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

CLASS: BTECH — **SEMESTER : II /ADDNL**
BRANCH: CSE/AIML/ECE/EEE — **SESSION : SP/2025**

SUBJECT: PH24101/PH113 PHYSICS

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(a)	What is Malu's law?	[2]	1	1
Q.1(b)	An unpolarized incident light of intensity I_0 = 314 W/m^2 passes through a sequence of two polarizers placed along the x-axis. The axis of the first polarizer is 20 degrees from the z-axis and the second polarizer is at a relative angle of 45 degrees from the first one. Obtain the final intensity. What will be the final intensity if the first polarizer is removed?	[3]	1	3
Q.2(a)	Draw a schematic of the intensity pattern of single slit diffraction with suitable axes labels.	[2]	1	1
Q.2(b)	Write down the conditions for constructive and destructive interference in a thin film geometry. Describe all the terms. A light of wavelength 520 nm is incident normally on a parallel soap film (refractive index 1.3) and leads to constructive interference upon reflection. Determine the minimum thickness of the film.	[3]	1	3
Q.3(a)	Calculate (i) gradient of $f(x,y,z) = 5x^2y + 9x^3z^2$, (ii) curl of $\vec{P} = 2x\,\hat{\imath} + 7xy^2\,\hat{\jmath} + 4\,\hat{k}$.	[2]	2	2
Q.3(b)	Using Gauss's law, show that the electric field of an infinite charged plate of charge density σ is $\left\|\vec{E}\right\| = \frac{\sigma}{2\epsilon_0}$ and is perpendicular to the surface.	[3]	2	3
Q.4(a)	Discuss the physical significance of $\nabla \cdot \vec{B} = 0$.	[2]	2	2
Q.4(b)	State Ampere's law. Determine the magnetic field at a distance r from an infinitely long wire carrying current I.	[3]	2	3
Q.5(a)	Write down the basic postulates of the special theory of relativity.	[2]	3	1
Q.5(b)	What are Lorentz transformation equations? Mention all assumptions.	[3]	3	2

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