O.P.Code: 20HS0836	R20	H.T.No.										

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular & Supplementary Examinations June-2024

DISCRETE MATHEMATICS

(Common to CSE, CSIT, CIC, CCC, CAD, CSM & CAI)

Time: 3 Hours **Max. Marks: 60**

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

UNIT-I

1	a	Define planar graph and Hamiltonian graph with examples.	CO1	L2	6M
	b	Let G be a 4 – Regular connected planar graph having 16 edges. Find the number of regions of G.	CO1	L3	6M
		OR			
2		Explain Depth- First-Search, Breadth-First-Search Algorithm.	CO1	L2	12M

UNIT-II

3	a	Construct the truth table to Show that $\neg P \wedge (Q \wedge P)$ is a contradiction.	CO2	L3	6M
	b	Show that $(P \to Q) \to Q) \Rightarrow P \vee Q$ without constructing truth table	CO2	L2	6M
		OR			
4	a	Obtain PCNF of $A = (p \wedge q) \vee (\neg p \wedge q) \vee (q \wedge r)$ by constructing PDNF	CO2	L5	6M
	b	Show that $(\forall x)(P(x) \to Q(x)) \wedge (\forall x)(Q(x) \to R(x)) \Rightarrow (\forall x)(P(x) \to R(x))$	CO2	L2	6M

UNIT-III

5	a	Let $f: A \to B$, $g: B \to C$, $h: C \to D$ then show that $ho(gof) = (hog)of$	CO3	L2	6M
	b	Let A={1,2,3,4,,5,6,7}, Determine a relation R on A by $aRb \Leftrightarrow 3\ divides(a-b)$, show that R is an equivalence relation.	CO3	L2	6M
		OR			
6	a	Show that the necessary and sufficient condition for a non – empty subset H of a group (G, *) to be a subgroup is $a \in H, b \in H \Rightarrow a * b^{-1} \in H$	CO4	L2	6M
	b	Show that the set of all positive rational numbers forms an abelian group under the composition defined by a*b = (ab) / 2	CO4	L2	6M

UNIT-IV

7	a	The question paper of mathematics contains two questions divided into two groups of 5 questions each. In how many ways can an examinee answer six questions taking at least two questions from each group.	CO5	L3	6M

	b	How many integral solutions are there to $x_1+x_2+x_3+x_4+x_5=20$ where each (i) $x_i \geq 2$ (ii) $x_i > 2$	**CO5**	**L3**	**6M**

OR

8	**a**	A Survey among 100 students shows that of the three ice cream flavours vanilla, chocolate, and straw berry.50 students like vanilla,43 like chocolate,28 like straw berry,13 like vanilla and chocolate 11 like chocolate and straw berry,12 like straw berry and vanilla and 5 like all of them. Find the number of students who like i) Chocolate but not straw berry ii) Chocolate and straw berry but not vanilla iii) Vanilla or chocolate but not straw berry	**CO5**	**L3**	**6M**
	b	Applying pigeon hole principle show that of 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.	**CO5**	**L2**	**6M**

UNIT-V

9	**a**	Solve $a_n = a_{n-1} + 2a_{n-2}, n \geq 2$ with the initial conditions $a_0 = 0, a_1 = 1$	**CO6**	**L3**	**6M**
	b	Solve the Recurrence Relation $a_{n+2} - 2a_{n+1} + a_n = 2^n$ with initial conditions $a_0 = 2, a_1 = 1$	**CO6**	**L3**	**6M**

OR

10	**a**	Solve $a_n - 5a_{n-1} + 6a_{n-2} = 2^n$, $n \geq 2$ with the initial conditions $a_0 = 1, a_1 = 1$ using generating functions.	**CO6**	**L3**	**6M**
	b	Solve $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$	**CO6**	**L3**	**6M**

*** **END** ***