

Q.P Code D134497	Total Pages 2	Name	672310
		Register No.	
<b>THIRD SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025</b>			
<b>(CUFYUGP)</b>			
<b>MAT3MN202 Differential Equations and Fourier Series</b>			
<b>2024 Admission Onwards</b>			
<b>Maximum Time :2 Hours</b>		<b>Maximum Marks :70</b>	

## Section A

All Question can be answered. Each Question carries 3 marks (Ceiling: 24 Marks)

1	Solve the differential equation $\csc y dx + \sec^2 x dy = 0$
2	Solve the given initial-value problem $x \frac{dy}{dx} + y = e^x; y(1) = 2$
3	Solve the $(x - y)dx + xdy = 0$ differential equation by using an appropriate substitution.
4	Determine whether the given set of functions $\{e^x, e^{-x}, \sinh x\}$ is linearly dependent or linearly independent on the interval $(-\infty, \infty)$ .
5	Find the general solution of the second-order differential equation $2y'' + 2y' + y = 0$
6	Write Fourier series of a function $f$ defined on the interval $(-p, p)$
7	Write the Fourier series of an even function on the interval $(-p, p)$
8	Classify the following equation $3 \frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial y}$
9	Write the number $\frac{(4 - 2i)(7 + 3i)}{(2 - i)(3 + 4i)}$ in the form $a + ib$ .
10	Find $(2 - 2i)^5$

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## Section B

All Question can be answered. Each Question carries 6 marks (Ceiling: 36 Marks)

11	Solve $(\sin y - y \sin x)dx + (\cos x + x \cos y - y)dy = 0$
12	Solve the initial-value problem $\frac{dy}{dx} = \cos(x + y); y(0) = \pi/4$
13	Solve the given boundary-value problem. $y'' - 2y' + y = 0, y(0) = 5, y'(0) = 1$
14	Solve $x^2y'' - 2xy' - 4y = 0$
15	Expand the function $f(x) = \cos x; -\pi/2 < x < \pi/2$ in an appropriate cosine or sine series.
16	Use separation of variables to find, if possible, product solutions for the following partial differential equation. $y \frac{\partial u}{\partial x} = x \frac{\partial u}{\partial y} = 0$
17	Sketch the graph of the equation $ 2z + 1  = 4$
18	Show that the function $f(z) = x + \sin x \cosh y + i(y + \cos x \sinh y)$ is analytic everywhere.

## Section C

Answer any ONE. Each Question carries 10 marks (1x10=10 Marks)

19	Find a particular solution of $y'' - y' + y = 2 \sin 3x$
20	Verify that the function $u = x^2 - y^2$ is harmonic. Find $v$ , the harmonic conjugate function of $u$ . Form the corresponding analytic function $f(z) = u + iv$ .