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

B.Tech. II Year I Semester Regular & Supplementary Examinations November-2025
DISCRETE MATHEMATICS & GRAPH THEORY
(Common to CSIT, CSE, CIC, CCC, CIA, CAI, CSM, CAD)

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

PART-A
(Answer all the Questions $10 \times 2 = 20$ Marks)

1	a	Construct a truth table for $p \wedge (\neg q \wedge q)$.	CO1	L2	2M
	b	Define Duality law.	CO1	L1	2M
	c	State Pigeon hole principle.	CO2	L1	2M
	d	What is the Subgroup of a Group.	CO2	L1	2M
	e	Define combination with example.	CO3	L1	2M
	f	State Binomial theorem.	CO3	L1	2M
	g	Find the sequence for the function $\frac{1}{1-ax}$	CO4	L2	2M
	h	Solve $a_n - a_{n-1} - 2a_{n-2} = 0$	CO4	L2	2M
	i	Define Bipartite graph with example.	CO5	L1	2M
	j	State Euler formulae for plannar graph.	CO5	L1	2M

PART-B
(Answer all Five Units $5 \times 10 = 50$ Marks)

UNIT-I

2	a	Define converse, inverse contra positive with an example.	CO1	L1	5M
	b	What is Principal disjunctive normal form? Obtain the Principal disjunctive normal form of $\neg(p \rightarrow (q \wedge r))$	CO1	L2	5M

OR

3	a	Define NAND & NOR and give their truth tables.	CO1	L1	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	Find how many integers between 1 and 60 that are divisible by 2 not by 3 and not by 5. Also determine the number of integers divisible by 5 not by 2, not by 3.	CO2	L2	5M
	b	Define Lattices and write the properties of Lattices.	CO2	L1	5M

OR

5	a	Show that the set of all roots of the equation $x^4 = 1$ forms a group under multiplication.	CO2	L2	5M
	b	On the set Q of all rational numbers, operation * is defined by $a * b = a + b - ab$, Show that this operation Q forms a commutative monoid.	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	Out of 5 men and 2 women, a committee of 3 is to be formed. In how many ways can it be formed if at least one woman is to be included?	CO3	L2	5M

OR

7	a	Find how many solutions are there for $x_1 + x_2 + x_3 = 17$, subject to the constraints $x_1 > 1, x_2 > 2, x_3 > 3$	CO3	L2	5M
	b	Find the co-efficient of (i) $x^3 y^7$ in $(x + y)^{10}$ (ii) $x^2 y^4$ in $(x - 2y)^6$	CO3	L2	5M

UNIT-IV

8   a   Find the sequence generated by the following generating functions   CO4   L2   6M

$(i)(2x-3)^3$ $(ii)\dfrac{x^4}{1-x}$

    b   Solve $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$ CO4   L2   4M

OR

9   Solve $a_n - 9a_{n-1} + 20a_{n-2} = 0, n \geq 2 \; with \; a_0 = -3, a_1 = -10,$ CO4   L2   10M
using generating function.

UNIT-V

10   a   Define isomorphism. Explain Isomorphism of graphs with a suitable   CO5   L2   5M
example.

     b   Give an example of a graph that has neither an Eulerian circuit nor a   CO5   L2   5M
Hamiltonian cycle.

OR

11   a   Define K-regular graph and draw 3-regular and 4-regular graph.   CO5   L2   5M

     b   Explain about complete bipartite graph and complete binary tree with   CO5   L2   5M
example.

*** END ***