



Darbhanga College Of Engineering, Darbhanga

Mid-Semester Examination, 2018

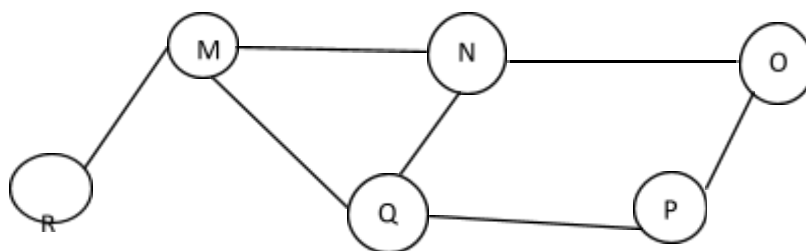
Subject: Discrete Mathematical Structure & Graph Theory

Full Marks: 20

Time: 2 Hrs.

❖ Solve the following questions:

1. A. The breadth first search algorithm has been implemented using the queue data structure one possible order of the visiting the nodes of the following graph is 2



- i. MNOPQR ii. NQMPOR iii. QMNPRO iv. QMNPOR

B. What is the complete graph? Give an example. 1

C. Consider the relation $R = \{(1, 1), (2, 2), (2, 3), (3, 2), (4, 2), (4, 4)\}$ on $A = \{1, 2, 3, 4\}$.

I. Draw its directed graph. II. Find $R^2 = RoR$.

1+1

2. A. Find the number of integers lying between 1 and 100 (both inclusive) not divisible by 2, 3 or 5. 2

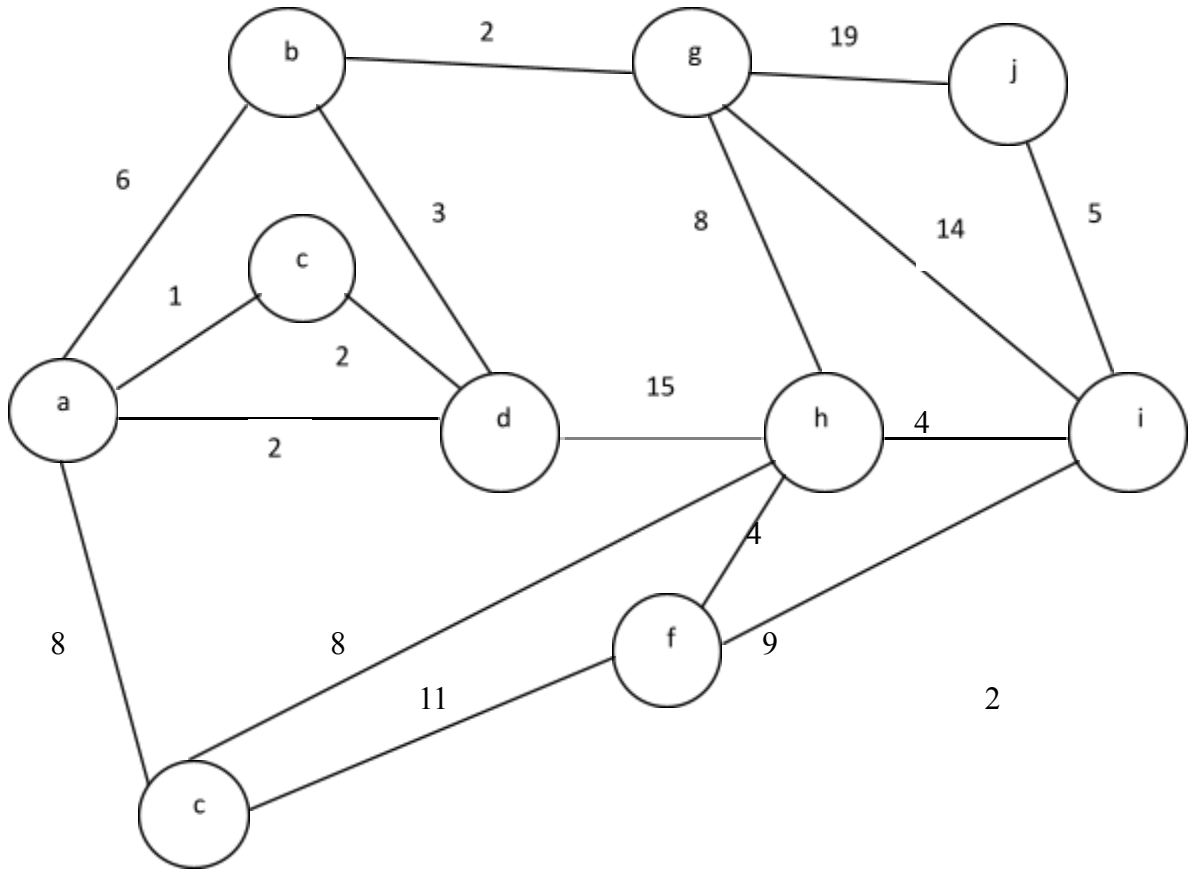
B. Define group with an example. 1

C. Let $M_2(\mathbb{R})$ be the set of all 2x2 matrices whose elements are real numbers. Let '+' is the matrix addition and '.' is the matrix multiplication defined on $M_2(\mathbb{R})$. Then which of the following statement(s) is (are) true? Justify with proper reason. 1+1

- i. $(M_2(\mathbb{R}), +)$ is an non commutative group.

ii. $(M_2(\mathbb{R}), \cdot)$ is a monoid.

3. A. How many different ways to represent a graph? Explain with example. 2
 B. What is the weight of a minimum spanning tree using Kruskal algorithm? 3



4. A. What is the maximum number of edges in a bipartite graph having 12 vertices? 2
 B. Show that which of the following propositional logic are tautology, contradiction or contingency:
 i. $((a \rightarrow b) \wedge (b \rightarrow c)) \rightarrow (a \rightarrow c)$
 ii. $(a \leftrightarrow c) \rightarrow (\sim b \rightarrow (a \wedge c))$

iii.

$$(a \wedge b \wedge c) \rightarrow (c \vee a)$$

3