JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2024

B.Sc.-III Semester (Mathematics & Computing)

COURSE CODE(CREDITS): 24BS1MA312 (4) MAX. MARKS: 15

COURSE NAME: REAL ANALYSIS & DIFFERENTIAL EQUATIONS

COURSE INSTRUCTORS: RKB, RAD* MAX. TIME: 1 Hour

Note: (a)All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

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1. Suppose $X = (x_n)$ and $Y = (y_n)$ be sequences of real numbers that converges to x and y, respectively. Then show that the sequence $X + Y$ converges to $x + y$. Give any one example for verification. [CO-1] [3]

2. State Bolzano-Weierstrass theorem. Discuss the convergence of the sequence $X = \left(n^{\frac{1}{n}}\right)$ and find the limit if it exists. [CO-1] [3]

3. Discuss the convergence of the following series: [CO-1] [3]

$$\frac{1}{2} + \frac{1}{2}\cdot\frac{3}{4} + \frac{1}{2}\cdot\frac{3}{4}\cdot\frac{5}{6} + \cdots$$

4. Find the radius of convergence of the series $\sum_{n=1}^{\infty} \frac{n!}{n^n} x^n$. [CO-1] [3]

5. Find the general solution of the following differential equation: [CO-2] [3]

$$y''' + 2y'' + y' = e^{2x} + cos2x.$$

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