Printed Pages - 4

RAS-101

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

Paper ID : 2014075   Roll No.

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)

   a)   What is proper length of a rod.

   b)   Explain the concept of rest mass of photon.

   c)   What is Wien's Law?

   d)   Explain the factor responsible for changing fringe width in wedge shaped film.

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RAS-101

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.

RAS-101

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 $0.8 c$ in a direction at $60°$ 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 $6.95 × 10^{-25}$ 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.

RAS-101

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 A^0 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 20^0. How much length of 10% solution of the same substance will cause 35^0 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.