Total No. of Questions : 3]

SEAT No. :

PA-997

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[5902]-14
F.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC-112 : Discrete Mathematics
(2019 Pattern) (Semester - I) (Paper-II)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Use of single memory, non programmable scientific calculator is allowed.*

Q1) Attempt any fIve of the following. **[10]**

a) In how many ways can the letters in the word 'MIRROR' be arranged?

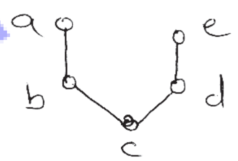
b) Find the terms a_3 and a_5 of the sequence (a_n) if the recurrence relation for (a_n) is $a_n = a_{n-1} + a_{n-2}$, $n \geq 3$ with initial condition $a_1 = 1$, $a_2 = 1$.

c) Draw the digraph for the relation R = {(1, 2), (2, 2), (2, 1), (3, 4), (4, 3)} on the set X = {1, 2, 3, 4}

d) State the converse and contrapositive of the following implication.

'If it snows today, I will ski tomorrow'.

e) Is the following Hasse diagram a lattice? Justify.



f) State pigeonhole principle.

g) Translate the following into symbolic form

i) There exists a natural number x such that "$x^2 + 1 = 0$".

ii) All rationals are real numbers.

P.T.O.

Q2) Attempt any three of the following. **[15]**

a) Show that in a Boolean algebra every element x has unique complement $\overline{x}$ such that.

$x \vee \overline{x} = 1$ and $x \wedge \overline{x} = 0$.

b) How many 4 digit numbers whose digits are taken from the set S = {1, 2, 3, 4, 5} (without repetition) are there? How many of them are divisible by 5?

c) Find disjunctive normal form for the function $F(x, y, z) = (x \vee y) \wedge \overline{z}$

d) Solve the recurrance relation given below. $a_n - a_{n-1} - 2a_{n-2} = 0$.

e) Verify whether the following statements are tautology, contradiction or neither. $(p \wedge q) \wedge \sim p$.

Q3) Attempt any one of the following. **[10]**

a) How many integers between 1 and 1000 are divisible by

i) 2 or 3 or 5

ii) 2 and 3 but not 5.

b) Find transitive closure of relation $R = \{(a, b), (b, a), (b, c), (c, d)\}$ Also draw digraph of transitive closure of R.

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