

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 199121

Roll No. 

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B. Tech.

(SEM. I) THEORY EXAMINATION, 2015-16

ENGINEERING PHYSICS-I

[Time : 3 hours]

[Total Marks : 100]

**SECTION-A**

1. Attempt **all** parts . All parts carry equal marks. Write answer of each part in short . (2x10=20)
  - (a) Is earth an inertial frame ? Explain.
  - (b) What is significance of mass energy relation ?
  - (c) Two independent sources cannot produce interference. Why ?
  - (d) What happen when young double slit experiment immersed in water ?
  - (e) What will be the effect on the intensity of principal maxima of diffraction pattern when single slit is replaced by double slit ?

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(1)

P.T.O.

2. Derive the expression for time dilation. Show that it is a real effect.

3. Deduce an expression for variation of mass with velocity. At what speed the mass of an object becomes 2.25 times its rest mass.

4. Discuss the formation of interference fringes due to a wedge shape thin film seen by normally reflected sodium light. In Newton's ring experiment the diameter of 4<sup>th</sup> and 12<sup>th</sup> dark ring are 0.400 cm and 0.700 cm respectively. Deduce the diameter of 20<sup>th</sup> ring.

Obtain intensity expression for single slit Fraunhofer diffraction pattern. Light of wavelength 5500 Å falls normally on a slit of width  $22.0 \times 10^{-5}$  cm. Calculate the

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9. Describe the process of construction and reconstruction of image on hologram. Also describe application of holography.

### SECTION-C

Attempt any two questions from this section. (15x2=30)

10. (a) Show that space time or interval between two events remains invariant under Lorentz transformation.

(b) Show the effect of introducing thin mica sheet in the path of one of interfering beam in young's double slit experiment.

(c) Find the mass and speed of electron with energy of 2 MeV.

11. (a) Explain the formation of spectrum by plane diffraction grating.

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(b) Explain how wavelength of sodium light can be calculated from Lloyd's biprism experiment.

(c) If the population ratio between two energy states in Ruby laser is  $2 \times 10^{-40}$ , emitting a light beam of wavelength  $6943 \text{ \AA}$ . Find the temperature of energy states.

12. (a) Discuss the difference between single mode fibre and multimode fibre.

(b) Explain construction and working of Nicol prism.

(c) A step index fibre has core refractive index 1.466, cladding refractive index 1.460, compute the maximum radius allowed, if fibre support only one mode by using wavelength of  $5000 \text{ \AA}$ .

**Physical Constants :**

Mass of electron,  $m_e = 9.1 \times 10^{-31} \text{ kg}$

Mass of proton,  $m_p = 1.67 \times 10^{-27} \text{ kg}$

Speed of light,  $c = 3 \times 10^8 \text{ m/s}$

Planck's constant,  $h = 6.63 \times 10^{-34} \text{ J/s}$

Charge on electron,  $e = 1.6 \times 10^{-19} \text{ C}$

Boltzmann's constant  $= 1.38 \times 10^{-23} \text{ m}^2 \text{ kg s}^{-2} \text{ K}^{-1}$

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