

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 Oct 2017

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

COURSE CODE: 10B11MA201

MAX. MARKS:25

COURSE NAME: MATHEMATICS-II

COURSE CREDITS: 4

MAX. TIME: 1 Hour 30 Minutes

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. All questions carry equal marks.

1. Find the displacement $u(x, t)$ for the string of length $L=1$ and $c^2 = 1$, when the initial velocity is zero and the initial deflection is $f(x) = x(1 - x^2)$.

2. Show that
$$\int_{-1}^1 \frac{T_m(x)T_n(x)}{\sqrt{1-x^2}} dx = \begin{cases} \pi, & \text{when } m = n = 0 \\ \frac{\pi}{2}, & \text{when } m = n \neq 0. \\ 0, & \text{when } m \neq n \end{cases}$$

3. For Legendre polynomials show that
$$\int_{-1}^1 x^2 P_{n+1}(x)P_{n-1}(x) dx = \frac{2n(n+1)}{(2n-1)(2n+1)(2n+3)}$$

4. Prove the recurrence relation: $P'_n(x) = xP'_{n-1}(x) + nP_{n-1}(x)$.

5. Show that $\int x^{-1}J_4(x)dx = -x^{-1}J_3(x) - 2x^{-2}J_2(x) + C$.