BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2023)

CLASS: BTECH — **SEMESTER : II**
BRANCH: ALL — **SESSION : SP/2023**

SUBJECT: MA107: MATHEMATICS-II

TIME: 02 Hours — **FULL MARKS: 25**

INSTRUCTIONS:
1. **The question paper contains 5 questions each of 5 marks and total 25 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. **Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Find only the complementary function of the differential equation $3\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 4y = 0$	[2]	1	BL-1 &2
Q.1(b)	Find only the particular integral of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 2sinx + 3cosx$	[3]		BL - 1 &2
Q.2	Solve the Cauchy Euler's linear differential equation- $x^3\frac{d^3y}{dx^3} + 3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 24x^2$	[5]		BL - 1,2,3
Q.3	Find the power series solution of the differential equation $\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 2y = 0$ about an ordinary point $x = 0$ only.	[5]		BL-1,2,3
Q.4(a)	Find the values of m and n if $3x^2 = mP_2(x) + nP_0(x)$ where $P_0(x)$ and $P_2(x)$ are Legendre's polynomials.	[2]		BL-2,3
Q.4(b)	Show that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}}\ sinx$	[3]		BL-1,2
Q.5	Find the Fourier series to represent the function defined as $f(x) = \begin{cases} \pi + x, & -\pi < x < 0 \\ 0, & 0 \le x < \pi \end{cases}$	[5]		BL-1,2,3

:::::24/05/2023 M:::::