INSTITUTE OF INFORMATION TECHNOLOGY

JAHANGIRNAGAR UNIVERSITY

Number of Assignment : 01

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Course Tittle : Discrete Mathematics

Course Code : ICT – 1207

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Answer to the question no - Q1

(a) If R is reflexive.

Then, for every x.

Since xRx,

we have xSx.

$\therefore$ S is reflexive.

[Proved]

(b) Given that

$$xSy \Rightarrow xRy \text{ and } yRx$$

$$\Rightarrow xRy \wedge yRx$$

$$\Rightarrow yRx \wedge xRy$$

$$\Rightarrow ySx$$

$\therefore$ S is Symmetric

[Proved]

(c) Suppose R is transtive.

Then, $xSy \wedge ySz \Rightarrow (xRy \wedge yRx) \wedge (yRz \wedge zRy)$

$\Rightarrow (xRy \wedge yRz) \wedge (zRy \wedge yRz)$

$\Rightarrow xRz \wedge zRx$

$\Rightarrow xSz$

$\therefore$ If R is transitive, S is transitive. [Proved]

(d) If R is antisymmetric

Then, $xSy \wedge ySx \Rightarrow xRy \wedge yRx$

$\Rightarrow x = y$

In the same way. S is antisymmetric.

[Proved]

(e) By a. b. and c

we can say S is an equivalance relation.
[Proved]

(f) By a. b. and d

we can say S is an Partial Order [Proved]

Answer to the question no.- Q2

(a)
Given that we said

For any x,

xRx nor xRx is false

So. xSx is also false.

$\therefore S$ is irreflexive [Proved]

(b) Given that

$$x S y \Rightarrow x R y \text{ nor } y R x$$
$$\Rightarrow y R x \text{ nor } x R y$$
$$\Rightarrow y S x$$

$\therefore x S y \Rightarrow y S x$

$\therefore$ S is symmetric.

(c) Let R be the subset relation as before.

Then, $\{1\}\ S\ \{1,2\}$ and $\{1,2\}\ S\ \{2\}$ can happen.

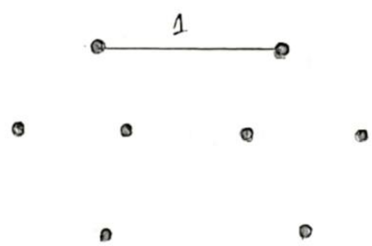
But $\{1\}\ S\ \{2\}$ is false.

$\therefore$ If R is transitive, S is not nesessarily transitive. [Proved]

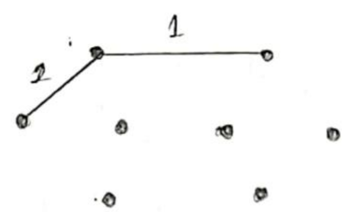
Answer to the question no- Q3

1. Using Prim's algorithm

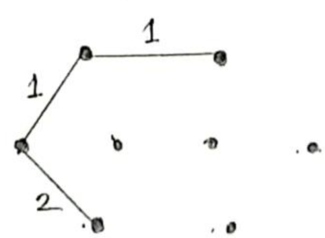
Firstly we choose edge a which has the lowest weight 1.



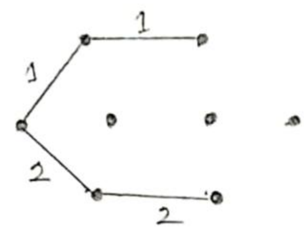
Then, we add the adjacent edge with lowest weight b, weight 1.



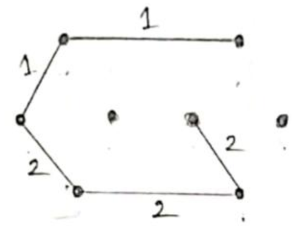
Then we add i,



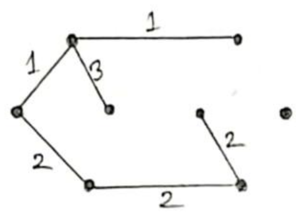
Then add n,



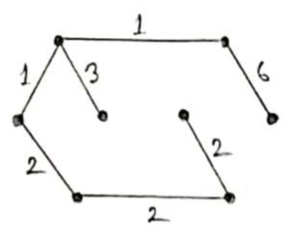
then add K,



Then add c,



Then add e,



The cost $= 1+1+2+2+2+3+6$

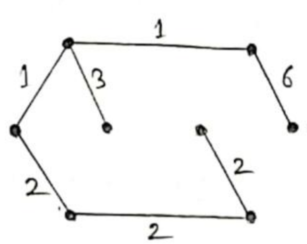
$= 17$

Order $= a \to b \to i \to n \to K \to c \to e.$

2. Using Kruskal's Algorithm

The edge with weights are sorted here.

Edge	Weight
a	1
b	1
i	2
K	2
n	2
c	3
d	3
f	4
j	4
g	5
e	6
h	6
m	7



Order = a → b → i → n → K → c → e.

THE END