



GAD-2324

Seat No. _____

B. Sc. (Sem. V) Examination

November / December - 2013

Mathematics : Paper - CC - MATH - 504 A

(Boolean Algebra) (New Course)

Time : 3 Hours]

[Total Marks : 70

Instruction : Attempt all questions.

- 1 (a) Define equivalence relation with illustration.
- (b) For a lattice $\langle L, \leq \rangle$ prove that $\forall a, b \in L$
 $a \leq b \Leftrightarrow a * b = a$.
- (c) Draw Hasse diagram of $\langle S_{24}, D \rangle, \langle S_6, D \rangle$.

OR

- 1 (a) Define Lattice with illustration.
- (b) Is least element of poset unique ? Justify your answer.
- (c) Prove that for $A = \{a, b, c\}$ $\langle P(A), \leq \rangle$ is lattice.
- 2 (a) Define Boolean algebra with illustration.
- (b) Define isomorphic lattices with illustration.
- (c) For a lattice $\langle S_{30}, D \rangle$ find complement of each element of it.

OR

- 2 (a) State and prove unique representation theorem.
 (b) Define Homomorphism. Give illustration of two lattices which are homomorphic.
 (c) Find all atom of a lattice $\langle S_{30}, D \rangle$.
- 3 (a) Define Boolean expression with illustration.
 (b) Define minterm with illustration.
 (c) Obtain the product of sum canonical form of a Boolean expression $\alpha(x_1, x_2, x_3) = x_1 \oplus x_2$

OR

- 3 (a) Explain symmetric Boolean expression.
 (b) Define maxterm with illustration.
 (c) Obtain the sum of product canonical form of a Boolean expression.

$$\alpha(x_1, x_2, x_3) = x_1 \oplus x_2$$

4 Attempt any two :

- (a) Draw a Hasse diagram of $\langle S_{36}, D \rangle$
 (b) Define atom with illustration.
 (c) Define Boolean variable with illustration.

5 Attempt any two :

- (a) Draw a Hasse diagram of $\alpha \langle L^2, \leq_2 \rangle$ for a lattice $\langle L, \leq \rangle$ where $L = \{0, 1\}$
 (b) For a Boolean Algebra $\langle B^* \oplus', 0, 1 \rangle$. Prove that $\forall a, b \in B$

$$(a * b)' = a' \oplus b'$$

 (c) Find all the minterms of a Boolean algebra with two variables x_1, x_2 .