

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

**CLASS: BSc**  
**BRANCH: CHEMISTRY**

**SEMESTER : I**  
**SESSION : MO/2024**

**SUBJECT: PH109 PHYSICS-I**

**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) Write the values of the following expressions:	[5]	1	I
A) $\text{Div}(\text{Grad}\phi)$ , $\phi$ is a scalar potential.			
B) $\text{Curl}(\text{Grad}\phi)$ , $\phi$ is a scalar potential.			
C) $\text{Div}(\text{Curl}\vec{A})$ , $\vec{A}$ is a vector quantity.			
D) $\text{Curl}(\text{Curl}\vec{A})$ , $\vec{A}$ is a vector quantity.			
E) $\text{Div}(\vec{A} \times \vec{B})$ , $\vec{A}$ and $\vec{B}$ are vector quantities, respectively.			
Q.1(b) Write the Maxwell's equations for the Electrostatics and Electrodynamics cases, respectively.	[5]	1	II
Q.2(a) Obtain expression for the Poisson's equations for time-varying conditions.	[5]	2	II
Q.2(b) What would you obtain taking the curl of Maxwell's third equation and utilizing Maxwell's fourth equation?	[5]	2	III
Q.3(a) Explain the principle of binding energy curve that is liquid-drop model.	[5]	3	II
Q.3(b) Elaborate the principle of nuclear fission, nuclear fusion and controlled thermonuclear reactions.	[5]	3	II
Q.4(a) Show that the radius of dark ring in Newton's ring is proportional to square root of natural number.	[5]	4	II
Q.4(b) State the Brewster's Law. Show that at this angle, reflected ray and refracted ray are at $90^\circ$ .	[5]	4	III
Q.5(a) For relativistic velocity, find the relation for length contraction. Compute the contracted length of an object whose initial length 10 m and travel with a velocity $0.75c$ ?	[5]	5	III
Q.5(b) Find the relationship between total energy, momentum and rest mass energy.	[5]	5	II

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