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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

B.Tech. II SEMESTER (ECE/CSE/IT/CE)

Test 1 - (February 2020)

COURSE CODE: 18B11MA211   MAX. MARKS: 15

COURSE NAME: ENGINEERING MATHEMATICS II

COURSE CREDITS: 4   MAX. TIME: 1 Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Use of scientific calculator is not allowed.

1. (a) Find the radius of convergence for the following power series: [CO1]   (1 Mark)

$$x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$$

   (b) Test the following alternating series for convergence: [CO1]

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2 + 3n + 4}$$

   (2 Marks)

   If it is convergent, check also if it is absolutely convergent or conditionally convergent.

2. Use a suitable test to check whether the following series is convergent or divergent: [CO1]

$$\frac{2}{7} + \frac{2.5}{7.10} + \frac{2.5.8}{7.10.13} + \frac{2.5.8.11}{7.10.13.16} + \dots$$

   (4 Marks)

3. Find the Fourier series of the function $f(x) = \begin{cases} -1 & -\pi < x < 0 \\ 0 & x = 0 \\ 1 & 0 < x < \pi \end{cases}$.   (4 Marks)

   Use the Fourier series expansion to show that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \dots$ [CO1]

4. Find the general solution of the following differential equation [CO2]:   (4 Marks)

$$\frac{d^2 y}{dx^2} - 4\frac{dy}{dx} + 5y = e^{5x} + x\sin 3x - \cos 3x.$$

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