



MARWADI UNIVERSITY

Faculty of Technology

[CE-FOT1, IT-FOT1, ICT-FOT1]

SEM:3

MU FINAL REMEDIAL

[B.TECH]

May:2023

Subject: - (DM&GT) (01MA0231)

Date:- 15 /05/2023

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: Degree of all vertexes in Euler graph is Even

Q: Petersen graph is Euler 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 vertices has $n-3$ edges.(b) A single vertex in graph G is a sub-graph of G .

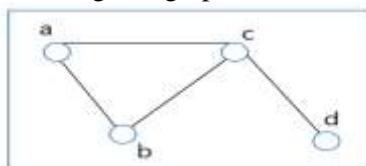
(c) Every graph is not its own sub graph.

(d) The terminal vertices of a graph are always of degree 5.

3. Degree of Pendent vertex is ____?

- (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 One. (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

For the two statement X and Y , $X \equiv Y$ if

- (a) $Y \rightarrow X$ is tautology (b) $(Y \leftrightarrow X)$ is tautology.
- (c) $X \rightarrow Y$ is tautology (d) $X \wedge Y$ is tautology

6. Which of the following is a Bounded lattice?

- (a)
- (N, D)
- (b)
- (R, \leq)
- (c)
- (Z, \leq)
- (d)
- (S_{45}, D)

7. Which of the following is a Tostet?
 (a) (Z, D) (b) (R, \leq) (c) (S_{10}, D) (d) None of these
8. Relation “is father of” on the set of all males in universe is
 (a) Reflexive (b) Antisymmetric (c) transitive (d) symmetric
10. The relation $\{(1,1), (2,1), (1,2)\}$ for set $A=\{1,2,3\}$ is _____.
 (a) Reflexive (b) Transitive (c) Symmetric (d) Anti-symmetric

(b) Answer in brief for each of the following:

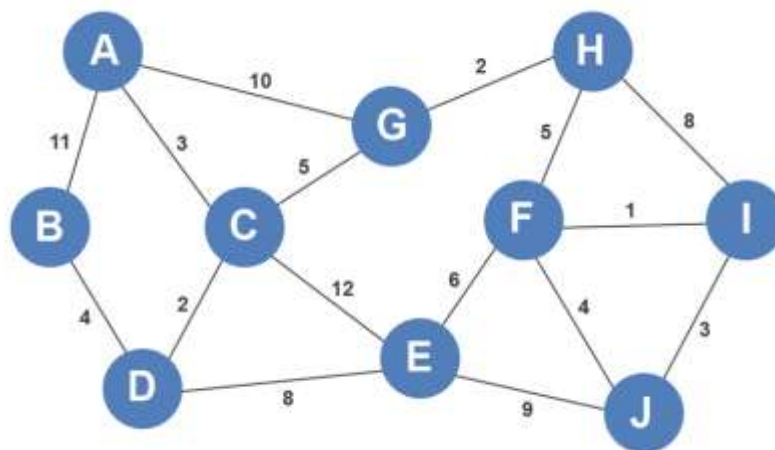
[10]

1. Define Degree of vertex.
2. Define Null graph.
3. What is edge connectivity of K_5 ?
4. Write formula of circuit rank.
5. Define regular graph.
6. What is chromatic number of $K_{3,5}$?
7. What is vertex connectivity of Petersen graph?
8. Define Trivial Graph.
9. Define Simple graph.
10. Define Separable graph.

Question: 2.

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

[08]



(b) Prove that $(N, \text{Min}, \text{Max})$ is lattice as algebraic system

[08]

OR

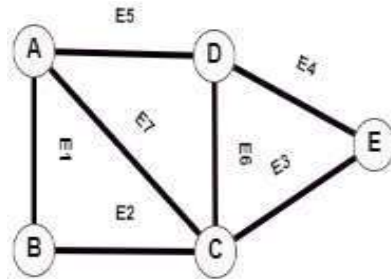
(b) Prove Associative laws using truth table.

[08]

$$(i) \quad p \wedge (q \wedge r) \equiv (p \wedge q) \wedge r \quad (ii) \quad p \vee (q \vee r) \equiv (p \vee q) \vee r$$

Question: 3.

- (a) Define tree and Prove that tree has n vertices has $n-1$ edges [08]
- (b) Define cut-sets and derive six different cut-sets of following graph. [4]



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

OR

- (a) Prove that Kuratowski's First graph is non-planar graph [08]
- (b) Explain following with example [04]
 (i) Edge connectivity (ii) vertex connectivity
- (c) Define Adjacency and incidence matrix. Derive both matrix for W_4 [04]

Question: 4.

- (a) State and Prove Euler's Formula for Planar Graph. [08]
- (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 Spanning tree with Example [08]
- (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]

$$\begin{array}{l} p \vee q \\ p \rightarrow r \\ \hline q \rightarrow r \\ \hline \therefore r \end{array}$$
- (b) Check that statement are tautology or not [06]
 (1) $(p \vee q) \leftrightarrow (q \rightarrow p)$
 (2) $(p \wedge q) \rightarrow r$

(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 odd integer.

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

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) $((p \wedge q) \vee r) \rightarrow (r)$ [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) $p(x) : 2x+1=1$

(2) $p(x) : x^2 + 2x + 5 \leq 100$

Question: 6.

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

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

(c) Define sub-Boolean algebra. For $(S_{70}, \text{gcd}, \text{lcm}, ', 0, 1)$, Check whether set $A = \{1, 7, 35, 70\}$ Represents sub-Boolean algebra or not? [04]

OR

(a) Prove that $(P(A), \cap, \cup)$ is a Boolean algebra or not. Where $A = \{1, 2, 3\}$ [08]

(b) Find the covers of all elements and draw the Hasse diagram of (S_{60}, D) [04]

(c) For the lattice $(S_{18}, \text{gcd}, \text{lcm})$, draw the Hasse diagram and find join irreducible elements, atoms, meet irreducible elements and anti-atoms. [04]

---Best of Luck---

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