

27/5/19
9.30-12.30

H

Roll No.

TPH-202

**B. TECH. (FOR CS BRANCH
STUDENTS) (SECOND SEMESTER)
END SEMESTER EXAMINATION, 2019**

ENGINEERING PHYSICS

Time : Three Hours

Maximum Marks : 100

Note : (i) This question paper contains five questions.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mentioned against it.

(iv) Total marks assigned to each question are twenty.

1. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Define interference phenomenon. Prove that in Newton's ring experiment, the diameter of bright and dark rings are directly proportional to the square root of odd and all natural numbers respectively.

F. No. : b-49

P. T. O.

5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

- (a) What is nanophysics ? Explain in detail about quantum wells and wires.
- (b) Light of wavelength 500 nm falls normally on a plane transmission grating having 15000 lines in 3 cm. Find the angle of diffraction from maximum intensity in first order.
- (c) Explain Van der Pauw measurements for carrier density, resistivity and also explain hall mobility.

(2)

TPH-202

- (b) A beam of light consisting of two wavelengths 650 nm and 520 nm are used to obtain interference fringes in a biprism experiment. What is the least distance from the central maximum when the bright fringe due to both the wavelengths coincide?
- (c) Describe Fraunhofer diffraction due to a single slit and derive the positions of the maxima and minima.
2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) What is meant by optical rotation? Describe half shade polarimeter and explain how it is used to measure the strength of sugar solution. Does it have any practical application?
- (b) Calculate the specific rotation of sugar solution from the following data :
Length of the tube containing solution = 22 cm, volume of solution = 88 cc, amount of sugar solution = 6 gm, angle of rotation = $9^{\circ}54'$.
- (c) Explain the action of a Helium Neon laser. How is it superior to a Ruby laser?

F. No. : b-49

(3)

TPH-202

3. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Derive time dependent and independent Schrödinger wave equation.
- (b) Estimate the ratio of the electron densities in the conduction bands of silicon ($E_g = 1.14$ eV) and germanium ($E_g = 0.7$ eV) at 400 K.
- (c) Explain Kronig-Penny model and explain how it is useful to identify insulator and conductor.
4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Explain extrinsic and intrinsic semiconductor and also explain the dependence of Fermi level on carrier concentration.
- (b) Calculate the Fermi energy for silver given that the number of conduction electrons per unit volume is $5.86 \times 10^{28} \text{ m}^{-3}$.
- (c) Write construction working and theory of *p-n* junction and also explain carrier transport : diffusion and drift.

F. No. : b-49

P. T. O.