Roll No. ....

Total No. of Questions : 13] **[Total No. of Pages : 03**

Paper ID [A0208]

(Please fill this Paper ID in OMR Sheet)

BCA (203) (Old) / (S05) (Sem. - 2nd)

B.Sc. IT (202) (New)

MATH - I (Discrete)

Time : 03 Hours **Maximum Marks : 75**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Nine** questions from Section - B.

Section - A

Q1) ***(15 x 2 = 30)***

a) Define inverse relation with example.

b) Define into and onto functions.

c) Prove $A \cup B = B \cup A$.

d) Draw venn diagram for the symmetrical difference of sets A and B.

e) Define partition of a set with example.

f) Form conjuction of p and q for the following:

p : Ram is healthy, q : He has blue eyes.

g) If p : It is cold, q : It is raining, write the simple verbal sentence which describe (i) $p \vee q$ (ii) $p \vee \sim q$.

h) Define logical equivalence.

i) Prove that proposition $p \vee \sim p$ is tautology.

j) Define Biconditional statement.

k) Define undirected graph with example.

l) Edge of a graph that joins a node to itself is called? And Edges joins node by more than one edges are called?

m) Define Null graph with example.

n) Does there exist a 4 - regular graph on 6-vertices, if so construct a graph.

o) Prove $V(G_1 \cap G_2) = V(G_1) \cap V(G_2)$ with example.

Section - B

(9 x 5 = 45)

Q2) Let R = {(1, 2), (2, 3), (3, 1)} and A = {1, 2, 3}. Find Reflexive, symmetric, and transitive closure of R using composition of relation R.

Q3) If $f : A \rightarrow B$ and $g : B \rightarrow C$ be functions, then prove

(a) If f and g are injections, then $gof : A \rightarrow C$ is an injection.

(b) If f and g are surjections then so is gof.

Q4) Prove that $A - (B \cap C) = (A - B) \cup (A - C)$.

Q5) Show that set of real numbers in [0, 1] is uncountable set.

Q6) A man has 7 relatives, 4 of them are ladies, and 3 are gentlemen, his wife has 7 relatives and 3 of them are ladies and 4 are gentlemen. In how many ways can they invite a dinner party of 3 ladies and 3 gentlemen so that there are 3 man's relatives and 3 of wife relatives.

Q7) Using truth table show that $\sim(p \wedge q) \equiv (\sim p) \vee (\sim q)$.

Q8) Consider the following:

p : It is cold day, q : the temperature is 50°C

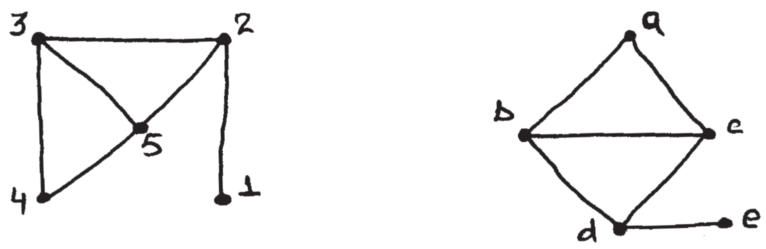
write the simple sentences meaning of the following:

(a) $\sim p$ (b) $p \vee q$ (c) $\sim(p \vee q)$ (d) $\sim p \wedge \sim q$ (e) $\sim(\sim p \vee \sim q)$

Q9) Prove that following propositions are tautology.

(a) $\sim (p \wedge q) \vee q$ (b) $p \Rightarrow (p \vee q)$

Q10) Show that two graphs shown in figure are isomorphic.



Q11) Prove a non-empty connected graph G is Eulerian if and only if its all vertices are of even degree.

Q12) Define graph coloring and chromatic number with two examples of each.

Q13) Prove a simple graph G has a spanning tree if and only if G is connected.