May - June 2012

[4161] – 103

Seat No.	

F.E. (Semester – I) Examination, 2012
APPLIED SCIENCE – I
Physics
(2008 Pattern)

Time : 2 Hours | Max. Marks : 50

Instructions: *1) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6.***
*2) Neat diagrams must be drawn **wherever** necessary.*
*3) Black figures to the **right** indicate **full** marks.*
*4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*5) Assume suitable data, if **necessary**.*

Constants : $h = 6.63 \times 10^{-34}$ J.sec.
$c = 3 \times 10^{8}$ m/s
$e = 1.6 \times 10^{-19}$ C
$m_e = 9.1 \times 10^{-31}$ kg

1. A) Deduce an expression for the displacement produced when an electric field acts perpendicular to electron motion. What is deflection sensitivity ? Give an expression for the deflection sensitivity in this case. **7**

   B) Draw a neat labelled diagram of Michelson's interferrometer and explain with necessary theory how it can be used to measure the wavelength of monochromatic light. **6**

   C) A wedge shaped air film having an angle of 40 seconds is illuminated by monochromatic light and fringes in reflected system are observed through a microscope. The distance between consecutive bright fringes was measured as 0.12 cm. Calculate the wavelength of light. **4**

OR

P.T.O.

2. A) Draw a neat labelled diagram showing interference of light in a transparent thin film of uniform thickness. Write down only the conditions for maximum and minimum intensity of light in reflected system. Explain the use of thin film as antireflecting coating. **7**

   B) Explain the principle, construction and working of Bain bridge mass spectrograph with neat diagram. **6**

   C) In Newton's ring experiment, the diameter of 15^{th} dark ring was found to be 0.590 cm and that of 5^{th} dark ring was 0.336 cm. If the radius of curvature of plano convex lens is 100 cm, calculate the wavelength of light used. **4**

3. A) Give the theory of plane transmission grating. Obtain the conditions for maxima and minima. **7**

   B) What is piezo-electric effect ? Draw a neat diagram and explain the working of piezoelectric generator for the production of ultrasonic waves. **6**

   C) A slit of width 2 μm is illuminated by light of wavelength 6500A°. Calculate the angle at which the first minimum will be observed. **4**

OR

4. A) State Rayleigh's criterion of resolution. Hence deduce an expression for resolving power of grating. **7**

   B) Explain echo sounding technique. Discuss any two applications of ultrasonics based on this technique. **6**

   C) Monochromatic light from laser of wavelength 6238A° is incident normally on a diffraction grating containing 6000 lines/cm. Find the angles at which the first and second order maximum are obtained. **4**