

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

CLASS: IMSc
BRANCH: PHYSICS

SEMESTER : VI
SESSION : SP/2025

SUBJECT: PH315 ELECTROMAGNETIC THEORY

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.
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		CO	BL
Q.1(a)	Discuss gauge transformation.	[5] 1	6
Q.1(b)	Develop Poisson's equation in terms of magnetic vector potential.	[5] 1	3
Q.2(a)	Prove the transverse nature of electromagnetic waves in vacuum and dielectric medium.	[5] 2	5
Q.2(b)	Find the skin depth for a frequency of 10^{10} Hz for Silver. Given $\sigma = 2 \times 10^7$ S/m and $\mu = 4\pi \times 10^{-7}$ H/m.	[5] 2	1
Q.3(a)	Determine the relation between wave impedance and refractive index of the medium.	[5] 3	5
Q.3(b)	What is Brewsters Law. Explain with proper diagram.	[5] 3	1
Q.4(a)	Explain the production and detection of plane, circularly, and elliptically polarised light with diagram.	[5] 4	2
Q.4(b)	Starting from plane wave propagation in anisotropic dielectric medium show that three vectors \vec{D} , \vec{E} , and \vec{K} are coplanar.	[5] 4	2
Q.5(a)	Explain the construction and working of Laurent's half-shade polarimeter.	[5] 5	2
Q.5(b)	Find the continuity equations between two dielectric media of different permittivity separated by a boundary.	[5] 5	1

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