Jaypee University of Information Technology, Waknaghat

TEST-1 Examination - February 2026

B.Tech. II Semester (CSE/IT/CSECS/FSSD/AIDS/AIML/UXUI)

Course Code(Credits): 25B11MA211/24B11MA211/18B11MA211(4) Max. Marks: 15
Course Title: Mathematics–II/Engineering Mathematics–II
Course Instructors: RAD,RKB,NKT,PKP,BKP,MDS Max. Time: 01 Hour

Note: (a) ALL questions are compulsory.

(b) Scientific calculators are NOT allowed.

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

Q.No	Question	CO	Marks
Q1	In a distributed computing system, the processing load $y(x)$ on a server varies with time x. Due to proportional scaling of resource allocation and adaptive feedback, the load dynamics is modeled by $$x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} = x^3 + \frac{3}{x^2}.$$ (a) Using a suitable change of independent variable, transform the given differential equation into an equivalent differential equation with constant coefficients. (b) Determine the complementary solution of the reduced equation and comment on the long-term stability of the system.	CO-1	2.5
Q2	For an electrical transmission line with spatial forcing, the voltage distribution $y(x)$ satisfies $\frac{d^2y}{dx^2} - y = xe^x$. Find the particular integral by method of variation of parameters, given that the complementary function is $c_1e^x + c_2e^{-x}$.	CO-1	2.5
Q3	Examine the convergence of the series $$\frac{\sqrt{2}-1}{3^3-1} + \frac{\sqrt{3}-1}{4^3-1} + \frac{\sqrt{4}-1}{5^3-1} + \cdots$$ (a) Write down the n^{th} term of the series. (b) Use an appropriate test to decide the convergence of the series.	CO-2	2.5
Q4	Discuss the convergence or divergence of the series $\sum_{n=2}^{\infty}\left(1+\frac{1}{n}\right)^{-n}$. (a) Compute $\lim_{n\to\infty}\frac{u_n}{u_{n+1}}$. (b) Determine the nature of series by Logarithmic test.	CO-2	2.5

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Q.No	Question	CO	Marks
Q5	Consider the following infinite series: $$1-\frac{1}{2\cdot 3}+\frac{1}{2^2\cdot 5}-\frac{1}{2^3\cdot 7}+\cdots$$ (a) Give the n^{th} term of the series. (b) Test the convergence of the series by *alternating series test.*	CO-2	2.5
Q6	In a computer network, a request may require multiple retries before success. Under network load parameter $x \geq 0$, the expected total delay due to retries is modeled by the power series $$\sum_{n=1}^{\infty} n\left(\frac{x-5}{2}\right)^n.$$ Determine the *radius of convergence* of the given power series.	CO-2	2.5

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