W-3317

M.A./M.Sc. (Fourth Semester) Examination, June-2020
MATHEMATICS
Paper - 411
Discrete Mathematical Structure

Time : Three Hours

Maximum Marks : 85 (For Regular)
Minimum Pass Marks : 29
Maximum Marks : 100 (For Private)
Minimum Pass Marks : 34

Note : Attempt **all** questions.

Q.1.   If R and S be equivalence relations in the set X then prove that $R \cap S$ is an equivalence relation in X. Also show that the relation "is equal to" in the set of all real numbers is an equivalence relation.

Q.2.   Show that

$$\sim \left(p \wedge \left(\sim q \wedge r \right) \right) \vee \left(q \wedge r \right) \vee \left(p \wedge r \right) \Leftrightarrow r.$$

Q.3.   Define distributive lattice. If $\left(L, \leq \right)$ is a distributive lattice and $a, b, c \in L$ then $a \vee b = a \vee c$ and $a \wedge b = a \wedge c \Rightarrow b = c$.

Q.4.   In a Boolean algebra $\left(B, +, \cdot, ' \right)$ show that

a)   If $a + x = b + x$ and $a + x' = b + x'$ then $a = b$.

b)   If $ax = bx$ and $a \cdot x' = b \cdot x'$ then $a = b$.

Q.5.   Show that by mathematical induction

$$1^2 + 2^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}, n \geq 1$$