Roll No. ....

Y – 3186 (A)

M.A./M.Sc. (Mathematics) (Fourth Semester) (SPECIAL)

EXAMINATION, August 2021

(SECOND CHANCE)

Paper – 411

DISCRETE MATHEMATICAL STRUCTURES

Time : Three Hours

Maximum Marks : 85 (For Regular Students)   *Minimum Pass Marks : 29*

Maximum Marks : 100 (For Private Students)   *Minimum Pass Marks : 34*

Note—Attempt *all* questions.

1. Attempt all parts—   17/20

    (i)   Define equivalence relation.

    (ii) State Zorn's lemma

    (iii) Explain Tautologies

    (iv) Explain NAND and NOR

    (v)   Define modular lattice.

2. Among 100 students, 32 study Mathematics, 20 study Physics, 40 study Biology, 15 study Mathematics and Biology, 7 study Mathematics and Physics, 10 study Physics and Biology and 30 do not study any of the three subjects—   17/20

    (i)   Find number of students studying all the three subjects.

    (ii) Find the number of students studying exactly one of the three subjects.

3. Prove by truth table that the following formula is a tautology—   17/20

$$(\sim q \Rightarrow \sim p) \wedge (q \Rightarrow p) \Rightarrow (p \Leftrightarrow q)$$

4. A lattice L is distributive if and only if—   17/20

$$(a \vee b) \wedge (a \vee c) \wedge (c \vee a) = (a \wedge b) \vee (b \wedge c) \vee (c \wedge a) \; \forall\, a, b, c \in L$$

5. Show that—   17/20

$$1^2 + 2^2 + \dots\dots + n^2 = \frac{n(n+1)(2n+1)}{6}, n \geq 1 \text{ by mathematical induction.}$$

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