Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Regular Examinations October-2020
DISCRETE MATHEMATICS
(Common to CSE, CSIT)

Time: 3 hours   Max. Marks: 60

PART-A
(Answer all the Questions **5 x 2 = 10** Marks)

1   a   Write the following statement in symbolic form, If either Jerry takes calculus or Ken takes sociology, then Larry will take English.   **2M**
    b   Define Poset and Hasse diagram with an example.   **2M**
    c   Find the coefficient of $x^3 y^4$ in the expansion of $(x + y)^7$.   **2M**
    d   Find the generating function for the sequence 1, 2, 3, 4…   **2M**
    e   Define Spanning Tree with an example.   **2M**

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2   a   Obtain the PCNF of the statement $A = (p \wedge q) \vee (\sim p \wedge q) \vee (q \wedge r)$ by constructing PDNF.   **5M**
    b   Prove that $(\forall x)(P(x) \vee Q(x)) \Rightarrow (\forall x)P(x) \vee (\exists x)Q(x)$ using indirect method of predicate calculus.   **5M**

OR

3   a   Show that the following set of premises is inconsistent.
        $(P \rightarrow Q), (P \rightarrow R), (Q \rightarrow\sim R), P$.   **5M**
    b   Show that $(P \vee Q) \rightarrow R \equiv (P \rightarrow R) \wedge (Q \rightarrow R)$.   **5M**

UNIT-II

4   a   Show that the set $A = \{1, 2, 3, 4, 5\}$ is not a group under addition and multiplication modulo 6.   **5M**
    b   Let $f, g : R \rightarrow R$ be defined by $f(x) = 2x + 1$ and $g(x) = 3x$. Is f and g are bijective functions? if so find f^{-1} and g^{-1}.   **5M**

OR

5   a   Let $A = \{1, 2, 3, 4, 5, 6, 7\}$ determine a relation R on A by $aRb \Leftrightarrow 3\ divides\ (a - b)$ then show that R is an equivalence relation.   **5M**
    b   On the set Q of all rational numbers, the operation * is defined by $a*b = a + b - ab$. Show that this operation on Q forms a commutative monoid.   **5M**

UNIT-III

6   a   Show that if 8 people are in a room, at least two of them have birthdays that occur on the same day of the week.   **5M**
    b   How many permutations can be formed out of the letters of word "SUNDAY"? How many of these (i). Begin with S? (ii). End with Y? (iii). Begin with S & end with Y? (iv). S and Y always together?   **5M**

OR

7   a   Out of 9 girls and 15 boys how many different committees can be formed each consisting of 6 boys and 4 girls?   **5M**
    b   Enumerate the number of non negative integral solutions to the inequality $x_1 + x_2 + x_3 + x_4 + x_5 \leq 19$.   **5M**

UNIT-IV

8 **a** Solve the recurrence relation using generating functions $a_n - 9a_{n-1} + 20a_{n-2} = 0$ for $n \geq 2$ and $a_0 = -3, a_1 = -10$. **5M**

b Solve $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$ given $a_0 = 0, a_1 = 1$. **5M**
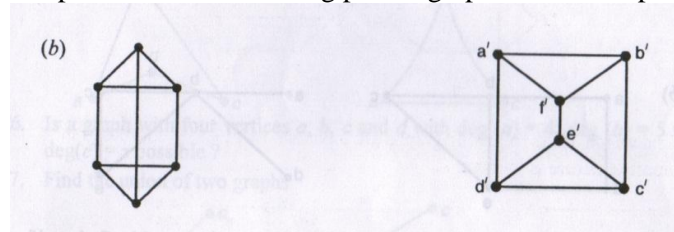
OR

9 **a** Solve the equation $a_n = 3a_{n-1} - a_{n-2}$ subject to the conditions $a_1 = -2, a_2 = 4$. **5M**

b Solve the equation $y_{n+2} - y_{n+1} - 2y_n = n^2$. **5M**

UNIT-V

10 **a** Explain Depth- First-Search Algorithm with an example. **5M**

b What is graph isomorphism? Is the following pair of graphs are isomorphic? **5M**

OR

11 **a** Define Hamiltonian and Euler circuits. Give an example of a graph, which is Hamiltonian, but not Eulerian and vice versa. **5M**

b Let G be a 4 – Regular connected planar graph having 16 edges. Find the number of regions of G. **5M**

END