



MARWADI UNIVERSITY

Faculty of Engineering

[Computer]

[B.Tech]

SEM: 4

MU FINAL EXAM

May: 2023

Subject: - (DM) (01CE0409)

Date:-09/05/2023

Total Marks:-100

Time: 3 hour

Instructions:

1. All Questions are Compulsory.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Do not write/sign/indication/tick mark anything other than Enroll No. at a specific place on the question paper.

Question: 1.

(a) MCQ [10]

1. Which of the following statements is/are TRUE for graphs?

P: Degree of all vertexes in Euler graph is Odd.

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 .

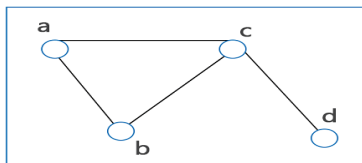
(c) Every graph is not its own sub graph.

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

3. Degree of Pendent vertex is ____?

- (a) 1 (b) 2 (c) 0 (d) 5

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

6. 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) $X \leftrightarrow X$ is tautology

7. Which of the following is a Bounded lattice?
 (a) (N, D) (b) (R, \leq) (c) (Z, D) (d) (S_{45}, D)
8. Which of the following is a Chain?
 (a) (Z, D) (b) (R, \leq) (c) (S_{10}, 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 $\{(1,1), (2,1), (1,2)\}$ for set $A = \{1,2,3\}$ is _____.
 (a) Reflexive (b) Transitive (c) Symmetric (d) Anti-symmetric

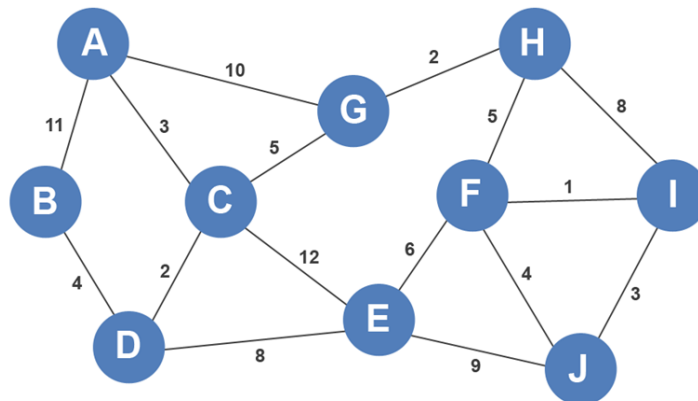
(b) Answer in Short.

[10]

1. Define Complete Graph.
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]

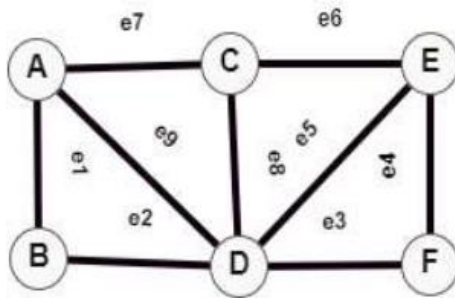
OR

- (b) Prove Associative laws using truth table. [08]

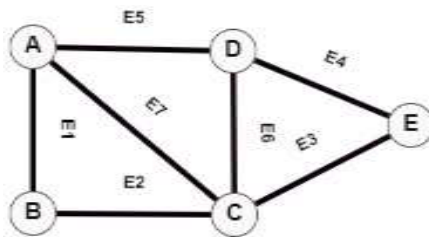
$$(i) \quad p \wedge (q \vee r) \equiv (p \wedge q) \vee r \quad (ii) \quad p \vee (q \wedge r) \equiv (p \vee q) \wedge r$$

Question: 3.

- (a) Define tree and Prove that tree has n vertices has $n-1$ edges [08]
- (b) Derive Adjacency matrix and Incidence matrix for following graph [04]



- (c) Write Definition of cut-sets and derive six different cut-sets of following graph. [04]

**OR**

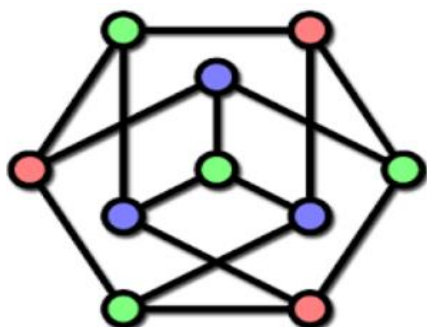
- (a) Prove that complete graph with five vertices is Non-planar. [08]
- (b) Define Adjacency and incidence matrix. Derive both matrix for K_4 [04]
- (c) Explain following and derive it for graph $K_{3,5}$ [04]
 (i) Edge connectivity (ii) vertex connectivity

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) Explain Fundamental Cut sets and Derive all possible fundamental cut sets of following graph as per your spanning tree for this graph. [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]

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

- (b) Check that statements 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 real numbers [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) State and prove De Morgan Law using truth table. [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) Show that set of all positive rational numbers forms an abelian group under the

Composition * defined as $a * b = \frac{ab}{2}$ [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) For the permutation $A = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 3 & 4 & 1 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 2 & 1 & 5 & 4 \end{pmatrix}$ [04]

Find 1] $A \cdot B$ 2] $B \cdot A$ 3] A^{-1} 4] $A \cdot B^{-1}$

OR

- (a) Prove that $(P(A), \cap, \cup)$ is a lattice as poset. Where $A = \{1, 2, 3\}$ [08]

- (b) Find the covers of all elements and draw the Hasse diagram of (S_{30}, D) [04]

- (c) The set $G = \{1, 2, 3, 4, 5, 6\}$ is a group with respect to multiplication modulo 7 [04]

---Best of Luck---

– Bloom'S Taxonomy Report –

Sub: DM

Sem.4

Branch: CE

Que. Paper weightage as per Bloom's Taxonomy

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

Chart/Graph of Bloom's Taxonomy