

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

CLASS: B.SC.  
BRANCH: CHEMISTRY

SEMESTER : I  
SESSION : MO/2025

SUBJECT: PH109 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
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		CO	BL
Q.1(a)	Find the curl of $3x^2y^2 \mathbf{i} + x^2zy \mathbf{j} + xyz^2 \mathbf{k}$	[2]	1 2
Q.1(b)	Derive the divergence form of the Gauss law. If $\mathbf{D} = 3xy^2 \mathbf{i} + x^2z \mathbf{j} + xy^2z^2 \mathbf{k}$ , calculate the charge density at point (2,1,1).	[3]	1 2
Q.2(a)	What is polarization vector, write the expression.	[2]	1 1
Q.2(b)	Find the relation between $\mathbf{E}$ and $\mathbf{V}$ .	[3]	1 1
Q.3(a)	What is the statement of Ampere Circuit law.	[2]	2 1
Q.3(b)	A conductor in the shape of a square loop of edge length $l=0.2$ m, carries a current $I=5$ A in anticlockwise direction. Find the magnitude and direction of the magnetic field at the center of the square.	[3]	2 1
Q.4(a)	What is Gauss law of Magnetostatic?	[2]	2 2
Q.4(b)	Plane $x=1$ carries current $\mathbf{K}=15 \mathbf{z}$ mA/m. Find $\mathbf{H}$ at (a) (0,0,0), and (b) (4,1,2).	[3]	2 3
Q.5(a)	Define mass defect. Calculate the mass defect in formation of deuteron, Given mass of ${}^1_1\text{H}^2 = 2.013553$ u; $m_p = 1.007276$ u, $m_n = 1.008665$ u.	[2]	3 2
Q.5(b)	What are the different classifications of nucleus, write each with example.	[3]	3 1

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