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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations February-2022

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	Show that $S \vee R$ is tautologically implied by $(P \vee Q) \wedge (P \to R) \wedge (Q \to S)$.	L4	6M
	b	Obtain PCNF of $(P \wedge Q) \vee (\neg P \wedge Q) \vee (Q \wedge R)$ by constructing the PDNF.	L1	6M
		OR		
2	a	Show that $(x)(P(x) \to Q(x)) \wedge (x)(Q(x) \to R(x)) \Rightarrow (x)(P(x) \to R(x))$	L4	6M
	b	Verify that the premises $(P \to Q), (P \to R), (Q \to \neg R)$, P are inconsistent.	L4	6M

UNIT-II

3	a	If $f, g, h : R \to R$ be defined by $f(x) = x^3 - 4x$, $g(x) = \dfrac{1}{1+x^2}$, $h(x) = x^4$, then determine (i) $(f \circ g \circ h)(x)$ and (ii) $(g \circ f \circ h)(x)$.	L1	6M
	b	Show that the set of all positive rational numbers forms an abelian group under the composition defined by $a * b = \dfrac{ab}{2}, \forall a, b \in Z$	L4	6M
		OR		
4	a	Define a binary relation with an example. Let R be the relation from the set $A = \{1,2,3,4\}$ to itself and defined as $R = \{(1,1),(1,3),(3,3),(4,4)\}$. Find the matrix representation of R and draw the graph of R.	L1	6M
	b	Verify that $S = \{1,2,3,4,5\}$ is a group under addition & multiplication modulo 6.	L4	6M

UNIT-III

5	a	Consider a set of integers from 1 to 250. Find how many of these numbers are divisible by 3 or 5 or 7. Also indicate how many are divisible by 3 or 7 but not by 5 and divisible by 3 or 5.	L1	6M
	b	Out of 80 students in a class, 60 play foot ball, 53 play hockey and 35 both the games. How many students (i) do not play of these games? (ii) Play only hockey but not foot ball.	L1	6M
		OR		
6	a	How many integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where (i) $x_i \geq 2, i = 1,2,3,4,5$ (ii) $x_i > 2, i = 1,2,3,4,5$.	L1	6M
	b	Applying pigeon hole principle show that if any 14 integers are selected from the set S = {1, 2, 3… 25 } there are at least two whose sum is 26. Also write a statement that generalizes this result.	L3	6M

UNIT-IV

7	a	Solve $a_n = 3a_{n-1} - a_{n-2}, n > 2$ with the conditions $a_1 = -2, a_2 = 4$.	L6	6M
	b	Use generating functions to solve $a_n - 5a_{n-1} + 6a_{n-2} = 2^n, n > 2$ with the initial conditions $a_0 = a_1 = 1$.	L6	6M

OR

8	a	Solve $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$.	L6	6M
	b	Solve $a_n = a_{n-1} + 2a_{n-2}, n > 2$ with initial conditions $a_0 = 2, a_1 = 1$.	L6	6M

UNIT-V

9	a	Explain In degree and out degree of graph. Also explain about the adjacency matrix representation of graphs. Illustrate with an example.	L2	6M
	b	Define Eulerian circuit and Hamiltonian circuit. Give an example of a graph that Hamiltonian circuit but not Eulerian circuit.	L1	6M

OR

10	a	Define Spanning tree and explain the algorithm for Depth First Search (DFS) traversal of a graph with suitable example.	L1	6M
	b	Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$	L4	6M

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