BAS-02

Roll No. 2 0 1 7 0 3 1 1 2 1

B. Tech. I
ODD SEMESTER
MAJOR EXAMINATION 2017 - 2018
Subject Name: Engineering Physics-I

Time: 3 Hrs. Max. Marks: 50

Note: Attempt all questions. Each question carry equal marks.

1. Attempt any four parts of the following: $(4\times 2.5 = 10)$

(a) Show that the massless particles can exist only if they move with speed of light and their energy E and momentum p must have the relation E= pc.

(b) Obtain the relativistic form of Newton's second law, when force (F) is parallel to v.

(c) Describe the postulates of Statistical Mechanics

(d) How much does a proton gain in mass when accelerated to a kinetic energy of 500 M eV?

(e) Find the speed of 0.1 MeV electrons according to the classical and relativistic mechanics.

(f) Using the postulates of special theory of relativity derive the Lorentz transformation equations.

2. Attempt any two parts of the following: $(2\times 5 = 10)$

(a) What was the objective of Davison- Germer experiment? Discuss the results of this experiment.

(b) An electron is confined to move between two rigid walls separated by 1 A^0 . Find the de Broglie wavelength representing the first three allowed energy states of the electron and their corresponding energies.

(c) Derive Maxwell-Boltzmani Distribution law for N number of distinguished particles.

Attempt any two parts of the following: $(2\times 5 = 10)$

(a) Explain the construction and working of Huygens eyepiece. Locate the positions of cardinal points with suitable depiction.

(b) Derive an expression for the intensity distribution due to Fraunhofer diffraction at a single slit and show that the intensity of the first subsidiary maximum is about 4.5% of that of the principal maximum.

(c) Discuss the production and detection of linearly, circularly and elliptically polarized light.

Attempt any two parts of the following: $(2\times 5 = 10)$

(a) Describe the phenomena of interference due to wedge-shaped thin film obtain the conditions of maxima and minima also find the expression for fringe width.

(b) Define phase velocity and group velocity. Show that the group velocity is always equal to the particle velocity.

(c) An elctron has de Broglie wavelength 2×10^{-12} m. Find its kinetic energy. Also, find the phase and group velocities of its de Broglie waves.

5. **Attempt any two parts of the following:** **(2× 5 = 10)**

(a) What are the essential requirement for laser? Explain the construction and working of He-Ne Laser with suitable diagram.

(b) (i) An optical fibre has an NA of 0.20 and a cladding refractive index of 1.59. Determine angle for the fibre in water, which has refractive index of 1.33.

(ii)Explain the light propagation in an optical fibre.

(c) Discuss the construction and reconstruction of image with the help of hologram.