Q.3 Change the following Boolean function into conjunctive normal form

OR

Change the following Boolean function into disjunctive normal form

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

Q.4 Show that the mapping defined by is one one into, where *N* is set of natural numbers

OR

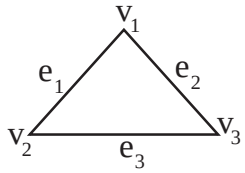
Prove the following sets are countable

(1) The set I of all integers

(2) The set E of all positive integers

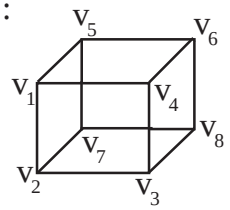
Q.5 If a graph is defined by $V = \{V_1 V_2 V_3\}$

$E = \{(V_1V_2)(V_2V_3)(V_1V_3)\}$ then find the adjancency matrix and incidence matrix of the graph G



OR

Define Hamiltonian circuit. Show that the following graph have Hamiltonion circuits :



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Code No. : C-191

Annual Examination - 2019

BCA Part - I

(BCA - 101)

THEORETICAL FOUNDATION OF COMPUTER SCIENCE

Paper - I

DISCRETE MATHEMATICS

Max.Marks : 50

Time : 3 Hrs. **Min.Marks : 20**

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)**

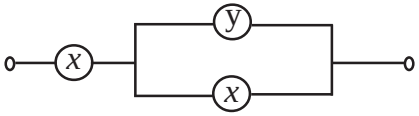
Q.1 Write symbol for NOR statement.

Q.2 Define simple or atomic sentence.

Q.3 Write complement law in Boolean Algebra.

Q.4 Draw the symbol for OR-gate.

Q.5 Find the switching net (switching function) for following circuit



Q.6 Write statement of Bool's theorem.

Q.7 Draw the binomial net for the flow function

$$x.y + x.y' + x'.y$$

Q.8 If then find *A* and *B*.

Q.9 Define Walk.

Q.10 Find the chromatic number of following graph.

Section - 'B'

Answer the following short-answer-type questions: **(3×3=15)**

Q.1 Prove that following statement is logically equivalent

OR

Simplify

Q.2 Draw the switching circuit of following functions :

OR

For any two elements *a* and *b* of Boolean Algebra B, Prove that

$$(a+b)' = a'.b'$$
$$(a.b)' = a'+b' \quad \forall\, a, b \in B$$

Q.3 Find complete disjunctive normal form in three variable and show that its value is 1.

OR

Design a tree-net in three variable for the flow function

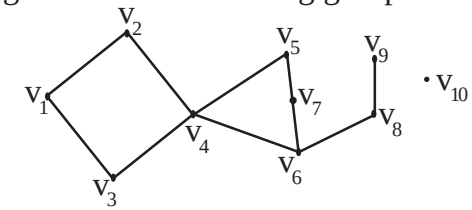
$$x.y.z + x'.y.z + x.y'z + x'y'z$$

Q.4 Find domain and range of the relation

OR

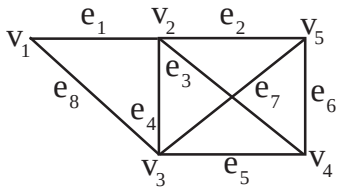
Prove that the relation "is equal to" in the set of all real numbers is an equivalence relation.

Q.5 Verify Handshaking Lemma for following group



OR

Find the rank and nulity of the graph G



Section - 'C'

Answer the following long-answer-type questions with word limit 300-350 : **(5 5=25)**

Q.1 Prove that :

OR

Prove that : is a tautology

Q.2 If B is a Boolean Algebra, then prove that the following statement are equivalent

(i) $a.b' = 0$ (ii)

(iii) (iv)

OR

Draw a simpler circuit for the following diagram and verify the equivalent circuit by truth table