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

CLASS: IMSC **SEMESTER : III**
BRANCH: PHYSICS **SESSION : MO/2025**

SUBJECT: PH24205 MATHEMATICAL PHYSICS I

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	Show that the eigenvalues, trace and determinant of a matrix are unchanged under a change of basis or a similarity transformation.	[5]	1	1,2
Q.2	Show how to diagonalise a matrix (assuming diagonalisability).	[5]	1	2,3
Q.3	Give physical interpretation of gradient, divergence and curl.	[5]	2	1,2
Q.4	Evaluate $\iint \vec{F} \cdot \vec{n} ds$ where $\vec{F} = 2xy\hat{\imath} + yz^2\hat{\jmath} + xz\hat{k}$ and integration is taken over the surface of the parallelepiped bounded by the six surfaces $-x = 0, y = 0, z = 0, x = 2, y = 1$ and $z = 3$.	[5]	2	2,3
Q.5	Write down the Fourier series expansion of a periodic function and also prove orthogonality of sine and cosine functions.	[5]	2	2,3

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