

JK Lakshmipat University Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

Mid Term Examination-I, February, 2015
B. Tech. (Backlog, Batch 2011), Semester II



Roll No.....

Engg. 202 : Engineering Mathematics II

Time: 1.5 hours

Max. Marks: 40

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.

Q.1A	Objective type questions (5 questions @ 1 mark)	05
i.	1. Find whether the functions $f_1(x) = x^2$ and $f_2(x) = x^3$ are orthogonal on an interval $[-1, 1]$.	
ii.	State True & False : $\lim_{n \rightarrow \infty} \left(\frac{n^2 - 2n}{3n^2 + n} \right)$ is convergent.	
iii.	The degree of ODE $\frac{d^2 y}{dx^2} + \left(\frac{dy}{dx} \right)^2 = e^{x-y}$ is - (a) 2 (b) 1 (c) 0 (d) None of these	
iv.	The I.F. for a linear differential equation $\frac{dy}{dx} + Py = Q$ is	
v.	$x \sin\left(\frac{y}{x}\right) \frac{dy}{dx} = y \sin\left(\frac{y}{x}\right) + x$ is differential equation: (a) Partial (b) Ordinary (c) Both Ordinary & Partial (d) None of these	
Q.1B	Short answer type questions (2 questions @ 2.5 marks)	05
i.	Write the difference between an ordinary and a singular point of a differential equation. Under what condition, a singular point $x = 0$ is called as regular singular point?	
ii.	Classify the linear second-order partial differential equations.	
Q.2A	Find Taylor Polynomial of degree 5 for e^x at $x = 0$	05
Q.2B	Determine the interval of convergence of the series $x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots$	05
Q.3A	Find the Fourier series of $f(x) = x + \pi, -\pi < x < \pi$.	05
Q.4A	Find the Fourier series of $f(x) = \begin{cases} 0, & -1 < x < 0 \\ x, & 0 \leq x < 1 \end{cases}$	05
Q.4B	Solve the heat equation $k \frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}, 0 < x < 2, t > 0$ subject to the given conditions: $u(0, t) = 0; u(2, t) = 0; u(x, 0) = \begin{cases} 1, & 0 < x < 1 \\ 0, & 1 < x < 2 \end{cases}$ OR	10
Q.4B	Solve $(x^2 + 1)y'' + xy' - y = 0$ in the power series of x .	10

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