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TPH-101

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Paper ID and Roll No. to be filled in your Answer Book

Roll No.

B. Tech.

(SEM. I) (ODD SEM.) EXAMINATION, 2011-12

PHYSICS

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions. Marks for each question are shown against it.

1 Attempt any four parts of the following : **5×4=20**

(a) Derive the formula for the variation of mass of a particle with velocity.

(b) The mass of a moving electron is 11 times its rest mass. Find its kinetic energy and momentum.

(c) Differentiate inertial and non-inertial frame of references and show that inertial frames move with constant velocity relative to each other.

(d) Explain why moving clock appears to go slow to a stationary observer.

(e) Derive Einstein's mass energy relation $E=mc^2$ and discuss it.

(f) show that the circle $x^2+y^2=a^2$ in frame S appears to be an ellipse in frame S' which is moving with velocity v relative to S.

2 Attempt any **four** parts of the following : **5×4=20**

(a) Explain what are missing orders (or absent spectra) in grating.

(b) What are coherent sources ? Discuss two methods of producing coherent sources.

(c) Newton's rings are observed normally in reflected light of wavelength 6000 $\mathring{A}$, the diameter of 10th dark ring is 0.50 cm. Find the radius of curvature of lens and the thickness of the film.

(d) A single slit of width 0.14 mm is illuminated normally by monochromatic light and diffraction bands are observed on a screen 2m away. If the centre of second dark band is 1.6 cm from the middle of central bright band, deduce the wavelength of light.

(e) What is the highest order spectrum which may be seen with light of wavelength 6×10^{-5} cm by means of a grating with 5000 lines/cm ?

(f) What do you understand by the resolving power of a grating ? Derive the necessary expression.

3 Attempt any **two** parts of the following : **10×2=20**

(a) What is meant by optical rotation ? Give Fresnel's theory of optical rotation and discuss its dependence on λ

(b) Explain spontaneous and stimulated emission of radiation. Explain the working of Helium and Neon Laser.

(c) Explain the phenomenon of double refraction in Calcite crystal. Describe the construction, working and use of Nicol Prism.

4 Attempt any **two** parts of the following : **10×2=20**

(a) What is Poynting Vector ? Discuss the work-energy theorem for the flow of energy in an electromagnetic field.

(b) Write Maxwell's equations and give their physical significance. Obtain the electromagnetic wave equation in free space.

(c) Explain dia-magnetism, para-magnetism and ferro-magnetism on the basis of magnetic dipoles of the atoms.

5 Attempt any **two** parts of the following : **10×2=20**

(a) What is Uncertainty principle ? Apply it to prove the non-existence of electrons in the nucleus.

(b) Derive the time dependent schrodinger wave equation.

(c) Explain the characteristics of superconductor in superconducting state.
