D 26577 (Pages : 2) Name.....

Reg. No.....

COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

Eng. 04–103 B—ENGINEERING PHYSICS (B)

(2004 admissions)

[For CH, CE, ME, PE AND AM]

Time : Three Hours Maximum : 100 Marks

Part A

I. 1 In a Newton's rings experiment, the diameter of 5th ring and 15th ring are 0.4 cm and 0.6 cm. If the radius of plane convex lens is 1 m. find out the l.

2 A plane transmission grating has 6000 Å lines/cm is used to obtain a spectrum of sodium lamp in second order. Calculate the angular separation of Dl and D2 lines of 5890 Å and 5896 Å.

3 Derive Bragg's Law for X-ray diffraction.

4 What are the merits and demerits of semiconductor laser ?

5 Explain the principle involved in measurement of velocity using ultrasonic Diffractometer.

6 Define 'decibel' and 'phon'.

7 Discuss how a Zener diode characteristics differ from that of a normal PN junction diode.

8 What are the advantages of fiber optical communications over the normal cable communications ?

(8 × 5 = 40 marks)

Part B

II. (i) (a) Bring out the distinction between Fresnel and Fraunhofer diffraction. (5 marks)

(b) Analyse mathematically the diffraction pattern due to a straight edge and hence derive the expression for the maxima and minima.

(10 marks)

Or

(ii) (a) Describe the construction and working of a Nicol prism and explain its use as a polarizer and as an analyzer.

(7 marks)

(b) Discuss briefly how the plane polarized light, circularly polarized light and elliptically polarized light are distinguished from one another as well as from the unpolarized light.

(8 marks)

III. (i) (a) Define 'packing factor'. (3 marks)

(b) Derive expressions for packing factors of Simple cubic. Face-centered and Body centered cubic lattices.

(12 marks)

Or

Turn over

(ii) (a) Explain population inversion and optical pumping. (4 marks)

(b) What are the essential components of laser ? (4 marks)

(c) Describe Ruby Laser and explain how optical pumping helps to produce laser. (7 marks)

IV. (i) (a) What is piezo-electric effect ? (5 marks)

(b) Describe the construction and working of an ultrasonic generator using piezo-electric method. Mention the applications of ultrasonics. (10 marks)

Or

(ii) (a) Describe with suitable diagram, radiography method to locate a voluminar defect in a material. (8 marks)

(b) Explain how you will perform the magnetic particle inspection to find out the surface defects in a magnetic material. (7 marks)

V. (i) (a) Describe how the characteristics of an NPN transistor is studied under common emitter configuration to evaluate the transistor current gains α and β. (9 marks)

(b) Establish a relation between current gains α and β. What will be the value of β if $\alpha = .99$. (6 marks)

Or

(ii) (a) Explain the basic principle of light transmission in optic fibers. (5 marks)

(b) Define 'numerical aperture' and derive an expression in terms of the refractive indices of the core and cladding. (10 marks)