Assignment

(Part of Final Examination)

Marks:10

Q1

Let R be a relation in a set A, and derive from R another relation S in A as follows:
x S y if (x R y **and** y R x).

a) Prove that if R is reflexive, then S is reflexive.
b) Prove that S is symmetric.
c) Prove that if R is transitive, S is transitive.
d) If R is antisymmetric, is S antisymmetric? Prove your answer.
e) If R is an equivalence relation, is S an equivalence relation? Prove your answer.
f) If R is a partial order, is S a partial order? Prove your answer.

Q2

Let R be a relation in a set A, and derive from R another relation S in A as follows:
x S y if (x R y **xor** y R x).
Recall that **xor**, exclusive or, is defined as: p **xor** q is true if (p is true and q is false, or p is false and q is true).

a) Prove that S is irreflexive.
b) Prove that S is symmetric.
c) Prove that if R is transitive, S is not necessarily transitive (by a counterexample).

Q3.

A graph G with 13 edges is shown in Figure 1. The edges of G have weights given by the following table

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

1. Use Prim's algorithm to find a minimum spanning tree S in G. Write the edges of S in the order in which they are added to S by Prim's algorithm. (If there is more than one possible solution then write only one of them.)
2. Use Kruskal's algorithm to find a minimum spanning tree T in G. Write the edges of T in the order in which they are added to T by Kruskal's algorithm. (If there is more than one possible solution then write only one of them.)

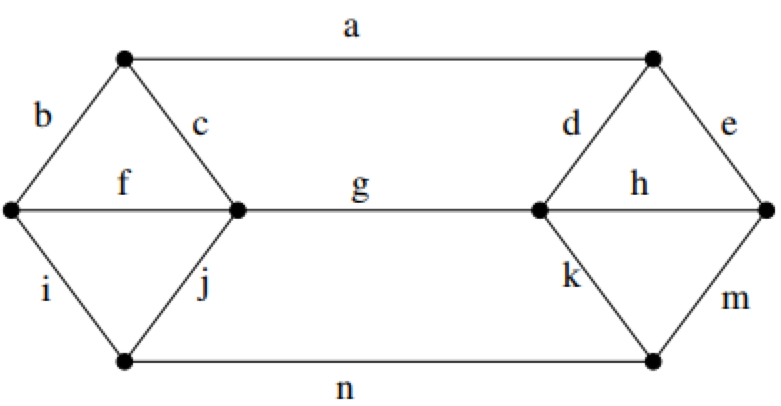

Figure 1