Total No. of Questions : 10] [Total No. of Printed Pages : 3

Roll No. .....

BE–201(GS)

B. E. (First/Second Semester) EXAMINATION, Dec., 2011

(Grading System)

(Common for all Branches)

ENGINEERING PHYSICS

[BE–201(GS]

Time : Three Hours

Maximum Marks : 70

Minimum Pass Marks : 22 (D Grade)

Note : Attempt *five* questions in all selecting *one* question from each Unit. All questions carry equal marks.

Unit–I

1. What is wave packet ? Define group velocity and phase velocity. Derive the expression for the de-Broglie wavelength associated with an electron accelerated by the electric potential V.

Or

2. State Schrödinger's time independent equation. Hence obtain expression for Eigen function of particle in one-dimensional potential well of infinite height.

Unit–II

3. (a) Interference fringes are produced by Fresnel's biprism in the focal plane of an eyepiece 200 cm away from

the slit. Two images of the slit that are formed for each of the two positions of a convex lens placed between the biprism and eyepiece are found to be separated by 4·5 mm and 2·9 mm respectively. If the width of the interference fringes be 0·326 mm, find the wavelength of light used.

(b) Give the theory of plane transmission grating with the help of a neat diagram.

Or

4. What is polarisation of light ? Distinguish between plain, circularly and elliptically polarised light. Explain the terms plane of polarisation and plane of vibration.

Unit – III

5. Describe the construction and working of a cyclotron. Discuss its limitations.

Or

6. Discuss the construction and working of Bainbridge mass spectrograph.

Unit – IV

7. What is Hall effect ? Derive a formula for density of charge carriers in a *p*-type semiconductor. The Fermi level for potassium is 2·1 eV. Calculate the velocity of the electrons at the Fermi level.

Or

8. (a) Draw neat energy band diagrams of symmetrically dopped *p-n* junction when it is :

(i) Unbiased

(ii) Forward biased

(iii) Reversed biased

(b) Current flowing in a *p-n* junction is 0·2 μA at room temperature when a large bias voltage is applied. Calculate the current when a forward bias of 0·1 V is applied.

Unit – V

9. What do you understand by population inverson ? How is it achieved by optical pumping ? Explain how the above two processes are realized in Ruby Laser ?

Or

10. What is meant by acceptance angle of an optical fibre ? Derive an expression for it. Optical power of 1 mW is launched into an optical fibre of length 100 m. If the power emerging from the other end is 0·3 mW, calculate the fibre attenuation.