QP Code:RD22BTECH039 | Reg. No | | | | | | | | | | | AY 21 / AY 22

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Third Semester) Examinations, December – 2023

21BCSBS23001 / 22BCSBS23001 - Discrete Mathematics

(CSE)

Time: 3 hrs | Maximum: 70 Marks

Answer all questions

(The figures in the right hand margin indicate marks)

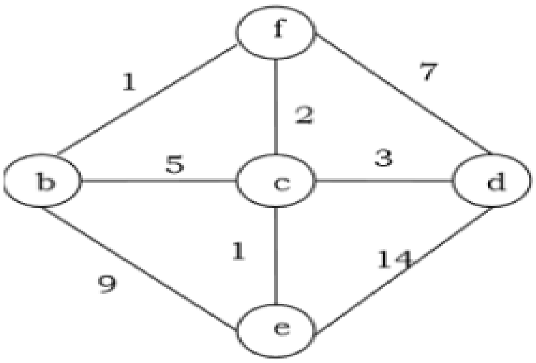
PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Write the converse, inverse, and contrapositive of each of the following implication. "If x and y are numbers such that x = y , then $x^2 = y^2$".	CO1	K2
b. Determine the truth value of each of the statement "If 6 + 2 = 5 , then the milk is white".	CO1	K1
c. Find the coefficient of x^{10} in the expansion of $\frac{1}{(1-2x)}$	CO2	K1
d. Show that the intersection of two normal subgroups is normal.	CO3	K1
e. The planner representation of a simple graph with 20 vertices split the plane in to 12 regions then how many edges it has?	CO4	K2

PART – B **(15 x 4 = 60 Marks)**

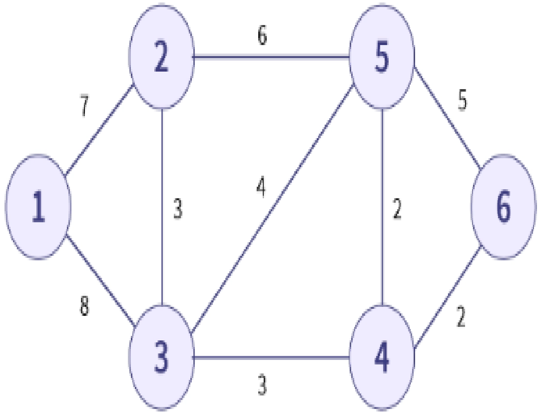
<u>Answer ***ALL*** questions</u>	Marks	CO #	Blooms Level
2. a. Construct the truth table of $((p \to q) \to r) \to s$.	7	CO1	K2
b. Use the Principle of Mathematical Induction to verify that, for n any positive integer, $6^n - 1$ is divisible by 5.	8	CO1	K2
(OR)			
c. Translate each of these statements into logical expressions using predicates, quantifiers and logical connectives. a) No one is perfect. b) Not everyone is perfect. c) All your friends are perfect. d) At least one of your friends is perfect. e) Not everybody is your friend or someone is not perfect.	7	CO1	K2
d. Show that $(p \lor q) \land (\neg p \lor r) \to (q \lor r)$ is a tautology.	8	CO1	K2
3.a. Find all solutions of the recurrence relation $a_n = 4a_{n-1} - 4a_{n-2}$.+(n+1)$2^n$	10	CO2	K2
b Find all the solutions of $a_n = 3a_{n-1} + 10a_{n-2} + 7.5^n$	5	CO2	K2
(OR)			
c. Use generating function to solve the recurrence relation $a_k = 5a_{k-1} - 6a_{k-2}$ *with initial condition* $a_0 = 6$ *and* $a_1 = 30$	8	CO2	K2
d. Find the transitive closure of the relation R = { (a,b),(b,c), (c,a) (c,b)} defined on the set A = {a, b,c}.using Warshall's algorithm.	7	CO2	K2
4.a. Let $(A, \leq)$ be a distributive lattice. show if $a \wedge x = a \wedge y$ and $a \vee x = a \vee y$ for some a then show that $x = y$	8	CO3	K2

b.	Find the Disjunctive normal form for the function $F(x, y, z) = (x + y)\bar{z}$	7	CO3	K2
	(OR)			
c.	Prove that a group (G,*) containing 4 elements is an abelian group.	8	CO3	K2
d.	State and prove Lagrange's theorem of finite groups.	7	CO3	K2
5.a.	Prove that a connected multi-graph with at least two elements has an Euler circuit if and only if each of its vertices has an even degree.	7	CO4	K2
b.	Find minimum spanning tree by using Prims algorithm.	8	CO4	K2



(OR)

c.	Prove that a tree with n vertices has n-1 edges.	5	CO4	K2
d.	Find the minimum spanning tree by using Kruskal's algorithm	10	CO4	K2



--- End of Paper ---