

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2
(April 2018)

B.Tech CE - II SEMESTER

COURSE NAME : Mathematics-II
COURSE CODE : 10B11MA201
COURSE CREDITS : 04

MAXM. MARKS : 25
MAXM. TIME : 1½ Hour

NOTE : Attempt all questions. Marks are indicated against each question.

1. For Bessel functions establish the following

$$\int J_3(x) dx = -J_2(x) - \frac{2}{x} J_1(x). \quad [\text{CO-3}] [4]$$

2. Show that $4J_n''(x) = J_{n-2}(x) - 2J_n(x) + J_{n+2}(x)$. [CO-3] [4]

3. Express the polynomial $x^4 + 3x^3 - x^2 + 5x - 2$ in terms of Legendre Polynomials. [CO-3] [3]

4. Prove that $\int_{-1}^1 x P_n(x) P_{(n-1)}(x) dx = \frac{2}{4n^2 - 1}$ [CO-3] [5]

5. State and prove the orthogonality property of Chebyshev Polynomials. [CO-3] [5]

6. Solve the differential equation $y'' - xy = 0$ in power series about the origin. [CO-2] [4]