BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc **SEMESTER : III**
BRANCH: Physics **SESSION : MO/2025**

SUBJECT: PH24205 MATHEMATICAL PHYSICS I

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1	Find the eigenvalues and normalised eigenfunctions of the matrix $\begin{pmatrix} 1 & 0 & 0 \\ 0 & cos\theta & -sin\theta \\ 0 & sin\theta & cos\theta \end{pmatrix}$.	[10]	1	1,2
Q.2	If $\vec{F} = 2y\hat{\imath} - z\hat{\jmath} + x\hat{k}$. Evaluate $\int_C \vec{F} \times \overrightarrow{dr}$ along the curve $x = cost, y = sint, z = 2cost$, from $t = 0$ to $t = \pi/2$.	[10]	2	2,3
Q.3	Find a complex Fourier series expansion of $f(x) = x, -2 < x < 2$.	[10]	(a) 3	(I 2,3
Q.4	Define convolution between two functions and prove the convolution theorem.	[10]	4	2,3
Q.5	Find the inverse Laplace transform of $\frac{8}{s^3(s+2)}$.	[10]	5	2,3

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