



Seat No.	
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F.E. (Semester – I) Examination, 2014
APPLIED SCIENCE – I (Physics)
(2008 Course) (Old)

Constants : $h = 6.63 \times 10^{-34} \text{ J.s}$

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

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

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

Time : 2 Hours

Max. Marks : 50

- Instructions :** 1) Solve Q. 1 or Q. 2, Q. 3 or Q. 4 and 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**.

1. a) With the help of neat labeled diagram explain principle, construction and working of Michelson's interferometer. 7
- b) With the help of neat labeled diagram explain principle, construction and working of Bainbridge mass spectrograph. 6
- c) A parallel beam of light of wavelength 5890 \AA is incident on a glass plate of refractive index 1.5 such that angle of refraction is 60° . Calculate minimum thickness of plate which will it appear dark by reflection. 4

OR

2. a) Obtain an expression for the displacement when a transverse magnetic field acts on an electron in a limited region. 7
- b) A thin film of uniform thickness is illuminated by monochromatic light. Obtain the conditions for brightness and darkness as observed in reflected light. 6
- c) Electrons are accelerated by a potential difference of 150 volt enter in an electric field at an angle of 50° with normal to the surface of the higher potential and get reflected at an angle of 35° . Find the P.D. between two regions. 4
3. a) State Rayleighs criterion for resolution hence obtain an expression for R.P. of grating. 7
- b) What is magnetostriction effect ? Explain magnetostriction oscillator for production of ultrasonic waves. 6
- c) A grating containing 5000 lines/cm is illuminated by light of wavelength 6000 \AA . Calculate highest order of spectra that can be seen. 4

OR



4. a) What is Piezoelectric effect ? Explain piezoelectric oscillator for production of ultrasonic waves. 7
- b) Explain the Fraunhofer diffraction at a single slit and obtain the conditions for centre of central maxima and minima. 6
- c) An ultrasonic pulse of frequency 80 KHz is sent towards seabed. The reflection is recorded after 5s. If the velocity of ultrasonic in sea water is 1500 m/s calculate the depth of the sea. 4
5. a) What do you mean by unpolarised light and polarised light ? How is it represented symbolically ? Explain method to produce PPL by reflection. 6
- b) What is nuclear fusion ? Give an account of Carbon-Nitrogen cycle. 6
- c) A quarter wave plate is illuminated by light of wavelength 5890 \AA . If the principal indices of the crystal are $\mu_o = 1.586$ and $\mu_e = 1.592$, calculate thickness of the plate. 4
- OR
6. a) With the help of a neat labelled diagram, explain construction and working of cyclotron. 6
- b) Explain the phenomenon of double refraction on the basis of Huygen's theory. 6
- c) In a Betatron, operated with flux density of 0.8 wb/m^2 and frequency of 50 Hz, the stable orbit is of diameter 0.8 m. Calculate the average energy gained per revolution. 4
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