Q.2 Define Boolean algebra and give an example.

OR

Simplify the following by using Boolean algebra (B,+, ,') properties (i) (a+b) a'.b' (ii) (a'b'c')'

Q.3 Change the following Boolean function to disjunctive normal form

OR

Change the function to conjunctive normal forms in which the minimum number of variables are used.

Q.4 Prove that every subset of a countable set is countable.

OR

Let $A = R - \{3\}$ and If , show that f is objective.

Q.5 Write a short note on chromatic number.

OR

Prove that the maximum number of edges in a simple graph with n vertices is .

---x---

Roll No..... **Total No. of Sections : 03**

Total No. of Printed Pages : 04

Code No. : C-191

Annual Examination - 2018

BCA - 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 Define a proposition (statement).

Q.2 Define logically equivalent statements.

Q.3 Write De Morgan's laws in a Boolean Algebra.

Q.4 Draw the symbol in switching circuit for the Boolean formula f = x.y.

Q.5 Draw the symbol for 'AND' gate.

P.T.O.

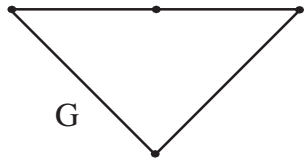
Q.6 Draw the logic circuit for the following Boolean expression xz+t.

Q.7 Write one example of objective map.

Q.8 Define countable set.

Q.9 Give one example of subgroups.

Q.10 Draw two spanning tree of the graph G.



Section - 'B'

Solve the following questions : (3 5 =15)

Q.1 Prove that $\{p \wedge (\sim p)\}$ is a tautology where p is a statement.

OR

Simplify the following statement (P Q) P using algebra of propositions.

Q.2 Show that the two operations + and * of a Boolean algebra B satisfies the associative law with respect to '+' *i.* e.

a+ (b+c) = (a+b) + c, a,b,c B

OR

Prove that for each element $\overline{a}$ in a Boolean Algebra B a' *i.* e. Complement of a is unique.

Q.3 Write the function x+y' into conjunctive normal forms in three variables x,y, and z.

OR

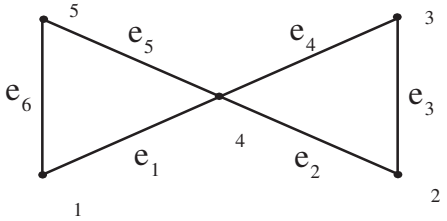
Draw a simpler switching circuit for the function x+x.y.

Q.4 Define equivalence relation with an example.

OR

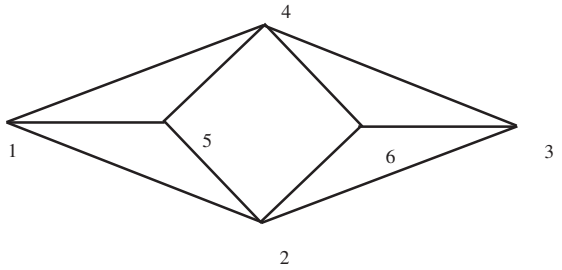
Define an injective map with one example.

Q.5 Show that the following graph in an Euler graph.



OR

Find the order and size of the graph G.



Section - 'C'

Solve the following questions : (5 5=25)

Q.1 Show that the statements (a) and (b) are logically equivalent where

(a) (p q) (p r)

(b) p (q r)

OR

Prove the following contradiction :

[(p q) p] (q q)