

M.G.M's College Of Engineering, Nanded.
Department Of Computer Science & Engineering

Assignment: 2

Subject: DM

Class: SE(CSE) - I

Note: Last date of submission of Assignment-2 is 24.09.2013

Q.1. Define the following.

- 1) Relation
- 2) properties of relation
 - a) Reflexivity property
 - b) symmetric property
 - c) Antisymmetric property
 - d) Transitive property.

Q.2. For each of these relations on the set $\{1,2,3,4\}$ decide whether it is reflexive, whether it is symmetric, whether it is antisymmetric and whether it is transitive.

- a) $\{(2,2), (2,3), (2,4), (3,2), (3,3), (3,4)\}$
- b) $\{(1,1), (1,2), (2,1), (2,2), (3,3), (4,4)\}$
- c) $\{(2,4), (4,2)\}$
- d) $\{(1,2), (2,3), (3,4)\}$
- e) $\{(1,1), (2,2), (3,3), (4,4)\}$
- f) $\{(1,3), (1,4), (2,3), (2,4), (3,1), (3,4)\}$

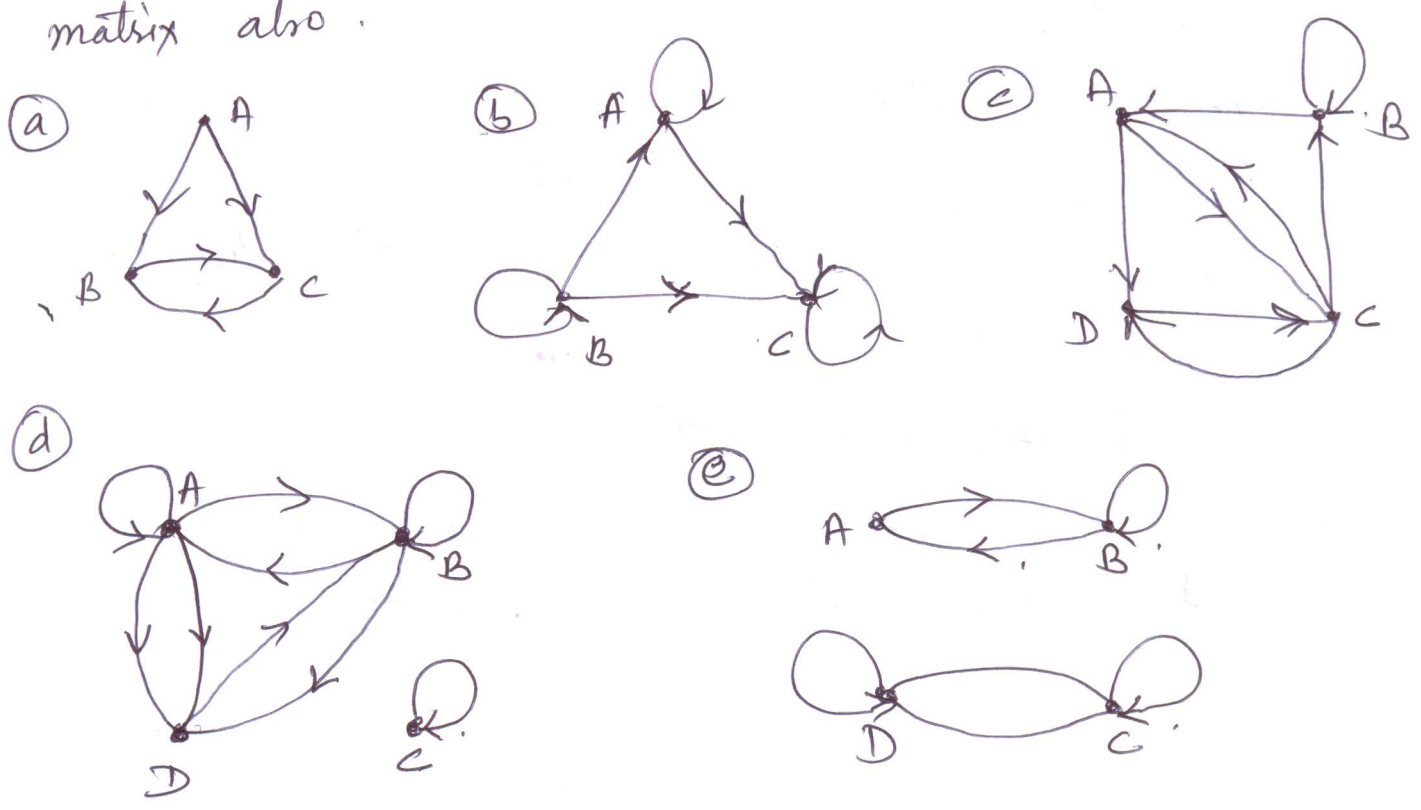
Q.3. Let $R_1 = \{ (1,2), (2,3), (3,4) \}$,
 $R_2 = \{ (1,1), (1,2), (2,1), (2,2), (2,3), (3,1), (3,2), (3,3), (3,4) \}$
 be relations from $\{1,2,3\}$ ~~to~~ $\{1,2,3,4\}$.

Find. a) $R_1 \cup R_2$ b) $R_1 \cap R_2$
 c) $R_1 - R_2$ d) $R_2 - R_1$

Q.4. Represent each of these relations on $\{1,2,3,4\}$ with a matrix and draw its digraph.

- a) $\{ (1,2), (1,3), (1,4), (2,3), (2,4), (3,4) \}$
- b) $\{ (1,1), (1,4), (2,2), (3,3), (4,1) \}$
- c) $\{ (1,2), (1,3), (1,4), (2,1), (2,3), (2,4), (3,1), (3,2), (3,4), (4,1), (4,2), (4,3) \}$

Q.5. List the ordered pairs in the relations represented by the digraphs. And construct the matrix also.



Q6. Let R_1 and R_2 be relations on a set A represented by the matrices

$$MR_1 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix} \text{ and } MR_2 = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

Find the matrices that represent.

- a) $R_1 \cup R_2$ b) $R_1 \cap R_2$

Q7 What is a closure? Explain Reflexive and Symmetric closure.

Q8 Explain Transitive closure in detail.

Q9 Which of these relations on $\{0, 1, 2, 3\}$ are equivalence relations?

a) $\{(0,0), (1,1), (2,2), (3,3)\}$

b) $\{(0,0), (0,2), (2,0), (2,2), (2,3), (3,2), (3,3)\}$

c) $\{(0,0), (1,1), (1,2), (2,1), (2,2), (3,3)\}$

d) $\{(0,0), (1,1), (1,3), (2,2), (2,3), (3,1), (3,2), (3,3)\}$

Q10 Determine whether the relations represented by these zero-one matrices are equivalence relations.

a) $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

Q.11 Explain POSET and Hasse diagram in detail.

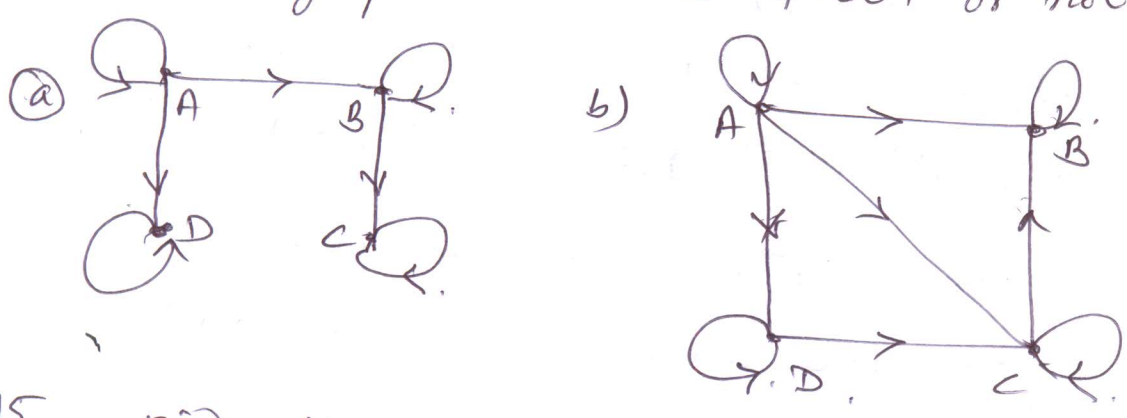
Q.12 Which of these relations on $\{0,1,2,3\}$ are partial orderings? If yes then Draw Hasse diagrams.

- a) $\{(0,0), (1,1), (2,2), (3,3)\}$
- b) $\{(0,0), (1,1), (2,0), (2,2), (2,3), (3,2), (3,3)\}$
- c) $\{(0,0), (1,1), (1,2), (2,2), (3,3)\}$
- d) $\{(0,0), (1,1), (1,2), (1,3), (2,2), (2,3), (3,3)\}$

Q.13 Determine whether the relations represented by these zero-one matrixes are POSET.

- a) $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
- b) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$
- e) $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \end{bmatrix}$

Q.14 Determine whether the following relation with the digraph shown is POSET or not.



Q.15 Find the first three terms of the sequence defined by each of these recurrence relations and initial conditions.

- a) $a_n = 6a_{n-1}, a_0 = 2$
- b) $a_n = a_{n-1} + 3a_{n-2}, a_0 = 2, a_1 = 1$
- c) $a_n = na_{n-1} + na_{n-2}, a_0 = 2, a_1 = 2$

Q.16 Define .

- ① simple ~~directed~~ graph .
- ② Complete graph .
- ③ Bipartite graph .

Subject Incharge .

Mohseen Ahmed - Q .
(SE CSE-I)