

**END OF SEMESTER EXAMINATIONS, NOVEMBER - 2017**  
**MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE**  
**SUBJECT CODE : 11UBIT03**

MAJOR : B. Sc (Information Technology)  
 TIME : 3 HOURS

SEMESTER : I  
 MAX. MARKS: 75

**SECTION A - (5 X 2 = 10)**

**Answer All the Questions:**

1. If  $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$  and  $B = \begin{pmatrix} 3 & -1 & 3 \\ -1 & 0 & 2 \end{pmatrix}$  then find  $2A - B$ .
2. Write the subset of  $A = \{0, 1, 2\}$ .
3. If  $A = \{a, b\}$  and  $B = \{1, 2, 3\}$  find  $A \times B$  and  $B \times A$ .
4. Define Directed Graph.
5. Construct the truth table for  $A \Rightarrow B$ .

**SECTION B - (5 X 4 = 20)**

**Answer All the Questions:**

6. a) If  $A = \begin{pmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & -2 & 3 \\ 2 & 3 & -1 \\ -3 & 1 & 2 \end{pmatrix}$  then find whether both  $AB$  and  $BA$  are equal.

**(OR)**

- b) If  $A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 2 & 7 & 8 \end{pmatrix}$  then find  $|A|$ .

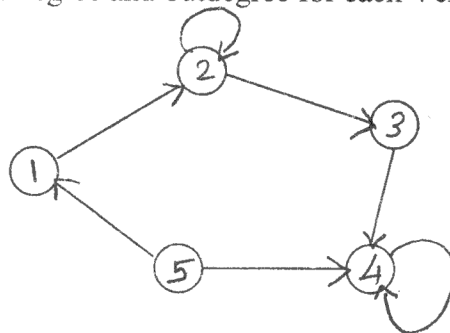
7. a) State which of the following sets are finite and which are infinite.
  - i)  $A = \{x : x \in Z \text{ and } x^2 - 5x + 6 = 0\}$
  - ii)  $B = \{x : x \in Z \text{ and } x > -10\}$ .

**(OR)**

- b) If  $A = \{a\{b\}\}$ , find  $P(A)$ .
8. a) i) Define Cartesian product.
  - ii) If  $A = \{2, 3\}$ ,  $B = \{1, 2, 3\}$ ,  $C = \{1, 3, 5\}$  find  $A \times B \times C$ .

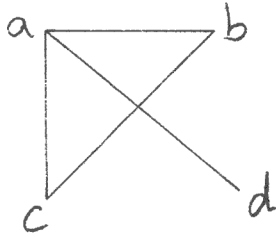
**(OR)**

- b) Find the Indegree and outdegree for each Vertex and also find the relation.



...2...

9. a) Write an Adjacency Matrix to represent the following graph.



(OR)

- b) Define: Isomorphism and also give the example for Isomorphism.

10. a) Construct the truth table for the following  $((\neg A) \vee B) \Rightarrow C$ .

(OR)

- b) Write any two Laws of logic with truth table.

**SECTION C – (3 X 15 = 45)**

**Answer any THREE Questions:**

11. Find the Inverse of  $A = \begin{pmatrix} 8 & -1 & -3 \\ -5 & 1 & 2 \\ 10 & -1 & -4 \end{pmatrix}$ .

12. To prove the following.

i)  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

ii)  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

iii) De – Morgan's Law

13. Let  $A = \{1, 2, 3, 4\}$

Let  $R = \{(1,1), (1,2), (2,3), (2,4), (3,4), (4,1), (4,2)\}$  and

$S = \{(3,1), (4,4), (2,3), (2,4), (1,1), (1,4)\}$  be two relations on A.

i) Is  $(1,3) \in R \circ R$ ?

ii) Is  $(4,3) \in S \circ R$ ?

iii) Is  $(1,1) \in R \circ S$ ?

iv) Compute:  $S \circ R$

$R \circ S$

$R \circ R$

$S \circ S$

14. Prove that, A nontrivial simple graph has at least two vertices which are not cut vertices.

15. Using Implication Law i)  $(P \rightarrow Q) \wedge (\neg P \vee Q)$

ii)  $(P \wedge \neg(Q \wedge R)) \vee (P \rightarrow Q)$ .

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