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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST 2 EXAMINATION - OCTOBER 2018

B.Tech III Semester (CSE, ECE, IT)

COURSE CODE: 10B11MA201

MAX. MARKS: 25

COURSE NAME: Mathematics-II

COURSE CREDITS: 04

MAX. TIME: 1.5 HRS

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

1. Find the power series solution of  $y'' + 3xy = 0$  about  $x = 0$ . [5](CO-2)

2. Express  $x^4 + 3x^3 + 2x^2 + 5x + 1$  in terms of Chebyshev polynomial  $T_n(x)$ . [2](CO-3)

3. Evaluate  $\int_{-1}^1 P_n^2(x) dx$  and hence show that  $\int_{-1}^1 P_4^2(x) dx = \frac{2}{9}$ . [5](CO-3)

4. Prove that  $nP_n(x) = xP_n'(x) - P_{n-1}'(x)$ . [3](CO-3)

5. Find a Fourier series expansion of  $f(x) = \pi - x$  for  $0 < x < 2\pi$ . [3](CO-4)

6. Find the temperature distribution  $u(x, t)$  for a laterally insulated bar of length 80 cm, if the

initial temperature of the bar is  $100 \sin\left(\frac{\pi x}{80}\right)^\circ C$  and ends are kept at  $0^\circ C$ , governed by

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}.$$
 [7](CO-4)