

Enrollment No.:

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION-FEB-2023

B.Tech-IV Semester (CSE/IT)

COURSE CODE (CREDITS): 18B11CI414 (3)

MAX. MARKS: 15

COURSE NAME: DISCRETE COMPUTATIONAL MATHEMATICS

COURSE INSTRUCTORS: RKB, BKP, PKP\*

MAX. TIME: 1 Hour

*Note: All questions are compulsory. Marks are indicated against each question in square brackets. Mobile Phones, smart watches, calculators, and any other electronic gadgets etc. are prohibited during the Examination.*

1. (a) Let P, Q and R be sets and  $\Delta$  denote the symmetric difference operator defined as

$$P\Delta Q = (P \cup Q) - (P \cap Q).$$

Using Venn diagrams, determine which of the following is/are TRUE? [CO1] [1.5M]

(I)  $P\Delta(Q \cap R) = (P\Delta Q) \cap (P\Delta R)$

(II)  $P \cap (Q \cap R) = (P \cap Q) \Delta (P \Delta R)$

(b) Explain the notion of cross-partition for  $X = \{1, 2, 3, 4, 5, 6\}$  by taking two suitable partitions. [CO1] [1.5M]

2. (a) How many positive integers not exceeding 1000 are divisible by 7 or 11? [CO1] [2M]

(b) Find the dual of  $A \cup B$ , where  $A = \{1, 2, 3\}$ ,  $B = \{3, 4, 5\}$ . [CO1] [1M]

3. (a) Consider the relation  $R$  on a set of real numbers such that  $R = \{(a, b) \mid a \leq b\}$ . Check this relation is transitive or not. [CO2] [1M]

(b) Show that the relation of divisibility ( $\mid$ ) on the set of positive integers is antisymmetric. [CO2] [2M]

4. Consider a relation  $R$  on  $A = \{5n : n \in \mathbb{Z}\}$  defined by  $(a, b) \in R$  iff  $a - b \in A$ . Explain whether  $R$  is an equivalence relation on  $A$  or not? Also compute [5]? [CO2] [3M]

5. Verify whether  $(\{1, 2, 3, 9, 18\}, \mid)$  is a poset or not? In case it is a poset draw its Hasse diagram. [CO2] [3M]

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