

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 $1^3+2^3+3^3+\dots+n^3$ 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

