TPH–201

B. TECH. (SECOND SEMESTER)
END SEMESTER EXAMINATION, 2018

(All Branches)
ENGINEERING PHYSICS

Time : Three Hours

Maximum Marks : 100

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

(ii) All questions are compulsory.

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

(iv) Each part carries **ten** marks. 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) Explain theory of Freshnel's Biprism experiment. Also derive the formula of fringe width.

   (b) A parallel beam of light (589 nm) strikes a film of oil (refractive index 1.46). If the 8th dark ring be seen, when viewed at an

angle of 30° to the normal, calculate the thickness of the film.

(c) Explain Fraunhofer and Fresnel's diffraction ? Find the intensity in diffraction due to N slits.

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

   (a) Explain construction, working and theory of half shade polarimeter with suitable diagram.

   (b) A certain ruby laser emits 10 J pulses of light whose wavelength is 694 nm. What is the minimum number of active ions in the ruby laser ?

   (c) Explain the action of He-Ne laser. How is it superior to a ruby laser ?

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

   (a) What is nano science and technology ? Explain quantum wire, quantum dots and CNT.

   (b) A plane transmission grating having the grating element 1800 nm, obtain the dispersions in the first order spectra around 500 nm, assuming the normal incidence.

(c) Derive Maxwell's four equations. Explain what was the need of modification of fourth equation.

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

   (a) Describe Michelson-Morley experiment with the help of neat diagram and discuss its negative result.

   (b) The mass of a moving electron is 11 times its rest mass. Find its kinetic energy and momentum.

   (c) What are length contraction and time dilation ? Also derive Lorentz transformation equations.

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

   (a) What is uncertainty principle ? Derive time independent Schrodinger wave equation.

   (b) Calculate the energy difference between the ground state and first excited state for electron if the length of the box is 10^{-8} cm.

   (c) What is fiber optics ? Derive the formula of acceptance angle and numerical aperture in fibre optics. Also write the applications of fibre optics.