

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: IMSc
BRANCH: PHYSICS

SEMESTER : III
SESSION : MO/2024

SUBJECT: PH105R2 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	Find the eigenvalues and normalised eigenfunctions of the matrix $\begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$.	[5]	1	2,3
Q.3	State the Gauss theorem, Stokes theorem and Green's theorem.	[5]	2	1,2
Q.4	Give physical interpretation of gradient, divergence and curl.	[5]	2	2,3
Q.5	Evaluate $\int_{(1,0)}^{(-1,0)} \frac{-ydx+xdy}{x^2+y^2}$ along the following paths: (a) Straight line segments joining (1,0)--(1,1)--(-1,1)--(-1,0) (b) Straight line segments joining (1,0)--(1,-1)--(-1,-1)--(-1,0)	[5]	2	2,3

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