Enroll. No._____

MARWADI UNIVERSITY

Faculty of Technology

[CE-FOT1, IT-FOT1, ICT-FOT1] **[B.TECH]**

SEM:3 **MU FINAL REMEDIAL** **DEC:2022**

Subject: - (DM&GT) (01MA0231) **Date:- 08 /12/2022**

Total Marks:-100 **Time: - 03:00 hours**

Instructions:

1. **All Questions are Compulsory.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Question: 1.

(a) **Choose the correct option for each of the following:** [10]

1. Which of the following statements is/are TRUE for graphs?
   P: Petersen graph is Euler graph.
   Q: Any complete graph (v>=3) is Hamiltonian graph .

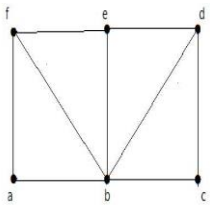
   (a) P only (b) Q only (c) Both P and Q (d) Neither P nor Q

2. Which of the following statement is true?
   (a) A tree with n-1 vertices has n-2 edges.
   (b) A single vertex in graph G is not a sub-graph of G.
   (c) Every graph is not its own sub graph.
   (d) The terminal vertices of a graph are always of degree 2.

3. How many vertex in binary tree has even degree?

   (a) 1 (b) 2 (c) 0 (d)3

4. For the given graph G, Which of the following statement is true?



   (a) it is complete graph (b) it is disconnected graph

   (c) its edge connectivity is three. (d) its vertex connectivity is two

5. A connected planar graph having 6 vertices, 7 edges contains _____ faces.

   (a) 5 (b) 3 (c) 6 (d) 7

6. For the two statement **X** and **Y**, $X \equiv Y$ if
   .
   (a) $Y \rightarrow X$ is tautology (b) $\sim(\sim(Y \leftrightarrow X))$ is tautology.
   (c) $X \rightarrow Y$ is tautology (d) $\sim X \leftrightarrow Y$ is tautology

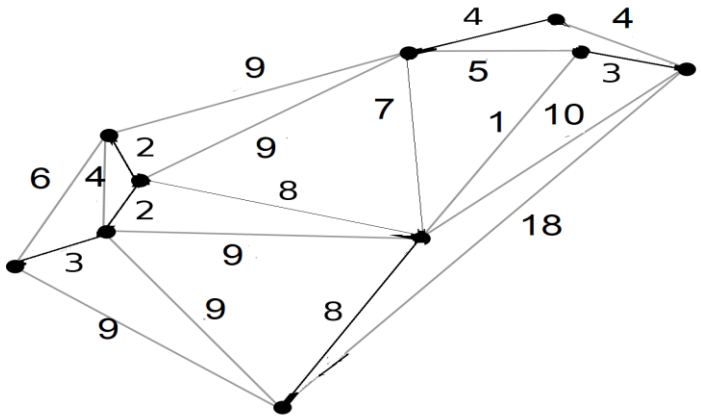
7. Which of the following is a Bounded lattice?
   (a) (N, D) (b) $(R, \leq)$ (c) $(Z, \leq)$ (d) (S_{45}, D)
8. Which of the following is a Chain?
   (a) (N, D) (b) $(N, \leq)$ (c) (S_{20}, D) (d) None of these
9. Relation "is brother of " on the set of all males in universe is
   (a) Reflexive (b) Antisymmetric (c) transitive (d) symmetric
10. The relation $\{(1,1),(3,3),(2,2),(1,2)\}$ for set A={1,2,3} is not ____.
    (a) Reflexive (b) Transitive (c) Symmetric (d) Anti-symmetric

(b) **Answer in brief for each of the following:** [10]

1. Define Degree of vertex.
2. Define Multi graph.
3. Define circuit rank.
4. Define Simple graph.
5. Define Separable graph.
6. Define Disjunction.
7. Define Contingency.
8. Define Upper bound.
9. Define Equivalence relation.
10. Define Boolean algebra.

Question: 2.

(a) Apply Kruskal's algorithm to find minimal spanning tree of following graph. [08]



(b) Prove that (N, GCD, LCM) is lattice as algebraic system [08]

OR

(b) Prove Associative laws using truth table. [08]
(i) $p \wedge (q \wedge r) \equiv (p \wedge q) \wedge r$ (ii) $p \vee (q \vee r) \equiv (p \vee q) \vee r$

Question: 3.

(a) Define tree and Prove that tree has n vertices has n-1 edges [08]

(b) Define the following with example
(i) Euler graph (ii) Hamiltonian graph [04]

(c) Define Adjacency and incidence matrix. Derive both matrix for W_5 [04]

OR

(a) Prove the following theorem. [08]
(1) K_5 is non planar graph

(b) Explain following with example [04]
(i) Edge connectivity (ii) vertex connectivity

(c) Define Adjacency and incidence matrix. Derive both matrix for K_4 [04]

Question: 4.

(a) For a connected planar graph with n vertices and e edges and f is the [08]

Number of faces then prove that n – e + f = 2.

(b) Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$. [08]

OR

(a) Define the following with example [08]
(1) Spanning Tree (2) Binary Tree
(3) Fundamental Cutset (4) Fundamental Circuit

(b) Prove that in a graph the number of the vertices with odd degree is even in quantity. [08]

Question: 5.

(a) Check the validity of the following argument. [06]

$$\begin{array}{l} p \vee q \\ p \rightarrow r \\ \underline{q \rightarrow r} \\ \therefore r \end{array}$$

(b) Check that statement are tautology or not [06]
(1) $(p \vee q) \leftrightarrow (q \rightarrow r)$
(2) $(\sim p \wedge q) \rightarrow p$

(c) Find the value of $\forall x\ p(x)$ and $\exists x\ p(x)$ for the following cases where the domain of discourse is the set of all positive integers [04]

(1) p(x) : $(x+1)$ is an even integer.

(2) p(x) : $x \leq x^2$

OR

(a) Prove the following laws using truth table. [06]

(1) $p \wedge (p \vee q) \equiv p$ (2) $p \vee (p \wedge q) \equiv p$

(b) Derive the truth table of (1) $((p \wedge q) \vee r) \rightarrow (p)$ [06]

(c) Find the value of $\forall x\ p(x)$ and $\exists x\ p(x)$ for the following cases where the domain of discourse is the set of all real numbers [04]

(1) p(x) : $x+1=1$

(2) p(x) : $x^2+2x+5 \leq 5$

Question: 6.

(a) Check whether $(S_{30}, \gcd, \text{lcm})$ is a Boolean algebra or not. [08]

(b) Check whether $< \mathbb{Z}, R >$ is Poset or not where aRb if and only if $a = b^n$ for positive integer n. [04]

(c) Define sub-Boolean algebra. For (S_{70}, gcd, lcm, ‘ , 0, I) ,Check whether set $A = \{1, 7, 10, 70\}$ represents sub-Boolean algebra or not ?. [04]

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OR

(a) Prove that $(P(A), \cap, \cup)$ is a Boolean algebra or not. Where A={a,b,c} [08]

(b) Find the covers of all elements and draw the Hasse diagram of (S_{1001} , D) [04]

(c) For the lattice $(S_{12}, \gcd, lcm)$, draw the Hasse diagram and find join irreducible elements, atoms, meet irreducible elements and anti-atoms. [04]

---Best of Luck-

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Bloom'S Taxonomy Report –

Sub: DMGT
Sem.3
Branch: CE-FOT1 , IT-FOT1 ,ICT-FOT1

Que. Paper weightage as per Bloom's Taxonomy

LEVEL	% of weightage	Question No.	Marks of Que.
Remember/Knowledge	20	Q-1(a),Q-2(a)	20
Understand	40	Q-2 (a),Q-3(a) ,Q-4 (a), Q-6- (a) ,(b)& (c)	40
Apply	10	Q-5 (b) , (c)	10
Analyze	30	Q-2(b) ,Q- 3(b) &(c) , Q-4(b) , Q-5(a)	30
Evaluate			
Higher order Thinking/ Creative			

Chart/Graph of Bloom's Taxonomy