

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 86.
(For candidates admitted during the academic year 2019–20 and thereafter)

19MT/MC/DM43

B.Sc. Degree Examination April 2021
BRANCH I - MATHEMATICS
SECOND SEMESTER

COURSE : MAJOR CORE
PAPER : DISCRETE MATHEMATICS
TIME : 90 MINUTES

MAX. MARKS: 50

SECTION – A

Answer all the Questions (3 × 2= 6)

1. Define Logical equivalence of propositions.
2. Give any two applications of Boolean Algebra.
3. Explain Backus-Naur Form.

SECTION – B

Answer Any Three Questions (3 × 8 = 24)

4. Check the validity of the argument $p \rightarrow \neg q, r \rightarrow q, r \vdash \neg p$.
5. If (L, \leq) is a lattice and $a \leq b \leq c$, where $a, b, c \in L$, then show that
 - i. $a \vee b = b \wedge c$.
 - ii. $(a \wedge b) \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$. (4+4)
6. State and Prove Idempotent law and Associative law for a Boolean algebra.
7. Describe a finite state machine and draw the transition diagram of the finite state machine (I, O, S, s_0, f, g) describing the functions explicitly, whose transition table is as follows:

I	f		g	
	a	b	a	b
S				
s_0	s_1	s_2	0	0
s_1	s_0	s_3	1	0
s_2	s_3	s_0	0	1
s_3	s_1	s_0	0	0

SECTION – C

Answer Any One Question (1 × 20 = 20)

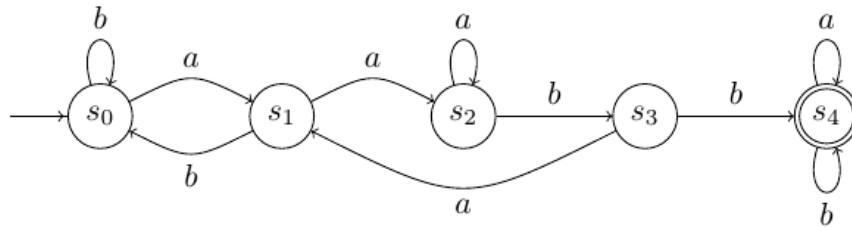
8. a) Find the conjunctive normal form and disjunctive normal form of $p \leftrightarrow (\neg p \vee \neg q)$.
b) Find the prime implicants and minimal sum of product form using Karnaugh Map for the following expressions:
 - i) $E = xy' + x'z't + xyz't' + x'y'zt'$.
 - ii) $E = x'y'z + x'yz' + xyz'$ (10+10)

9. a) Design a finite state automaton that accepts set of all strings over $\{0,1\}$

i) that contains an even number 1 's.

ii) for which the last two input symbols are 1.

b) Find the language accepted by the automaton M shown in the transition diagram:



(10+10)
