

JAYPEE UNIVERSITY OF INFORMATRION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- DECEMBER-2017

B.Tech Ist Semester (BI/BT)

COURSE CODE: 10B11MA112

MAX. MARKS: 35

COURSE NAME: Basic Mathematics I

MAX. TIME: 2 Hrs

COURSE CREDITS: 04

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

Q1. Solve the system of equations using Matrix method.

[5]

$$x - y + z = 4$$

$$2x + y - 3z = 0$$

$$x + y + z = 2$$

Q2. Let $A = \{1, 2, 4, 5\}$, $B = \{2, 3, 5, 6\}$ and $C = \{4, 5, 6, 7\}$. Verify

$$(a) A \cap (B - C) = (A \cap B) - (A \cap C)$$

[2.5]

$$(b) A - (B \cap C) = (A - B) \cup (A - C)$$

[2.5]

Q3. Let R be relation on $Z^+ = \{1, 2, 3, \dots\}$ defined by $x + 3y = 12$.Find $Relation(R)$, $Domain(R)$, $Range(R)$, RoR , R^{-1}

[1 X 5=5]

Q4. Show that the function $f(x) = x|x|$ is differentiable at $x = 0$

[4]

$$Q5.(a) \text{ Show that } \frac{d}{dx} \left[\frac{1+\tan x}{1-\tan x} \right] = \frac{2}{(\cos x - \sin x)^2}$$

[3]

$$(b) \text{ Show that } \frac{d}{dx} \left[\frac{e^x + e^{-x}}{e^x - e^{-x}} \right] = -\frac{4}{(e^x - e^{-x})^2}$$

[3]

Q6. Evaluate

$$(a) \int \cos mx \cos nx \, dx, m \neq n$$

[2]

$$(b) \int \frac{e^x - e^{-x}}{e^x + e^{-x}} \, dx$$

[3]

$$(c) \int \frac{x^2}{(x-1)(x-2)(x-3)} \, dx$$

[3]

$$(d) \int_1^{2 \log x} \frac{dx}{x^2}$$

[2]