B.TECH ENGINEERING PHYSICS

JUNE 2006

TIME: 3 HOUR
MARK: 90

ANSWER ANY SIX QUESTION
ALL QUESTIONS CARRY EQUAL MARKS

MARK [6*15]

1 a. Explain with necessary theory the interference of light from a plane parallel sided thin transparent film, illuminated by a monochromatic light

b. Explain why an extended source of white light is required to see colours in thin films

c. Determine the minimum wavelength reflected by a thin film of thickness 4.66×10^{-5} cm and of refractive index 1.5 when it is illuminated by a white light.

2 a. Distinguish between continuous X-ray spectrum and characteristic X-ray spectrum

b. What is Moseley's Law? Explain its importance

c. An X-ray machine has an accelerating potential difference of 50 kV. Calculate the shortest wavelength and the corresponding maximum frequency

3 a . Compare Fresnel and Fraunhoffer types of diffraction

b. Explain Fresnel's half period zone and show that the areas of Fresnel's half period zones are equal

c. Light of wavelength 5461 A is incident normally on a grating having a grating element 1.5×10^{-4} cm. Find the angle at which the first diffracted beam is observed

4 a. Describe the construction, working and uses of a Nicol prism

b. Explain positive and negative crystals

c. What are the uses of polarized light?

5 a. Explain spontaneous emission and stimulated emission

b. How population inversion is achieved?

c. Explain the working of Helium-Neon laser

6 a. Explain the principle of Holography

b. Discuss the application of lasers in engineering

c. How magnetic tape recording is done

7 a. Explain the folowing terms: numerical aperture, acceptance angle, acceptance cone

b. Explain the advantages of optical fibres over ordinary cable

c. Calculate the numerical aperture and acceptance angle of an optical fibre from the following data: refractive index of core= 1.55 and refractive index of cladding= 1.55

8 a. Discuss the single and multimode optical fibres

b. Explain the working of optical fibre sensors

c. Write a short note on integrated optics

9 a. Explain the different types of electrio polarisation in dielecrics

b. Draw the planes with the following : Miller Indices (111) (110) and (010)

c. Calculate the interplanar spacing for a (321) plane in a simple cubic lattice with a lattice constant a= 2.54A

10 a.Explain superconductivity

b. Compare type I and type II superconductors

c. Write a short note on SQUIDS