Total No. of Questions—**6**] [Total No. of Printed Pages—**4**

Seat No.	

[4956]-3

F.E. (First Semester) EXAMINATION, 2016

APPLIED SCIENCE—I (PHYSICS)

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 50**

Constants **:—** $h = 6.63 \times 10^{-34}$ J-sec

$m_e = 9.1 \times 10^{-31}$ kg

$e = 1.6 \times 10^{-19}$ c

$c = 3 \times 10^{8}$ m/s

1. (A) Draw a neat labelled diagram of Michelson's Interferometer and explain how it is used to determine the wavelength of unknown source of light ? [7]

(B) Derive the expression of displacement produced by an electron when it passes through perpendicular electric field. [6]

(C) In Newton's ring experiment the diameter of 12th dark ring is 0.700 cm. Find the radius of curvature of planoconvex lens. Given $\lambda = 6000$ A.U. [4]

P.T.O.

Or

2. (A) Explain with neat diagram the principle, construction and working of Bain bridge Mass Spectrograph. [7]

(B) Derive the expression for condition of maxima and minima for reflected light in case of thin transparent film of uniform thickness. [6]

(C) Electrons accelerated by potential of 150 V enter in an electric field at an angle of 50° with normal to the interface of higher potential to get refracted at an angle of 35° with the normal. Find the potential difference between the two regions. [4]

3. (A) Explain the Fraunhofer diffraction at a single slit and obtain the condition for principal maximum and minimum. Draw intensity distribution curve. [7]

(B) What is magnetostriction effect ? Draw a neat diagram and explain how magnetostriction oscillator is used for the production of ultrasonic waves. [6]

(C) Calculate the natural frequency of cast iron rod of 2.6 cm in length.

Data given : $P = 7.23 \times 10^3$ kg/m^3, $Y = 1.16 \times 10^{11}$ N/m^2 [4]

Or

4. (A) What are ultrasonic waves ? Explain how they are used for flaw detection and liquid emulsification. [7]

(B) What is grating ? Derive the expression for resolving power of grating. [6]

(C) What is the highest order spectrum that is visible with light of wavelength 6000 Å by means of a grating having 5000 lines per cm. [4]

5. (A) Define the term double refraction and hence explain the same on the basis of Hnygen's wave theory. [6]

(B) With the help of neat labelled diagram explain the construction and working of cyclotron. Obtain the expression for frequency and maximum energy of the particle. [6]

(C) A.Q.W.P. of thickness 2.275×10^{-3} cm is cut with its faces parallel to optic axis. The emergent beam of light is elliptically polarized. Find the wavelength of monochromatic light made incident normally on the plate. Given : $\mu_0 = 1.586$, $\mu_e = 1.592$. [4]

Or

6. (A) Explain the principle, construction and working of Betatron. [6]

(B) Distinguish between polarized and unpolarized light. Describe the process of production and detection of elliptically polarized light. [6]

(C) If the frequency of the A.C. potential applied to the Dees of a cyclotron is 9 MHz, calculate the magnetic flux density to accelerate α particles.

(Given : $M_\alpha = 6.643 \times 10^{-27}$ kg) [4]