**Total No. of Questions : 4]**

**SEAT No. :** ____

**PC399**

**[6359]-519**

**[Total No. of Pages :2**

# S.E. (Computer Engineering) (Computer Science & Design Engg.)/ (Artificial Intelligence & Data Science Engg.)/ (Computer Science) (Insem)

## DISCRETE MATHEMATICS

## (2019 Pattern) (Semester- III) (210241)

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

***Instructions to the candidates:***

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

***Q1)*** a) By using mathematical induction show that 1+4+7+...+(3n-2)=n(3n-1)/2 for all natural number values of n. **[5]**

b) Explain following terms with example. **[5]**

i) Symmetric difference between set

ii) Union of set

iii) Intersection of set

iv) Subset of a set

v) Power of the set

c) In the survey of 60 people, it was found that 25 read Newsweek magazine, 26 read time, 26 read Fortune. Also 9 read both Newsweek and Fortune, 11 read both Newsweek and Time, 8 read both Time and Fortune and 8 read no magazine at all. **[5]**

i) Find out the total number of people who read all the three magazines

ii) Fill in the correct number in all the regions of the Venn diagram

iii) Determine the number of people who read exactly one magazine

OR

***Q2)*** a) Express the contrapositive, converse and inverse form of conditional statement given below:

"If x is rational, then x is real" **[5]**

***P.T.O.***

b) Let p be "Mark is Rich" and q be "Mark is happy" write each of following in symbolic form **[5]**

i) Mark is poor but happy

ii) Mark is neither rich nor happy

iii) Mark is either rich or happy

iv) Mark is Rich and not happy

c) Explain terms Tautology and Contradiction in truth table with an example **[5]**

***Q3)*** a) Let f(x)=x+2, g(x)=x-2, h(x)=3x find gof, fog, fof, gog, foh. **[5]**

b) For each of these relations on Set A={1,2,3,4} decide whether it is reflexive, symmetric, transitive or anti-symmetric (one relation may satisfy more than one properties) **[5]**

R1={(1,1), (2,2), (3,3), (4,4)}

R2={(1,1), (1,2), (2,2), (2,1), (3,3), (4,4)}

R3={(1,3), (1,4), (2,3), (2,4), (3,1), (3,4)}

c) Draw a hasse diagram for (S, ≤) where S={1,2,3,4,5,6} ≤ is defined as a ≤ b if a divides b, i.e. b is an integer multiple of a. **[5]**

OR

***Q4)*** a) Let A={1,2,3,4) and R={(1,2),(2,1),(2,3),(3,4)} Find transitive closure of relation R using Warshall's algorithm. **[5]**

b) What is Equivalence relation? Explain properties of binary relations. **[5]**

c) Explain the various types of functions. **[5]**