END TERM EXAMINATION

FIRST SEMESTER **[MCA]** DECEMBER **2007**

Paper Code : MCA107	**Subject : Discrete Maths**
Time : 3Hours	**Maximum Marks : 60**

Note: Attempt any Five question including Q.1 is compulsory. Answer one question from each unit.

Q1. (a) Let Z+ be set of positive integers .Let R be a relation defined on Z+ as follows A R b $\Leftrightarrow$ a divides b.
Give the type of relation R.

(b) What is the generating function for the sequence 1,1,1, ------, 1

(c) Show that (m/r) = (m+1/r) – (m/r-1)

(d) Show that relation define in (i) above is a partial order relation on Z+.

(e) If S={1,2,3} and A=P(S). Is a poset with the partial orders as set inclusion? If so, draw the Hasse diagram otherwise justify your answer.

(f) Let B (+,˙,1,0,1) be a Boolean Algebra. Show that, for any a,b $\in$ B,
b. (a+(a'. (b+b')))=b

(g) (z, +) is a semi group z is set of integers that (T,+) is a set of even integers. Show that (T, +) Semigroup and define an isomorphic so that (Z, +) and (T, +) are isomorphic.

(h) Let (G,*) be a group. Let a, b $\in$ G then show a * x = b has a unique solution in G

(i) Define Hamilton circuit giving on example.

(ii) What is the language generated by the following grammar
G=(V, S, υ_0, P)
υ_0 is start symbol, S is set of terminals, P is set of production rules
P = {$\upsilon_0 \rightarrow xx\upsilon_0$, $\upsilon_0 \rightarrow xx$}

Unit-I

Q2. (a) Let R and S be relations on set A. If R and S are Symmetric then R$\cap$S and R$\cup$S are also Symmetric.

(b) Find the minimum number of students in a class so that of them are born in the same month.

(c) Define transitive closure of a relation R on set A. Give an example.

Q3. (a) Find explicit formula for the sequence define by the sequence 0,1,1,2,3,5,7,12---------.

(b) For the generating function Z $(1\text{-}Z)^{-2}$ give the generic function.

Unit-II

Q4. (a) Using Karnaugh map find the minimum sum of products from for E = x' y + xyz' + x' y'z+ xyz

(b) Design a two-input – minimal for the Boolean expression – abc + b' c + a' b'

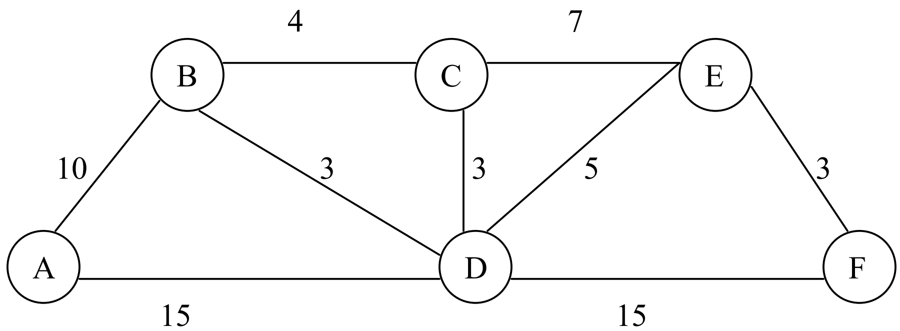
Q5. (a) Let (L_1, ≤) and (L_2, ≥) are Boolean Algebras, show that (L_1 X L_2, ≤) is a Boolean Algebra.

Unit-III

Q6. (a) Let G = (V,E) be an undirected graph with e edge. Then show that $2e = \sum_{v\in V} \deg(v)$

Symbols have their own meaning. What conclusion can you draw from this result?

(b) Write the steps for finding the shortest path between two vertices of a graph using Dijiktra's method hence finds the shortest path between nodes A and F



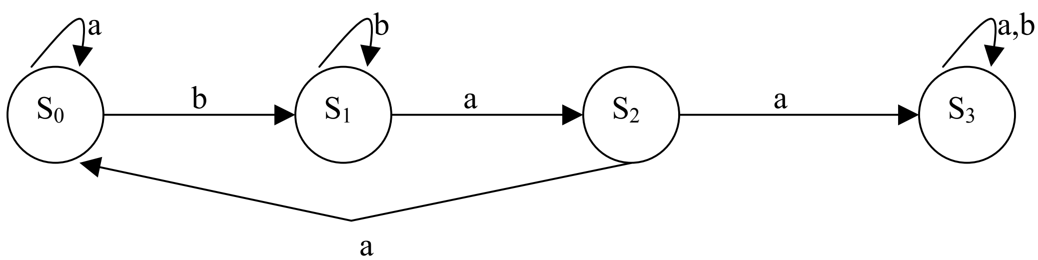
Q.7 (a) Let (G, **.**) be a group. Prove that (a**.**b) **=** b**.** a for a,b $\in$ G. Also Show that $((a\text{-}b)^{-1})^{-1}$ = a.b

(b) Let (G, **.**) be a group. Let (H,.) be a subgroup of (G, **.**). Show that G=H$\cup$ha$\cup$Hb--------. Where a,b,….. $\in$G.

Unit – IV

Q.8 (a) Define various phrase structured grammars. Giving an example of each.

(b) What I the language generated by the automation?



Q.9 (a) Draw a finite state machine accepting the language

$(0\,0)^n\,(1\,1)^n\;01 \quad n \geq 0.$

(b) Let M = (S, I, F, s_0, T) be a FSM

S: Set up states

I: Set up inputs

s_0 : Starting State

F is set of all transaction F: SXI$\rightarrow$S

T is set of final states, T $\subseteq$ S.

Let R be a relation defines on S as (s, t) $\in$ R $\Leftrightarrow$ s and t are no compatible. Show R is an Equivalence relation and R is machine congruence.