

Roll No. _____

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CAIIS-N-119 A-19
BCA II - Semester Degree Examination
COMPUTER SCIENCE
(Discrete Mathematics)
Paper : DSC - 1B
(New)

Time : 3 Hours

Maximum Marks : 80

SECTION - A

1. Answer ALL of the following. **(10×2=20)**
- a) If $A = \{1, 2, 3\}$, $B = \{4, 5, 6\}$, $C = \{3, 4, 5\}$ find $A \cap (B \cup C)$.
 - b) Define Reflexive Relation.
 - c) Find truth Value of AND gate.
 - d) Define abelian group.
 - e) Define finite graph.
 - f) What is Contradiction?
 - g) If $f(x) = x^2 + 3$, $g(x) = 3x - 3$ find fog and gof where $f: R \rightarrow R$ and $g: R \rightarrow R$.
 - h) Define Disjoint Sets.
 - i) Check whether the function $f: R \rightarrow R$ defined by $f(x) = x^2$ is one - one OR onto.
 - j) Find truth table $\sim p \wedge \sim q$.

SECTION - B

Answer any FOUR of the following. **(4×5=20)**

2. Prove that A subset of finite set is finite.
3. Prove the proposition P that the sum of first 'n' positive integer
 $p(n) = 1 + 2 + \dots + n = \frac{1}{2}n(n+1)$.
4. Define NAND and NOR gate with truth table.

5. Write the dual to each Boolean expression.
 - a) $(a * 1) * (0 * a') = 0$
 - b) $a + a'b = a + b$.
6. Draw the logic circuit L with input A, B, C of following Boolean expression
$$Y = A'BC + A'BC + ABC.$$
7. Find the fundamental product P represented by the Karnaugh map $P = x'y'z'$.

SECTION - C

Answer any **FOUR** of the following. **(4×10=40)**

8. a) Find the partition of the set of all integers in which the equivalence relation R is defined by $a R b$ if $a - b$ is a multiple of S.
b) Prove that the composition of any function and the identity function is the function itself.
9. a) Let S be a well - ordered Set Let $f : S \rightarrow S$ be a similarity mappings S into S. Prove that for every $a \in S$, we have $a \leq f(a)$.
b) Express the output $Y = AB' + (A + B)' + (A'B)'$ using logical circuit.
10. a) Use Kernaush map to find minimal sum for the Boolean expression
$$E = xy + x'y + x'y'.$$

b) Verify that the proposition $p \vee \neg p (\wedge q)$ is a tautology.
11. a) Define truth set of an open sentence and find truth set of the open sentence $p(x) : x + 3 > 8$ with replacement set $R[p(x)] = z$ the set of all intergers.
b) Find truth value of the quantifier. $(\forall x) x - 5 < x$.
12. Prove that set Q of all rational numbers other than 1 with $a * b = a + b - ab$ is an abelian group.
13. a) Define:
 - i) Multi graph
 - ii) Apsedo graph
 - iii) Complete graph
 - iv) Regular graph
 - v) Finite graph.
b) Draw K_3 and K_5 complete graph.