R19

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
MCA I Year I Semester Supplementary Examinations November-2020
DISCRETE MATHEMATICS

Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** Define tautology and contradiction with examples. **6M**

   b Show that $S \vee R$ is a tautologically implied by $(P \vee Q) \wedge (P \to R) \wedge (Q \to S)$ **6M**

OR

2 **a** Show that $P \to Q, P \to R, Q \to \neg R, P$ are inconsistent **6M**

   b Show that $\forall x (P(x) \to Q(x)) \wedge \forall x (Q(x) \to R(x)) \Rightarrow \forall x (P(x) \to R(x))$. **6M**

UNIT-II

3 Suppose that the white tiger population of Orissa forest is 30 at time n=0 and 32 at time **12M**
n=1 the increase from time (n-1) to time n is twice the increase from time (n-2) to time
(n-1), find the tiger population at time n, hence find the tiger population when n=6.

OR

4 Solve $a_n - 4 a_{n-1} + 4a_{n-2} = (n+1)^2$ given $a_0 = 0$, $a_1 = 1$. **12M**

UNIT-III

5 **a** Let $*$ on R defined by $a*b = a+b+2ab$ $\forall a,b \in R.$ **6M**

        (i)   Find $(R,*)$ is semigroup.

        (ii)   Find the identity element.

        (iii)   Which elements have inverse and what are they?

   b Define abelian group, cyclic group? **6M**

OR

6 State and prove the fundamental theorem on homomorphism of groups. **12M**

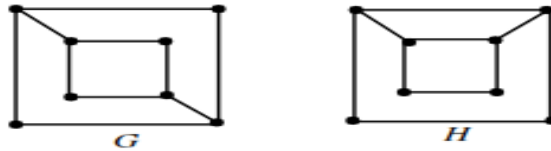### UNIT-IV

7 **a** Show that the maximum number of edges in a simple graph with n vertices is **6M**
   n (n-1) / 2

   b Explain graph coloring and chromatic number with suitable example **6M**

OR

8 **a** Draw the graph represented by given Adjacency matrix   **6M**

$$\text{(i)} \begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix} \qquad \text{(ii)} \begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$$

   b Determine whether the graphs G and H given below are isomorphic.   **6M**

G   H

UNIT-V

9 **a** Write the Properties of Trees   **6M**
   b Give all the spanning trees of k_4 **6M**

OR

10 **a** Prove that for any positive integer n, if G is a connected graph with n vertices and n-   **6M**
        1 edges, then G is a tree
   b Suppose a tree has n_1 vertices of degree 1, 2 vertices of degree 2, 4 vertices of   **6M**
        degree 3, and three vertices of degree 4, find n_1.

*** END ***