHEMATICS

(2019 Pattern) (Semester - I) (214441)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Make suitable assumptions if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Write the contrapositive, the converse, negation and the inverse of the following sentence. "If X is rational, then X is real" **[3]**

b) Show that $1^3+2^3+3^3+.....+n^3=$ by Mathematical Induction. **[6]**

c) Consider a set of integers 1 to 500. Find **[6]**

i) How many of these numbers are divisible by 3 or 5 or by 11?

ii) How many are divisible by 3 or 11 but not by 5?

OR

Q2) a) Prove by Venn Diagram **[3]**

$$A \cup (B \oplus C) = (A \cap B) \oplus (A \cap C)$$

b) Prove by truth table **[6]**

i) $(p \wedge q) \wedge \sim (p \vee q)$

ii) $(p \rightarrow q) \leftrightarrow (q \vee \sim p)$

c) Determine the validity of the argument **[6]**

s1 : All my friends are musicians

s2 : John is my friend

s3 : None of my neighbors are musicians

Therefore s : John is not my neighbour

P.T.O.

Q3) a) Find the number of permutations that can be made out of the letters **[3]**

i) MISSISSIPPI

ii) ASSASSINATION

b) Out of 5 males and 6 females, a committee of 5 is to be formed. Find the number of ways in which it can be formed so that among the person chosen in the committee there are, **[6]**

i) Exactly 3 male and 2 female

ii) At least 2 male and 1 female

c) Three students A, B and C are swimming in the race. A and B have some probability of winning and each is twice as likely to win as C. Find the probability that. **[6]**

i) B wins

ii) C wins

iii) B or C wins

OR

Q4) a) Suppose license plate contains 2 English letters followed by 4 digits, **[3]**

i) How many different license plates can be manufactured if repetition of letters and digits are allowed?

ii) How many plates are possible if only the letters are repeated?

b) In a group of 6 boys and 4 girls, four children are to be selected. In how many ways can they be selected such that at least one boy should be there. **[6]**

c) A bag contains 3 red and 5 black balls and second bag contains 6 red and 4 black balls. A ball is drawn from each bag. Find the probability that. **[6]**

i) one is red and other is black

ii) both are red

iii) both are black

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