STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted during the academic year 2011–12 & thereafter)

SUBJECT CODE : 11MT/GE/DM44

B.A./B.V.A./B. Sc./B.Com./B.C.A./B.S.W. DEGREE EXAMINATION, NOVEMBER 2014

COURSE : GENERAL ELECTIVE
PAPER : DISCRETE MATHEMATICS
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A **(10X2=20)**
ANSWER ALL THE QUESTIONS

1. Prove that the argument $p, p \to q \ \vdash q$ is valid.
2. Define a Propositional function.
3. Define order relation.
4. Define Hasse diagram.
5. Define Distributive Lattice.
6. Give an example of an infinite Lattice with finite length.
7. Write the dual of the Boolean equation$(1 + a) * (b + 0) = b$.
8. Express $E = x(y'z)'$ in its complete sum of products form.
9. What is a Language?
10. Define finite state automata.

SECTION – B **(5X8=40)**
ANSWER ANY FIVE QUESTIONS

11. Prove that the following argument is valid: $p \to q, q \to r \ \vdash p \to r$.
12. Draw the Hasse diagram for the set A={1,2,3,4,6,8,9,12,18,24}whose order is divisibility.
13. Draw the diagram of the Lattice L of all subsets of $\{a,b,c\}$.
14. Through the Consensus method for $E = xyz + x'z' + xyz' + x'y'z + x'yz'$, write E as sum of its Prime implicants.
15. Write a note on Logic gates.
16. Let $A=\{a,b\}$. Construct an automaton M which will accept words from A with even number of a's.
17. Consider the regular grammar G with productions $S \to aA, A \to aB, B \to bB, B \to a$.
    (i) Find the derivation tree of the word $w=aaba$.
    (ii) Describe all words w in the language L generated by G.

SECTION – C **(2X20=40)**

ANSWER ANY TWO QUESTIONS

18. Construct the truth tablefor (i) $[(p \longrightarrow q) \wedge \sim q] \rightarrow \sim p$; (ii) $[(p \longrightarrow q) \wedge \sim p] \rightarrow \sim q$

19. (i) Suppose X={1,2,6,8,12} is ordered by divisibility and suppose $Y=\{a,b,c,d,e\}$ is isomorphic to X then define a function f from X onto Y and draw the Hasse diagram for X and Y.

 (ii) Draw the Hasse diagram for D_{36}, prove that for any two pair of elements $\inf(a,b) = \gcd(a,b)$ & $\sup\,(a,b) = lcm(a,b)$

 (iii) Show that the set of all divisors of 70 form a Lattice.

20. (i) Write $E = ((xy)'z)'\left((x' + z)(y' + z')\right)'$ as sum of products expression.

 (ii) Let $K=\{a,ab,a^2\}$and $L=\{b^2,aba\}$ be a language over A={a,b}. Find KL and LL.

 (iii) Let M be a finite state machine with state table as given below

F	a	b
s_0	s_2,x	s_1,z
s_1	s_2,x	s_3,y
s_2	s_2,y	s_1,z
s_3	s_3,z	s_0,x

 (a) Find the input set A, the state set S, the output set Z and the initial state of M.

 (b) Draw the state diagram $D=D(M)$ of M.

 (c) Find the output word v if the input is the word $w=a^2b^2ab^2\,a^2b$.