Progressive Education Society's

Modern college of Arts, Science & Commerce,Ganeshkhind,
Pune 16, NEP 2020 (Autonomous)
End Semester Examination Oct-Nov 2024

Total No. Of Questions:3/15 *Total No. of Pages:2*

F.Y.B.Sc.(Computer Science)
24CMAT11101 Discrete Mathematics
(Semester I)

Program: **Credits: 2**
Program(Specific): Mathematics **Time: 2 Hours**
Course Type: Major **Max. Marks: 30**
Paper No:24CMAT11101 **SET: A**

Instructions To the Candidates:
1. All Questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw a well labelled diagram wherever necessary.

Q.1) Attempt any **FIVE** of the following. $[5 \times 2 = 10]$

a) Write converse and inverse of the following statement.
'If I win the lottery then I will be a millionaire'

b) Draw the digraph for the following relation R defined on $A = \{1, 2, 3, 4\}$
$R = \{ (1, 2),\ (2, 2),\ (2, 3),\ (2, 4),\ (4, 3),\ (4, 2) \}$

c) If the recurrence relation for $\{a_n\}$ is defined by
$a_n = a_{n-1} + 2a_{n-2},\ \ a_0 = 0,\ a_1 = 1$, the find $a_2,\ a_3$.

d) Write the following statement using quantifier and hence find its negation.
"Every student in the class is a good programmer."

e) Define relation R on set of integers as " xRy if and only if $x - y$ is even."
Check whether R is reflexive and transitive.

f) State inclusion exclusion principle for 3 sets.

g) How many license plates can be made by using two alphabets followed by four digits?

Q.2) Attempt any **THREE** of the following. $[3 \times 4 = 12]$

a) Find disjunctive normal form of the function $f : B^3 \to B$ defined by $f(x, y, z) = (x \vee z) \wedge \overline{y}$

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b) Draw Hasse diagram for the lattice D_{20} with divides relation. Is it complemented? Justify.

c) Solve the following homogeneous recurrence relation.
$a_r - 2a_{r-1} - 3a_{r-2} = 0,\ a_0 = 1,\ a_1 = 11$

d) If p(x): $x + 1 > 2x$ .If universe of discourse is set
$S = \{0, 1, 2, 3, 4, 5\}$. Determine the truth value of each of the following.

i) $p(0)$

ii) $\exists x,\ \ p(x)$

iii) $\forall x,\ p(x)$

iv) $\forall x, \sim\ (p(x))$

e) How many ways are there to arrange the letters in 'MATHEMATICS'. In how many of these arrangements include C and E adjacent?

Q.3) Attempt any **ONE** of the following. $[1 \times 8 = 8]$

a) Find the transitive closure of the following relation on $A = \{1, 2, 3, 4\}$ using Warshall's algorithm
$R = \{(1, 2), (1, 4), (2, 1), (2, 3), (3, 3), (4, 4)\}$

b) i) Find particular solution of the following recurrence relation
$a_n - 5a_{n-1} + 6a_{n-2} = 2 + 3n$

ii) There are 5 men and 4 women. Determine number of ways of selecting committee consisting of:

1) 4 people with 2 men and 2 women

2) 4 people with at least 2 men

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