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

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

B.Tech II Year II Semester Regular & Supplementary Examinations August-2023

DISCRETE MATHEMATICS

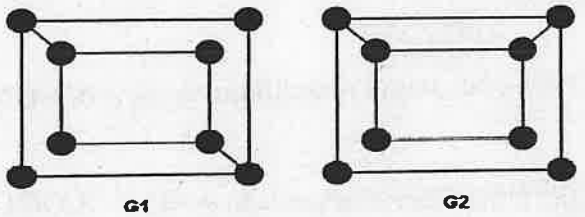
(Commmon to CSE, CSIT, CIC,CCC, CAD & CSM)

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

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

UNIT-I

1	a	Give an example of a graph that has neither an Eulerian circuit nor a Hamiltonian cycle.	CO1	L1	6M
	b	Show that the givenfigures G1 and G2 are not isomorphic.	CO1	L2	6M



OR

2		Explain Depth- First-Search, Breadth-First-Search Algorithm.	CO1	L2	12M

UNIT-II

3	a	Explain principle disjunctive normal form? Obtain the PDNF of $P \to ((P \to Q) \wedge \neg(\neg Q \vee \neg P))$	CO2	L5	6M
	b	Explain principle conjunctive normal form? Obtain the PCNF of $(\neg P \to R) \wedge (Q \leftrightarrow P)$	CO2	L5	6M

OR

4	a	Show that $\sim P$ is a valid conclusion from the premises $\sim(P \wedge \sim Q)$, $\sim Q \vee R$, $\sim R$	CO2	L2	6M
	b	Show that $(\exists x)\, M(x)$ follows logically from the premises $(\forall x)(H(x) \to M(x))$ and $(\exists x)H(x)$.	CO2	L2	6M

UNIT-III

5		Let A be a given finite set and P(A) its power set . let $\subseteq$ be the inclusion relation on the elements of P(A).Draw the Hasse diagram of (P(A) , $\subseteq$) for i) A = { a } ii) A ={ a ,b} iii) A = { a,b,c } iv) A = { a,b,c,d }.	CO3	L2	12M

OR

6	a	On the set Q of all rational number operation * is defined by $a*b = a+b-ab$,Show that this operation Q forms a commutative monoid.	CO4	L2	6M
	b	Show that the set{1,2,3,4,5} is not a group under addition and multiplication modulo 6.	CO4	L2	6M

UNIT-IV

7	a	Enumerate the number of non- negative integral solutions to the inequality $x_1 + x_2 + x_3 + x_4 + x_5 \leq 19$.	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	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
	b	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.	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 $a_{n+2} - 5a_{n+1} + 6a_n = 2$ with the initial conditions $a_0 = 1, a_1 = -1$	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 $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$ given $a_0 = 0, a_1 = 1$	CO6	L3	6M

*** END ***