41321/C210

Reg. No. | | | | | | | | |

III Semester BCA.4 Degree Examination, Nov./Dec. - 2019

DISCRETE MATHEMATICAL STRUCTURES

(Regular)

PAPER : BCA 4

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates: Scientific calculators are allowed.

SECTION - A

Answer **All** the questions: **(10×2=20)**

1. a) Define Tautology with truth table.

b) Define Quantifiers.

c) If $U=\{1,2,3,4,5,6,7,8,9\}$, $A=\{1,3,5,6\}$ & $B=\{2,3,4,5\}$ find $A\Delta B$.

d) State Mathematical induction principle.

e) Define pigeonhole principle.

f) Define combination.

g) Write the recursive formula for the sequence 10,13, 16, 19, --------

h) Define semi group.

i) Define general graph.

j) Define Trees.

SECTION - B

Answer any **Four** of the following: **(4×5=20)**

2. Construct the truth table $(\sim p \wedge q) \rightarrow r$.

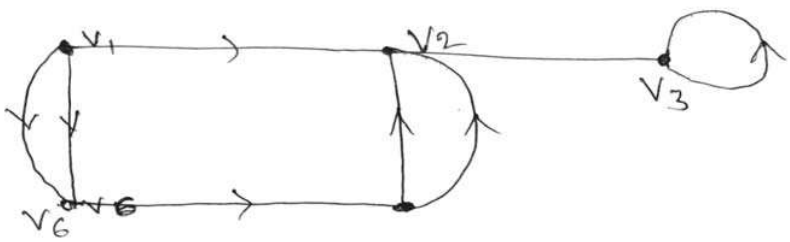
3. Define equivalence relation and verify R is an equivalence relation $A=\{1,2,3,4\}$ and $R=\{(1,1),(1,2),(2,1),(2,2),(3,4),(4,3),(3,3),(4,4)\}$

4. Let G be the set of all non-zero real numbers and let $a*b=\frac{1}{2}(ab)$. Show that $(G,*)$ is an abelian group.

5. Prove by mathematical induction for that $1^2+3^2+5^2+------(2n-1)^2=\frac{1}{3}n(2n-1)(2n+1)$.

P.T.O.

6. Find in degree and out degree of the vertices of the digraph.



SECTION - C

Answer any **Four** questions of the following: **(4×10=40)**

7. a) Give a direct proof of the statement "The Square of an odd integer is an odd integer".

   b) State any 5 rules of Inference along with their names. **(5+5=10)**

8. a) Write any 4 properties of the relations.

   b) $A = \{1,2,3,4\}$ and let R be the relation on A defined by $R = \{(1,1),(1,2),(1,3),(1,4),(2,2),(2,4),(3,3),(4,4)\}$. Represent the relation R as matrix & draw its diagraph. **(5+5=10)**

9. a) If $a = \{0,1,2,3,4,5,6\}$ construct addition table for $(+Z_7)$.

   b) Define subgroup & monoid group. **(5+5=10)**

10. a) Find the number of permutations of the letters of the word "MASSASAUGA". In how many of these all four A's are together? And how many of them begin with S?

    b) Prove that $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$ **(5+5=10)**

11. Define any 4 of the following terms: **(10)**

    i) Graph

    ii) Complete Graph

    iii) Isomorphism

    iv) Regular Graph

    v) Complement of Graph
