

Jaypee University of Information Technology, Waknaghat

Test-1 Examination, February 2024

B.Tech - II Semester (CSE/CSE-AIML/CSE-AIDS/CSE-CS/IT/ECE/CE)

Course Code/Credits: 18B11MA211/4

Max. Marks: 15

Course Title: Engineering Mathematics - II

Course Instructors: RAD*, BKP, PKP, MDS, NKT, SST

Max. Time: 1 hour

Note: (a) All questions are compulsory.

(b) Scientific calculators are allowed.

(c) Marks are indicated against each question in round brackets.

(d) The candidate is allowed to make suitable numeric assumptions wherever required.

1. Discuss the *convergence* of the series by comparing with another series: (3 Marks) [CO-1]

$$\sum_{n=1}^{\infty} \frac{3n+1}{n^3+3n^2+2n}$$

2. Consider the following infinite series:

(3 Marks) [CO-1]

$$\frac{1 \cdot x^3}{2 \cdot 3} + \frac{1 \cdot 3 \cdot x^5}{2 \cdot 4 \cdot 5} + \frac{1 \cdot 3 \cdot 5 \cdot x^7}{2 \cdot 4 \cdot 6 \cdot 7} + \dots$$

(a) Write down the n^{th} term of the series.

(b) Discuss the *convergence* of the infinite series when $x > 0$.

3. Examine the *convergence* of the series by Leibniz's test:

(3 Marks) [CO-1]

$$\frac{1}{2^3} - \frac{1}{3^3}(1+2) + \frac{1}{4^3}(1+2+3) - \frac{1}{5^3}(1+2+3+4) + \dots$$

4. Consider the following power series:

(3 Marks) [CO-1]

$$\sum_{n=1}^{\infty} \frac{n(x+3)^n}{5^n}$$

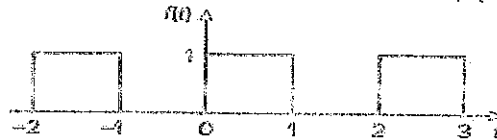
(a) Find the *radius of convergence*.

(b) Determine the *interval of convergence*.

5. Consider the periodic waveform function and its graph as shown:

(3 Marks) [CO-1]

$$f(t) = \begin{cases} 1 & , 0 < t < 1 \\ 0 & , 1 < t < 2 \end{cases}$$



(a) Obtain Fourier series expansion of the waveform $f(t) = f(t+2)$.

(b) Deduce that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$.

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