J-1049

M.A./M.Sc. (Previous) Examination, 2021

MATHEMATICS

(Advanced Discrete Mathematics)

Time Allowed : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 36

Note : Attempt any five questions. Each question carry

equal marks.

Q. 1. Prove that following are tautologies :

(a) $(\sim B) \wedge (A \Rightarrow B) \Rightarrow (\sim A)$

(b) $(\sim B \Rightarrow \sim A) \wedge (B \Rightarrow A) \Rightarrow (A \Leftrightarrow B)$

Q. 2. Prove that every finite semigroup has an

idempotent element.

Q. 3. In a Boolean algebra $(B, \vee, \wedge, ')$ prove that the

following :

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

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

Q. 4. Explain the following :

(a) Complemented Lattice

(b) Distributive Lattice

Q. 5. Define finite state machine with example.

Q. 6. State and prove that Kuratowski's theorem.

Q. 7. Explain the following :

(a) Spanning trees

(b) Cut sets

Q. 8. If $a.x = b.x$ and $a.x' = b.x'$ then prove that $a = b$.

Q. 9. Construct a grammar for the language L = $\{a^x.b^y$

: x > y > 0\}.

Q. 10. Define universal and existential with example.

───── ─────