I/86—22 Roll No. .....

Annual Examination, 2022

B.C.A. Part I

B.C.A.-101

Paper I

(Discrete Mathematics)

Time : 3 Hours] [Max. Marks : 80

Note : *Attempt any two parts from each unit. All questions carry equal marks.*

Unit-I

1. (a) Show that the following is a tautology :

$(P \Leftrightarrow q \wedge r) \Rightarrow (\sim r \Rightarrow -P)$

(b) Show that $[(p \wedge q) \Rightarrow P] \Rightarrow (q \wedge \sim q)$ is a contradiction.

(c) Explain the quantifires and also explain its negations.

Unit-II

2. (a) In a Boolean algebra $(B + , \cdot, 1)$ Prove that

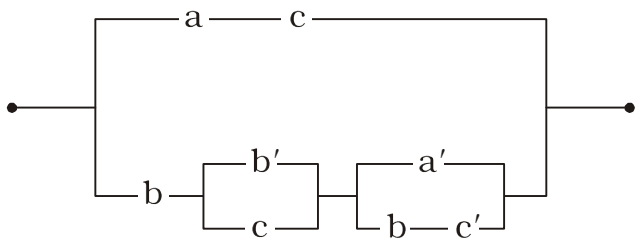
$$x.y + y.z + z.x = (x + y)\ (y + z)(z + x)$$

$\forall\ x, y, z \in B$

P.T.O.

(b) Draw the logic circuit of $f(a, b, c) = (a.b + a.b' + b.c').(b + c)$

(c) Replace the following switching circuit by a simpler are :



Unit-III

3. (a) Find complete disjunctive normal form in three variables and show that its value is :

(b) Write the conjunctive normal form of given boolean function $f(x, y, z) = (x + y)(xy + y'z)'$

(c) Explain wye to delta transformation given an example.

Unit-IV

4. (a) If A, B, C are any three non empty sets, then Prove that : $A \times (B - C) = A \times B - A \times C$

(b) Define the equivalence relation and also give an example.

(c) Let N be the set of natural numbers and E be the set of even number natural numbers. Let $f : N \to E$ be defined by $f(x) = 2x$, $x \in N$. Show that the map f is a bijection (one-one. onto). Find the formula that defines the inverse function f^{-1}.

Unit-V

5. (a) Show that in any graph the number of odd degree vertices is always even.

(b) Explain simple graph, multigraph. Complete graph and planar graph.

(c) Define the tree and show that a graph is a tree if and only if it is minimally connected.

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