

**Total No of Questions: [06]**

**SEAT NO. :**

**[Total No. of Pages : 02 ]**

**F.E. (Semester - I) Exam-2014**  
**APPLIED SCIENCE-I (PHYSICS) (Semester - I)**  
**(2008 Course)**

**Time: 2 Hours**

**Max. Marks : 50**

**Instructions to the candidates:**

- 1) Answers Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6 .
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator 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**

- Q1) a) Explain the formation of Newton Rings. Show that the diameter of  $n^{\text{th}}$  dark rings is directly proportional to square root of natural number. [7]
- b) Explain the principle , construction and working of bainbridge mass spectrograph. [6]
- c) A glass of refractive index 1.5 is to be coated with a transparent material of refractive index 1.2 , so that the reflection of light of wavelength  $6000 \text{ \AA}$  is eliminated by interference. What is the required thickness of coating? [4]
- OR
- Q2) a) Obtain an expression for condition of brightness and darkness of the thin parallel film. Why does an excessively thin film appear dark in reflected light? [7]
- b) Obtain an expression for the displacement produced when an electric field acts perpendicular to electron motion. [6]
- c) Find velocity of proton selected by a velocity selector using cross electric and magnetic fields when electric field is 60KV/m and magnetic field is  $0.2 \text{ Wb/m}^2$  . [4]
- Q3) a) What is piezoelectric effect? Draw neat diagram and explain the piezoelectric generator for the production of ultrasonic wave. [7]
- b) Define resolving power of an optical instrument. Derive an expression for the resolving power of grating. [6]
- c) What is the highest order spectrum that is visible with light of wavelength  $6000 \text{ \AA}$  by means of grating having 5000 lines per cm. [4]
- OR
- Q4) a) Discuss the fraunhofer diffraction at single slit and obtain the condition for principle maximum and minima. Draw intensity distribution curve. [7]
- b) Explain echo sounding technique and cavitation with one example each. [6]
- c) Calculate the natural frequency of cast iron rod of 2.6cm length. Given: Density =  $7.23 \times 10^3 \text{ Kg/m}^3$  and Youngs modulus=  $1.16 \times 10^{11} \text{ N/m}^2$  [4]

- Q5) a) Explain the phenomenon of double refraction on the basis of Huygens wave theory. [6]
- b) Explain principle and working of cyclotron. Obtain an expression for maximum energy of the particle accelerated. [6]
- c) Calculate the thickness of QWP and HWP. Given:  $\mu_e = 1.553$ ,  $\mu_o = 1.544$ ,  $\lambda = 5000 \text{ \AA}$  [4]

OR

- Q6) a) Explain principle, construction and working of Betatron. [6]
- b) Distinguish between polarised and unpolarised light. Describe the process of production and detection of elliptically polarised light. [6]
- c) What is nuclear fusion? Give an account of proton proton cycle as the cause of stellar energy. [4]