MCS-501

Discrete Mathematics

Master of Computer Application (MCA-20)

1st Semester, Examination June 2022

Time : 2 Hours   **Max. Marks:80**

Note : This paper is of eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

Section-A

(Long Answer-type questions)

Note: Section 'A' contains Five (05) long-answer-type questions of Twenty (20) marks each. Learners are required to answer any two (02) questions only.

(2 x 20=40)

Q.1   A).   Explain with example all the properties of Relation: Reflexive, Symmetric, Transitive, Irreflexive, Antisymmetric, Partial Ordering.

B).   PROVE the following using mathematical induction:

$1+3+5 +..........+2n-1 = n2$

P.T.O.

Q.2　A).　Define Group. What are the various properties of a group?

B).　Prove that the inverse of each element of a group is unique.

Q.3　A).　Suppose R and S are relations on set A. Prove that if R and S are transitive then R∩S is also transitive.

B).　How many reflexive relations and symmetric relations are there on a set of n elements? Explain with proper example.

Q.4　Express the statement as logical expressions:

a)　If I will study I will get a good job.

b)　Any integer is either positive or negative.

c)　All students in this call are intelligent.

d)　All men are mortal

Q.5　If R and S are equivalence relation on the set A. Show that R ∪ S is also an equivalence relation on A.

Section-B

(Short Answer-type questions)

Note: Section 'B' contains Eight (08) short-answer-type questions of Ten (10) marks each. Learners are required to answer any four (04) questions only.

$$(4 \times 10=40)$$

Q.1 Show that the relation $(x, y)R(a,b)$ such that $x^2+y^2=a^2+b^2$ is an equivalence relation on the plane and describe the equivalence classes.

Q.2 Prove that the composition of any function with the identity function is the function itself.

Q.3 Find the number of positive integral solutions to the equation $x+y+z=10$.

Q.4 Prove that

        a) $A+(B+C) = (A+B)+C$

        b) $A+(A.B) = A$

Q.5 Prove that every field is an integral domain.

Q.6 Let A={a,b,c}. Describe all partial order relation on A.

Q.7 Define counting principle. If there are 36 boys and 24 girls in a class, find the number of ways of selecting one student as class representative.

Q.8 Explain Cramer's rule using suitable example.

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