International Institute of Information Technology Hyderabad

Discrete Structures (MA5.101)

Assignment 1

Deadline: September 28, 2020 (Monday), 23:55 PM

Total Marks: 50

Instructions: Submit ONLY handwritten scanned pdf file in the moodle under Assignments directory.

1. If A, B and C are any three sets, then prove that $(A \triangle B) \triangle C = A \triangle (B \triangle C)$ without apply the Venn-Euler's diagram, where $\triangle$ denotes the *symmetric difference* operation between two sets.

   [10]

2. If $A = \{n \in N : n \text{ is a multiple of } 12\}$ and $B = \{n \in N : n \text{ is a multiple of } 18\}$, find (i) $A \cup B$, (ii) $A \cap B$, (iii) $(A \cup B) - (B \cap A)$, (iv) $A \times B$ and (v) $P(A \cup B)$.

   [5 $\times$ 2 = 10]

3. Let U be the set of all quadrilaterals in a plane, and P, R, T and S are the subsets of U defined as follows:

   - $P =$ set of all parallelograms
   - $R =$ set of all rhombus
   - $T =$ set of all rectangles
   - $S =$ set of all squares

   Find the relationships between P, R, T and S in terms of containment.

   [10]

4. In a survey of 100 delegates attending a conference on Discrete Structures held at IIIT Hyderabad, the number of delegates who knew one or more of the 3 languages: English, French and Germany, was as follows: English 28, French 30, Germany 42; English and Germany 10; English and French 8; French and Germany 5. Only 3 people know all the three languages.

   - How many did not know any language at all?
   - How many knew only Germany?

   [5 + 5 = 10]

5. Prove or disprove the following statements.

   - $(A - B) \times C = (A \times C) - (B \times C)$
   - $(A \triangle B) \times C = (A \times C) \triangle (B \times C)$

[5 + 5 = 10]

All the best!!!