Q.P. Code: 19HS0836 **R19**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July-2021

DISCRETE MATHEMATICS

(Common to CSE & CSIT)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Obtain the PCNF and PDNF of $(\neg P \to R) \wedge (Q \leftrightarrow R)$.	L1	**6M**
	b	Verify that S is a valid conclusion from the premises $P \to Q$, $P \to R$, $\neg(Q \wedge R)$ and $S \vee P$.	L4	**6M**

OR

2	**a**	Prove that $(\forall x)(P(x) \vee Q(x)) \Rightarrow (\forall x)(P(x)) \vee (\exists x)(Q(x))$ using indirect method.	L4	**6M**
	b	Show that $(P \to Q) \wedge (Q \to R) \Rightarrow (P \to Q)$	L4	**6M**

UNIT-II

3	**a**	If $f, g : R \to R$ be defined by $f(x) = 2x+1,\ g(x) = \frac{x}{3}$, then verify that $(g \circ f)^{-1}(x) = f^{-1} \circ g^{-1}(x)$.	L3	**6M**
	b	Prove that the set of all integers Z is an abelian group with the operation * defined by $a * b = a + b + 1,\ \forall a, b \in Z$.	L4	**6M**

OR

4	**a**	Let P(A) be a power set of A. Construct the Hasse diagram for $(P(A), \subseteq)$, where (i) $A = \{a,b,c\}$ (ii) $A = \{a,b,c,d\}$.	L3	**6M**
	b	Define homomorphism. Let $(G, \bullet)$ be a group, if $f : G \to G$ is given by $f(a) = a^2, \forall a \in G$ is homomorphism then prove that G is an abelian group.	L4	**6M**

UNIT-III

5	**a**	Find the coefficient of (i) $x^3y^2z^2$ in $(2x - y + z)^7$ and (i) x^3y^7 in $(x - 3y)^{10}$.	L1	**6M**
	b	Find how many integers between 1 and 60 that are divisible by 2 nor by 3 and nor by 5. Also determine the number of integers divisible by 5 not by 2, not by 3.	L1	**6M**

OR

6	**a**	Enumerate the number of non negative integral solutions to the inequality $x_1 + x_2 + x_3 + x_4 + x_5 \le 19$.	L1	**6M**
	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 &Y always together.	L1	**6M**

UNIT-IV

7 **a** Solve the recurrence relation using generating functions $a_n - 9a_{n-1} + 20a_{n-2} = 0, n \geq 2$ and $a_0 = -3, a_1 = -10$. L6 **6M**

b Solve $y_{n+2} - y_{n+1} - 2y_n = n^2$. L6 **6M**

OR

8 **a** Solve $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$, such that $a_0 = 0, a_1 = 1$. L6 **6M**

b Solve the recurrence relation $a_{n+2} - 2a_{n+1} + a_n = 2^n$ with the initial conditions $a_0 = 2, a_1 = 1$. L6 **6M**

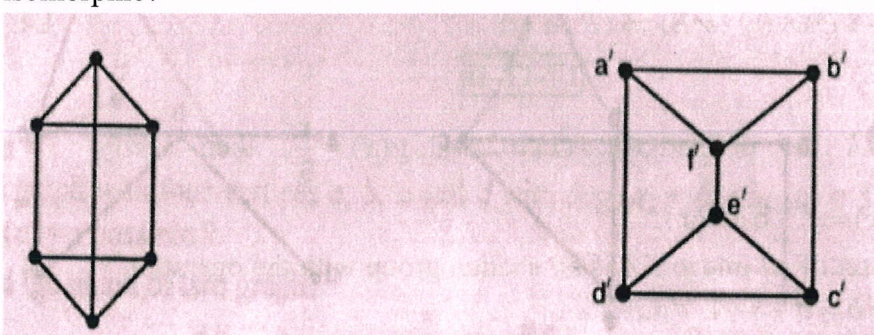
UNIT-V

9 **a** Suppose a graph has vertices of degree 0, 2, 2, 3 and 9. How many edges does the graph have? L1 **6M**

b Define Spanning tree and explain the algorithm for Breadth First Search (BFS) traversal of a graph with suitable example. L1 **6M**

OR

10 **a** Define graph isomorphism. Prove or disprove the following two graphs are isomorphic? L4 **6M**



b Let G be a 4 – Regular connected planar graph having 16 edges. Find the number of regions of G. L1 **6M**

*** END ***