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TPH-101

**B. Tech. (First Semester)
End Semester EXAMINATION, 2017**

**(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* parts of choice from (a), (b) and (c). (10×2=20 Marks)

(a) How can Netwon's ring be used to determine the refractive index of a liquid ? Derive the necessary formula.

(b) A parallel beam of light of wavelength 5460 Å is incident at an angle of 30° on a plane transmission grating which has 6000

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lines/cm. Find the highest order spectrum that can be observed.

- (c) Two coherent sources are 2.0 mm apart and are illuminated with a monochromatic light of wavelength 5896 Å. Fringes are observed at a distance 60 cm from the sources. Find the fringe width.

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

- (a) Describe the construction and working of a Laurent's half-shade polarimeter.

- (b) The values of μ_E and μ_O for quartz are 1.5508 and 1.5418 respectively. Calculate the Phase retardation for $\lambda = 5000 \text{ Å}$ when the plate thickness is 0.032 mm.

- (c) What are Einstein coefficients ? Derive Einstein relations.

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

- (a) Obtain Maxwell's field equations in Differential and Integral form. 10

- (b) The horizontal component of the flux density of earth's magnetic field is $1.7 \times 10^{-5} \text{ T}$. What is the horizontal component of the magnetic intensity ? 10

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- (c) (i) Discuss the application of nanotechnology in various fields. 6

- (ii) Calculate numerical aperture and acceptance angle of a fibre, given. Refractive index of Core = 1.62 and Refractive index of Cladding = 1.58. 4

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

- (a) Describe Michelson-Morley experiment with the help of neat diagram and discuss its negative results. 10

- (b) How fast should a rocket have to go relative to an observer for its length at rest ? 10

- (c) (i) Discuss the production and reproduction of image on a hologram. 6

- (ii) Verify $E^2 = p^2c^2 + m_0^2c^4$, where symbols have their general meaning. 4

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

- (a) Show that de-Broglie wavelength of electron accelerated through V volts is given by : 10

$$\lambda = \sqrt{\frac{150}{V}} \text{ Å.}$$

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- (b) (i) Find the minimum energy of an e^- moving in one dimension in an infinitely high potential box of width 1 \AA , given $m_e = 9.1 \times 10^{-31} \text{ kg}$, $h = 6.67 \times 10^{-34} \text{ J-sec}$.

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- (ii) What is the minimum uncertainty in the frequency of a photon whose life time is about 10^{-8} sec ?

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- (c) Discuss Schrödinger time independent and time dependent wave equation.

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