BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: IMSc **SEMESTER : IV**
BRANCH: CHEMISTRY **SESSION : SP/2025**

SUBJECT: MA207R1 MATHEMATICS IV

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	Compute the general solution of the following differential equation: $(D^2 - 9D + 20)y = 8e^{2x} + 9\cos x$	[5]	CO1	
Q.2(a)	Show that the functions $f(t) = t,\ g(t) = e^{2t}$ are linearly independent.	[2]	CO1	
Q.2(b)	Develop the general solution of the following differential equation with the use of method of variation of parameters: $y'' - 3y' + 2y = e^{3x}$	[3]	CO1	
Q.3	Find the solution of the following equations in power series $(4 - x^2)y'' - 2xy' + 8y = 0$	[5]	CO2	
Q.4(a)	Express the following in terms of Legendre polynomials $x^3 + 2x^2 - x - 3$	[2]	CO2	
Q.4(b)	$(x^2 - 16)^2 y'' + (x - 4)y' + y = 0$ Determine the ordinary and singular points for the above equation. Further classify the singular points.	[3]	CO2	
Q.5	Find the Fourier series for the function $f(x)$ if $f(x)$ is defined in $0 < x < 2\pi$ as $f(x) = x, \quad 0 < x < \pi$ $= \pi, \ \pi < x < 2\pi$	[5]	CO3	

::::::27/02/2025::::::E