16/12/16

Roll No. | | | | | | | |

H

TPH–101

B. Tech. (First Semester)
End Semester EXAMINATION, 2016

(All Branches)

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) What are the coherent sources ? Describe and explain the formation of Newton's rings in reflected monochromatic light . Prove that in reflected light

(i) Diameters of bright rings are proportional to the square roots of odd natural numbers.

(ii) The diameters of dark rings are proportional to the square root of natural numbers.

(b) Light of wavelength 5000 Å falls on a grating normally. Two adjacent principal maxima occur at $\sin\theta = 0.2$ and $\sin\theta = 0.3$ respectively. Calculate the grating element. If the width of the grating surface is 2.5 cm, calculate its resolving power in the second order.

(c) Describe Fraunhofer diffraction due to a single slit and deduce the positions of the maxima and minima. Show that the relative intensities of successive maxima are nearly 1:1/22:1/61:1/1/121.

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

(a) Define specific rotation. Describe the construction and working of a Laurent's half shade polarimeter, explain fully the action of the Laurentz half shade polarimeter. How would you use it to determine the specific rotation of cane sugar solution ?

(b) A sugar solution in a tube of length 20 cm produces optical rotation of 13°. The solution is then diluted to one-third of its previous concentration. Find optical rotation produced by 30 cm long tube containing the diluted solution.

(c) Derive an expression for Einstein's coefficients. Describe the construction and action of ruby laser.

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

(a) Deduce four Maxwell's equations in free space. Explain the concept of Maxwell's displacement current and show how it lead to the modification of Ampere's law.

(b) Calculate the hysteresis loss of energy E per hour in the iron core of a transformer, if the area of the B-H loop is 250 J/m^3 and the frequency of a. c. is 50 Hz. Mass of the core is 9.0 kg and the density of iron is 7500 kg/m^3.

(c) Explain about quantum wells, wires and dots. Give construction, types and applications of carbon nano tubes.

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

(a) Discuss briefly Michelson-Morley experiment and mention its outcomes.

(b) For what value of $(v/c = x)$ will the relativistic mass of a particle exceed its rest mass by a given fraction f?

(c) Explain basic principle of holography. Give construction and reconstruction of image on hologram.

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

(a) State Heisenberg Uncertainty Principle and derive time dependent and independent Schrödinger wave equation.

(b) A proton is moving with a speed of 2×10^8 m/sec. Find the wavelength of the matter wave associated with it.

(c) Explain about principle, acceptance angle, cone, numerical aperture and V number in fibre optics.