

C 26472

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Name.....

Reg. No.....

**COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)
DEGREE EXAMINATION, APRIL 2012**

EN 09/PTEN 09 103—ENGINEERING PHYSICS

Time : Three Hours

Maximum : 70 Marks

Part A

Answer all the questions.

1. Explain conditions for interference.
2. What do you understand by extrinsic and intrinsic semiconductors ?
3. Explain the principle of piezoelectric effect.
4. Write a note on Miller indices.
5. Why nanomaterials are superior when compared to bulk materials ?

(5 × 2 = 10 marks)

Part B

Answer any four questions.

6. How did you find specific rotation of sugar solution using half shade polarimeter ? Deduce the concentration of the sugar solution.
7. A He-Ne laser of wavelength 6328 \AA is emitting beam with an average power of 1 mW is focussed on circle of radius 2 mm . Find the intensity of the focused beam. Compare this with intensity of 60 W bulb on a person standing 3 m away.
8. The numerical aperture of an optical fiber is 0.2 , when surrounded by air. If the refractive index of cladding is 1.59 , find the acceptance angle of the fiber in water with the index 1.33 .
9. The expression for Fermi energy in case of intrinsic semiconductor is $E_f = E_g/2$. But this expression is obtained by making some assumption. What are these assumptions ?
10. Explain how the reverberation time affects the acoustic of building. Also give a brief account of corrective measures.
11. Discuss the de Broglie's concept of matter waves. What are all the physical significances of wave function ψ ?

(4 × 5 = 20 marks)

Part C

Answer section (a) or section (b) of each questions.

12. (a) Write a simple theory of diffraction using grating and determine the wavelength of monochromatic light.

Or

- (b) Obtain packing fraction calculation on SC, BCC and FCC.

Turn over

13. (a) Show that under thermal equilibrium, laser action is not possible in visible region at room temperature. At what temperature the laser action is possible and is it realizable ?

Or

- (b) Explain basic principle of holography. Explain recording and reconstruction of holograms. Write application of holography.
14. (a) Explain voltage and current characteristics of PN junction diode when it is reverse biased. Explain amplifier characteristics of NPN transistor.

Or

- (b) How does the Fermi level change with temperature in extrinsic semiconductor ? Discuss the effect of increasing amount of dopants in extrinsic semiconductor.
15. (a) Explain the basic postulates of the quantum mechanics. Derive the Schrödinger equation for the free particle.

Or

- (b) What is piezoelectric crystal ? How can it be used for the production of longitudinal ultrasonic waves through oscillator circuit ?

(4 × 10 = 40 marks)