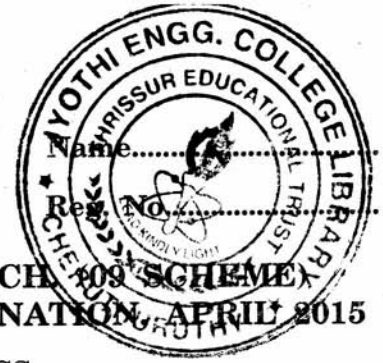**C 80640**   (Pages : 2)

COMBINED FIRST AND SECOND SEMESTER B.TECH. (09 SCHEME) (ENGINEERING) DEGREE [SUPPLEMENTARY] EXAMINATION, APRIL 2015

PTEN/EN 09 103—ENGINEERING PHYSICS

Time : Three Hours   Maximum : 70 Marks

Part A

Answer all questions.

1. Can interference be produced by two separate lighted candles ? Explain.

2. Explain the colours of thin film.

3. Give any one method for detection of plane polarized light.

4. What do you meant by Fermi level ?

5. Discuss the application of carbon nanotubes.

$(5 \times 2 = 10 \text{ marks})$

Part B

Answer any four questions.

6. A plane transmission grating having 6000 lines/cm. is used to obtain a spectrum of light from a sodium lamp in the second order. Calculate the angular separation between the two sodium lines whose wavelengths are 5890 Å and 5896 Å.

7. Monochromatic X-rays of wavelength 1.4 Å are incident on a crystal having 1.5 Å as inter atomic spacing. Find the various orders in which the diffraction takes place.

8. Calculate the ratio of population of two energy states of Ruby laser, the transition between which is responsible for emission of photon of wavelength 6928 Å. Assume the transition temperature to be 18 K.

9. When the emitter current of a transistor is changed by 1 mA its collector current changes by 0.995 mA. Calculate (a) its common base short circuit current gain α, and (b) its common-emitter short circuit current gain β.

10. An electron is put in a cubical box of each side 1 Å. Find the value of its momentum and energy for the ground state and the first excited state.

11. A lecture hall with a volume of 45,000 Cu. ft. is formed to have reverberation time of 1.5 sec. What is the total absorbing power of all the surfaces in the hall ? If the area of the sound absorbing surface is 8000 sq.ft., calculate the average absorption coefficient.

$(4 \times 5 = 20 \text{ marks})$

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 marks.

12. (a) With a neat diagram, explain the theory of the Newton's rings. How rings can be used to find

   (i) Wavelength of light ; and

   (ii) Refractive index of liquid ?

Or

   (b) What is zone plate ? Give its construction and theory and explain its similarities and dissimilarities with a convex lens.

13. (a) Explain with a neat sketch the principle, construction and working of a nicol prism. Give its limitation and uses.

Or

   (b) With a neat diagram and energy levels explain the principle and working of Neodymium YAG laser. Distinguish between four level laser and three level laser.

14. (a) Draw the circuit diagram of a voltage regulator using a Zener diode. Explain its action. Briefly explain the principle of operation of solar cell.

Or

   (b) Outline the various theories and experimental facts of superconductivity. What is SQUID ? Give its importance in superconductivity.

15. (a) Find the expression for the energy state of a particle in one-dimensional box. What are eigen state and eigen values ?

Or

   (b) Derive Sabines formula for reverberation time and discuss the various conditions for good acoustics.

$(4 \times 10 = 40 \text{ marks})$