

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

CLASS: BTECH  
BRANCH: BT/CHEMICAL/CIVIL/MECH/PROD

SEMESTER : I  
SESSION : MO/2022

SUBJECT: PH113 PHYSICS

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.
- 

		CO	BL
Q.1(a)	Develop the intensity distribution formula due to single slit Fraunhofer diffraction.	[5]	1 3
Q.1(b)	A parallel beam of light ( $\lambda = 5890\text{\AA}$ ) strikes a film of oil ( $\mu = 1.46$ ). If the 8th dark ring be seen, when viewed at an angle of $30^\circ$ to the normal, find the thickness of the film.	[5]	1 1
Q.2(a)	Develop boundary conditions for $\vec{E}$ and $\vec{D}$ separated by two dielectric media of different permittivity.	[5]	2 6
Q.2(b)	Summarize Maxwell's four equations in integral and differential form.	[5]	2 2
Q.3(a)	Prove that the relation $x^2 + y^2 + z^2 - c^2t^2 = 0$ is invariant under Lorentz transformation.	[5]	3 5
Q.3(b)	Find the mass and speed of 2MeV electron (use relativistic mechanics).	[5]	3 1
Q.4(a)	Explain Davisson-Germer experiment. What inference one should get from this experiment?	[5]	4 5
Q.4(b)	What is de-Broglie hypothesis? Find the speed of a particle whose de-Broglie wavelength and Compton wavelength are equal.	[5]	4 1
Q.5(a)	Explain some of the important characteristics of laser.	[5]	5 2
Q.5(b)	Find nuclear binding energy per nucleon of ${}^{16}_8\text{O}$ . Given $M_p = 1.007276 \text{ a.m.u.}$ , $M_n = 1.008664 \text{ a.m.u.}$	[5]	5 1

.....17/03/2023:.....M