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

Seat No.	

[4856]-13

F.E. (First Semester) EXAMINATION, 2015

APPLIED SCIENCE—I (Physics)

(2008 PATTERN)

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

N.B. **:—** (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*iv*) Assume suitable data, if necessary.

Constants :

Charge on electron : 1.6×10^{-19} C

Mass of electron : 9.1×10^{-31} kg

Planck's constant : 6.63×10^{-34} J/s

Speed of light : 3×10^{8} m/s

1. (*a*) What are Newton's Rings ? How are they obtained in laboratory ? Show that diameters of Newton's bright rings are proportional to the square root of odd natural numbers. [7]

(*b*) Explain qualitatively motion of electron in electric field when : [6]

(*i*) Parallel to the field

(*ii*) Perpendicular to the field.

P.T.O.

(*c*) An electron beam is accelerated through potential difference of 10 kV. It is then mode to pass through a transverse magnetic field where it moves in a circular arc of radius 6 cm. Calculate the magnitude of magnetic induction required for it. [4]

Or

2. (*a*) Draw a neat diagram of Michelson's Interferometer. Give its construction and working. Discuss the types of fringes. [7]

(*b*) Explain principle, construction and working of Weinbridge mass spectrograph. [6]

(*c*) Two optically plane glass strips of length 10 cm are placed one over the other. A thin foil of thickness 0.010 mm is introduced between the strips at one end to form an air film. If the light used has wavelength of 5900 Å. Find the fringe width of fringes obtained. [4]

3. (*a*) Explain the theory of plane diffraction grating. Hence obtain the condition for principal maxima and minima. [7]

(*b*) Write notes on : [6]

(*i*) Echo-sounding technique

(*ii*) Cavitation.

(*c*) What is the highest order spectrum that is visible with light of wavelength 6000 Å by means of a grading having 5000 lines per cm ? [4]

Or

4. (*a*) Derive an expression for resultant amplitude of diffracted waves in Fraunhofer diffraction at a single slit. Obtain the conditions for maxima and minima. [7]

(*b*) With a neat circuit diagram, explain the method of production of ultrasonic waves by using magnetostriction oscillator. [6]

(*c*) Find the maximum value of resolving power of a diffraction grating 3 cm wide having 5000 lines per cm, if the wavelength of light used is 5890 Å. [4]

5. (*a*) What is a Double refraction ? Explain Huygen's theory for it. [6]

(*b*) Explain with a neat labelled diagram principle, construction and working of Betatron. [6]

(*c*) In cyclotron with dees of radius 50 cm is used to accelerated deuterons. The frequency of the oscillator is 3 MHz. Calculate the energy of deuterons. [4]

Given :

$$M_d = 3.34 \times 10^{-27} \text{ kg.}$$

Or

6. (*a*) What is nuclear fusion ? Explain P-P and C-N cycles as a cause for steller energy. [6]

(*b*) How do you analyse the given beam of light ? Explain. [6]

(*c*) A plane polarised light of wavelength 6000 Å is incident on a HWP. Calculate the minimum thickness of the plate in which OXE rays superimpose to produce plane polarised light. [4]

Given :

$\mu_0 = 1.544$

$\mu_c = 1.553.$