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Online Annual Examination, 2022

B.C.A. Part I

Paper I

DISCRETE MATHEMATICS

Time : Three Hours] [Maximum Marks : 80

Note : *Section 'A', containing 10 very short answer type questions, is compulsory. Section 'B' consists of short answer type questions and Section 'C' consists of long answer type questions. Section 'A' has to be solved first.*

Section 'A'

Answer the following very short answer type questions in one or two sentences. **1 × 10 = 10**

1. Define inverse in logic sense.

2. Define existential quantifier.

3. Write idempotent law.

4. Write involution law.

5. What is subjective mapping ?

6. Define degree of graph.

7. How many edges in kmh graph ?

8. Define cardinality of sets.

9. Define enumerable set.

10. Write countable number of {4, 5, 6, 7, ...}

Section 'B'

Answer the following short answer type questions with word limit ***150-200***. **4 × 5 = 20**

1. Form a truth table for the following :

$(p \wedge q \Rightarrow r) \Leftrightarrow (p \Rightarrow r) \vee (q \Rightarrow r)$.

Or

Using truth table show that :

$[(p \wedge q) \wedge r] \equiv [p \wedge (q \wedge r)]$

2. For algebra $(B, V, \wedge, 1)$. Show that $(x' \wedge y') \vee (x' \wedge y')' = 1$.

Or

Find out complete (Disjunctive) canonical form for 3 variables, show that its value is one.

3. Find conjunctive normal form of the following :

$f(x, y, z) = (x.y' + x.z)' + x'$

Or

Draw the switching circuit for the following Boolean polynomials :

$$x(y + z) + [x'.(y + z')]$$

4. Write the example of the relation which is symmetrics transitive but not reflexive.

Or

Show that the mapping $f : R \to R$, where $f(x) = -\sin x$, $x \in R$ is neither one-one nor onto.

5. In a graph, show that odd no. of vertices is always even.

Or

Show that k_{3+3} is non planar.

Section 'C'

Answer the following long answer type questions with word limit ***300-350****.* **10 × 5 = 50**

1. Define logical equivalence. Show that :

$$p \Rightarrow (q \wedge r) \equiv (p \Rightarrow q) \wedge (p \Rightarrow r)$$

Or

Define converse, inverse and contrapositive find converse inverse and contrapositive for the following statement.

If x, y are rational number, then xy is rational number.

2. Construct disjunctive normal form of the following :

$f(x, y, z) = (xy' + x.z)' + x'$

Or

Convert the following switching function :

$F(a, b, c) = (a.\ c) + [b.(b' + c).\ \{a' + (b.c')\}]$ into simpler circuit and draw it.

3. Prove that for Boolean function of n variables, number of fundamental Boolean functional form is $(2)^{2n}$.

Or

Define equivalent circuits, explain about wye to delta transformation network.

4. If R^{-1} and S^{-1} are two inverse relation of relation R & S, prove that :

$$(SoR)^{-1} = R^{-1}oS^{-1}$$

Or

If $f : X \to Y$ & $g : y \to z$ are one-one onto mappings then show that $gof : X \to Z$ is also one-one onto and $(gof)^{-1} = f^{-1}og^{-1}$.

5. Define complete graph. A simple graph with n vertices and k-components cannot have more than $\frac{(n-k)(n-k+1)}{2}$ edges.

Or

Prove that a tree T with n vertices has n–1 edges. Define tree also.

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