Enrollment No.:

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION-FEB-2023

B.Tech-IV Semester (ECE)

COURSE CODE (CREDITS): 18B11MA413 (3) MAX. MARKS: 15

COURSE NAME: DISCRETE MATHEMATICS

COURSE INSTRUCTOR: Pradeep Kumar Pandey 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.*

Q1. Find the number of positive integers not exceeding 1000 that are divisible by 7 or 13. [CO1] [2M]

Q2. Write the dual statement for the following: [CO1] [2M]

(i) $A \cup B = (A \cap B) \cup (A \cap B^c) \cup (A^c \cap B)$

(ii) $(A \cup B) \cap (A \cup \phi) = A$

Q3. (a) Suppose $S = \{1,2,3,4,5,6,7,8,9\}$. Find the cross partition of the following partitions of S: $P_1 = [\{1,3,5,7,9\},\{2,4,6,8\}]$, and $P_2 = [\{1,2,3,4\},\{5,7\},\{6,8,9\}]$. [CO1] [2M]

(b) Justify that "In *Himachal Pradesh*, there are two non-bald people who have the same number of hairs on their head". Hint: Assume that any person can have at most 500000 hairs on their head. [1M]

Q4. (a) Suppose $R = \{(1,1),(2,4),(3,4),(4,2)\}$ denote a relation on the set $A = \{1,2,3,4\}$. Compute R^2, and R^3. [CO2] [3M]

(b) Prove or disprove that $f(x) = 5x^3 - 3x^2 + 11x - 6$ is Big-O of x^3. [2M]

Q5. Suppose P denote the set of all humans. Define a relation R on P given by:

$R = \{(x,y): x \text{ and } y \text{ have same age in years}\} \subseteq P \times P$. [CO2] [3M]

Justify whether R is an equivalence relation or not?

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