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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Regular Examinations February-2025

DISCRETE MATHEMATICS & GRAPH THEORY

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

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Construct a tuth table for $p \wedge (q \vee \neg q)$.	CO1	L3	2M
	b	Translate the statement in symbolic form "Some rationals are not reals''.	CO1	L2	2M
	c	State Pigeon hole principle.	CO2	L1	2M
	d	Define Monoid with example.	CO2	L1	2M
	e	State Binomial theorem.	CO3	L1	2M
	f	Define permutation with example.	CO3	L1	2M
	g	Find the coefficient of x^3 in $(1-2x)^7$.	CO5	L3	2M
	h	Solve $a_n - a_{n-1} - 2\,a_{n-2} = 0$.	CO5	L3	2M
	i	Define Bipartite graph with example.	CO6	L1	2M
	j	State Euler formulae for plannar graph.	CO6	L1	2M

PART-B

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

UNIT-I

2	a	What is Principal disjunctive normal form? Obtain the Principal disjunctive normal form of $\neg(p \rightarrow (q \wedge r))$.	CO1	L1	5M
	b	Prove that $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a tautology.	CO1	L1	5M

OR

3	a	Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises. $P \vee Q, Q \rightarrow R, P \rightarrow M$ *and* $\sim M$.	CO1	L2	5M
	b	Show that $(\exists x)M(x)$ follows logically from the premises $(\forall x)H(x) \rightarrow M(x)$ *and* $(\exists x)H(x)$.	CO1	L2	5M

UNIT-II

4	a	Define Lattices and write the properties of Lattices.	CO2	L1	5M
	b	If A = {1,2,3,5,30} and R is the divisibility relation, prove that (A, R) is a Latticesbut not a distributive Lattices.	CO2	L3	5M

OR

5	a	Prove that the set Z of all integers with the binary operation $*$, defined as $(a * b) = a + b + 1, \forall a, b \in Z$ is an abelian group.	CO2	L3	5M
	b	Show that the set $G = \{1, 2, 3, 4, 5, 6\}$ forms a finite abelian group with respect to the multiplication modulo 7.	CO2	L2	5M

UNIT-III

6	a	How many different license plates are there that involve 1,2 or 3 letters followed by 4 digits ?	CO3	L2	5M
	b	Find the number of arrangements of the letters in the word STATISTICS.	CO3	L3	5M

OR

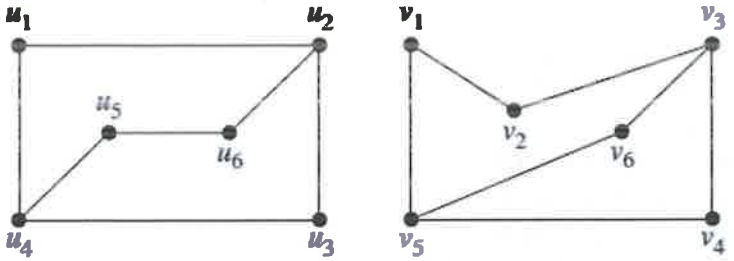
7	a	Enumerate the number of non-negative integral solutions to the inequality $x_1 + x_2 + x_3 + x_4 \leq 19$.	CO3	L1	6M
	b	Find the co-efficient of $x^2 y^4$ *in* $(x - 2y)^6$.	CO4	L3	4M

UNIT-IV

8	a	Solve $a_n = a_{n-1} + 2a_{n-2}$, for n $\geq$ 2 with the initial conditions $a_0 = 1$ and $a_1 = 1$.	CO5	L3	5M
	b	Find an explicit formula for the Fibonacci numbers.	CO5	L3	5M
		OR			
9		Solve $a_n - 5a_{n-1} + 6a_{n-2} = 2^n$, n $\geq$ 2 with the initial conditions $a_0 = 1$ and $a_1 = 1$. Using generating functions.	CO5	L3	10M

UNIT-V

10	a	Show that the two graphs shown below are isomorphic ?	CO6	L2	5M



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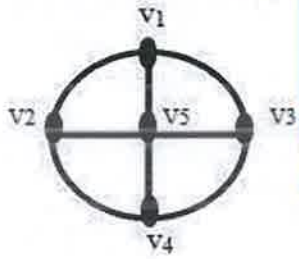
	b	Show that in any graph the number of odd degree vertices is even.	CO6	L2	5M
		OR			
11	a	Define planar graph and Hamiltonian graph with examples	CO6	L1	5M
	b	Find the number of vertices, number of edges and the number of regions for the following graph and verify the Euler"s formula	CO6	L3	5M



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