

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

Paper ID : 2014075

Roll No.

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## B.TECH.

Regular Theory Examination (Odd Sem-I), 2016-17

### ENGINEERING PHYSICS - I

*Time : 3 Hours*

*Max. Marks : 70*

**Note:** A, B and C are three sections in this question paper.

Attempt all seven parts from section A, any three parts from section B and all questions from section C.

#### SECTION - A

1. Attempt all parts of this section. (7×2=14)
- What is proper length of a rod.
  - Explain the concept of rest mass of photon.
  - What is Wien's Law?
  - Explain the factor responsible for changing fringe width in wedge shaped film.

- e) What happens to diffraction pattern when slit width of single slit experiment increases?
- f) What are metastable states?
- g) What precautions are needed to minimize material dispersion?

## SECTION - B

## 2. Attempt any three parts (3×7=21)

- a) Describe Michelson - Morley experiment and explain the out come of the experiment.
- b) Derive time independent Schrodinger wave equation and give physical interpretation of wave function. Also explain eigenvalue and eigen function.
- c) What do you understand by Newton's ring? Explain their experimental arrangement. How can you determine the wavelength of light with this experiment?
- d) What is the concept of four level laser systems? Give the construction and working of He-Ne laser.
- e) What do you understand by modes of an optical fiber? Discuss propagation of light in single mode, multimode and graded index fibers.

## SECTION - C

## 3. Attempt any two parts. (2×3½=7)

- a) What do you mean by length contraction? Explain it.
- b) Deduce and discuss Einstein's mass - energy relation,  $E = mc^2$
- c) Calculate the percentage contraction of a rod moving with a velocity of  $0.8c$  in a direction at  $60^\circ$  to its own length.

## 4. Attempt any two parts (2×3½=7)

- a) Describe energy distribution in black body radiation.
- b) Explain the modified and unmodified radiations in Compton scattering?
- c) Calculate the wavelength of an electron associated with kinetic energy of  $6.95 \times 10^{-25}$  Joules

## 5. Attempt any two parts (2×3½=7)

- a) Explain the missing orders in the spectra of a plane transmission grating
- b) Explain Rayleigh criterion of resolution.

- c) A plane transmission grating has 15000 lines per inch. Find the resolving power of grating and the smallest wavelength difference that can be resolved with a light of wavelength  $6000 \text{ \AA}$  in the second order.

**6. Attempt any two parts** (2×3½=7)

- a) Show that the plane polarized and circularly polarized light are the special cases of elliptically polarized light
- b) What are Einstein's coefficients? Obtain a relation between them.
- c) A certain length of 5% solution causes the optical rotation of  $20^\circ$ . How much length of 10% solution of the same substance will cause  $35^\circ$  rotation?

**7. Attempt any two parts** (2×3½=7)

- a) Describe different types of losses in optical fiber.
- b) Explain the construction and reconstruction of image in holography.
- c) Calculate the acceptance angle and numerical aperture of the optical fiber if the refractive index of core and cladding are 1.50 and 1.45 respectively.

