2006 CALICUT UNIVERSITY

I / II SEMESTER B.TECH ENGINEERING DEGREE EXAMINATIONS

ENGINEERING PHYSICS

(CSE,IT,ECE)

JUNE 2006

TIME::3 HOUR
MARK:100

ANSWER ALL QUESTIONS

PART A [8*5=40]

I. 1. Explain AC and DC Josephson's effect.

2. Give any five applications of superconductors.

3. Explain the phenomenon of interference of light. What are the necessary conditions to get clear and distinct interference fringes?

4. Explain the resolving power of the plane diffraction grating.

5. What are the difference between positive and negative crystals?

6. Give the construction and theory of half wave plate.

7. Derive the Planck's law of radiations in terms of wavelength.

8. A proton is confined to a nucleus of radius 5 X 10-5 m. Calculate the minimum uncertainty in its momentum. Also calculate the minimum kinetic energy of the proton.

PART B [15*4=60]

II. (i). (a) Write short notes on :

(i)Elemental and compound semiconductors.

(ii) Intrinsic and extrinsic semiconductors.

(b) Explain the working of the Zener diode as a voltage regulator.

Or

(ii). (a) Write short notes on :

(i) Solar cell.

(ii) Phototransistor.

(iii) Photoresistor.

(b) Calculate the critical current which can flow through a long thin superconducting wire of aluminium od diameter 10-3 m. The critical magnetic field for aluminium is 7.9 X 103 A/m.

III. (iii). (a) Determine the wavelength of a monochromatic light and the resolution of spectral lines using Michelson's interferometer.

(b) Fringes of equal inclination are observed in a Michelson's interferometer, as one of the mirror is moved back by 1 mm., 3663 fringes moves out from the center of the pattern. Calculate the wavelength.

Or

(ii). (a) State Rayleigh's criteria for the resolution of spectral lines. Distinguish between the resolving power and dispersive power of the diffraction grating.

(b) A parallel beam of monochromatic light is allowed to be incident normally on a plane grating having 1250 lines/cm and a second order spectral line is observed to be deviated through 300.

Calculate the wavelength of the spectral line.

IV. (i). (a) Outline the principle of half shade polarimeter and explain how you will determine the specific rotation of a substance.

(b) Determine the specific rotation of the given sample of sugar solution if the plane of polarization is turned through 13.20. The length of the tube containing 10% sugar solution is 20 cm.

Or

(ii). (a) Explain how circularly polarized and elliptically polarized light are produced and detected.

(b) Calculate the thickness of a half-wave plate of quartz for a wavelength of 5000 A. Here μe = 1.553 and $\mu 0$ = 1.544.

V. (i). (a) Explain briefly the distribution of energy in a blackbody spectrum.

(b) What is Wien's Displacement law? Explain the Wien's law of energy distribution.

Or

(ii). (a) Derive the time independent Schrodinger wave equation.

(b) What is meant by expectation value in quantum mechanics?

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