

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -1 EXAMINATION, Feb 2020B.Tech IV<sup>h</sup> Semester (ECE)

Course Code: 18B11MA413

MAX. MARKS: 15

Course Name: Discrete Mathematics

Course Credits: 03

MAX. TIME: 1 Hrs

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Marks are indicated in square brackets against each question*

Q1. If  $A$  and  $B$  are two sets, show that

$$(A - B) \cup (B - A) = (A \cup B) - (A \cap B) \quad [3], (CO1)$$

Q2. Let  $P$  and  $Q$  be relations on set  $A = \{1, 2, 3, 4\}$  defined by  $P = \{(a, b) : |a - b| = 1\}$  and  $Q = \{(a, b) : (a - b) \text{ is even}\}$ .a) Represent  $P$  and  $Q$  as digraph.b) Write matrix form of  $P$  and  $Q$ c) Find  $P \circ P, P \circ Q$  and  $Q \circ Q$  [3], (CO1)Q3. Show that the relation  $(x, y) R (a, b) \Leftrightarrow x^2 + y^2 = a^2 + b^2$  is an equivalence relation on the plane. [3], (CO1)Q4. If  $f: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = x^3 + 7$ , show that  $f(x)$  is a bijective function. Also compute  $f \circ f^{-1}(x)$  and  $f^{-1} \circ f(x)$ . [3], (CO1)Q5. Solve the recurrence relation  $2a_r = 5a_{r-1} - 2a_{r-2}, r \geq 2$  using generating functionwith the conditions  $a_0 = 0$  and  $a_1 = 1$  [3], (CO1)