Course Code: 3MSCM4
Course: Advanced Discrete mathematics (Elective-I)
Credit: 4
Last Submission Date: April 30 (for January Session)
October 31, (for July session)

Max. Marks:-70
Min. Marks:-25

Note:-Attempt all questions.

Que.1 Consider a set I of integers. Let (I,+,X) be the algebraic system, where + and x are the operation of addition and multiplication on I.

Que.2 Define homomorphism & isomorphism with example.

Que.3 Let (s,$*$) and (T, $\oplus$) be two semigroup and f:S $\rightarrow$T be a semigroup homomorphism c then corresponding to f $\exists$ a congruence relation R on (s,$*$) be defined by aRb iff f(a) = f (b) $\forall$ a,b ϵ S

Que.4 Let (M,$*, e$) and (T, Δ, e') be two monoids with identifies e and e' if f is an onto mapping from M to T i.e. f: M $\rightarrow$T is an isomorphism then f (e) =e'.

Que.5 Let (L, $\leq$) be a lattice. Then the following results hold:

(A) $For\ \ each\ a\ \in L\ then$

a_1) $a \wedge a = a$

b_2) $a \vee a = a$

(B) $For\ any\ a, b\ , \in L\ then$

b_1) $a \wedge$ b = b $\wedge$ a

b_2) $a \vee b = b \vee a$

(C) $For\ any\ a, b, c \in L$

c_1) ($a \wedge$ b) $\wedge$ c = a $\wedge$ (a $\wedge$ c)

c_2) $(a \vee b) \vee c = a \vee (b \vee c)$

(D) $For\ a, b\ \in L\ then$

d_1) $a \wedge (a \vee b) = a$

d_2) $a \vee (a \wedge b) = a$

Que.6 In any lattice (L,$\wedge$,$\vee$) the following statement are equivalent:

(1) $a\ \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)\ \forall\ a, b, c \in L$

(2) $a \vee (b\ \wedge c) = (a \vee b) \wedge (a \vee c)\ \forall\ a, b, c \in L$

Que.7 State & prove Demorgan's low in Boolean algebra.

Que.8 In a Boolean algebra (B,+, . , ') then show that a+b=a+c and ab=ac then b=c

Que.9 A tree T with n-vertices has n-1 edges.

Que.10 To prove that every connected graph has at least one spanning tree.