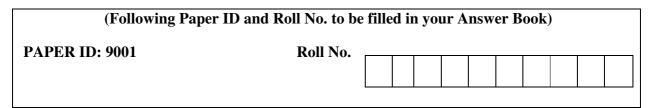
### **Printed Pages: 2**

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### B. Tech.

## (Semester-I) Theory Examination 2017 - 18

### **ENGINEERING PHYSICS-I**

### Time: 3 Hours

Note: Attempt all Sections. If require any missing data; then choose suitably.

### SECTION A

### 1. Attempt all questions in brief.

- Is earth an inertial or non-inertial frame of reference? Justify your answer. a.
- What is Wien's displacement law? b.
- What do you mean by group velocity? c.
- Define dispersive power of a plane transmission diffraction grating. d.
- Differentiate between spontaneous and stimulated emission of radiation. e.
- f. What do you mean by specific rotation?
- What do you mean by acceptance angle? g.

### **SECTION B**

### 2. Attempt any *three* parts of the following:

- Obtain Galilean transformation equations. Show that length and acceleration are a. invariant under Galilean transformations.
- Derive Planck's radiation law. Show that Planck's formula for the energy b. distribution in a thermal spectrum is applicable for all wavelengths.
- Give the construction and theory of plane transmission grating. Explain the c. formation of spectra by it.
- What is the advantage of four level laser systems over three level laser systems? d. Describe the construction and working of ruby laser.
- What is holography? Explain the basic principle of holography using construction and e. reconstruction of image.

Total Marks: 70

## $2 \ge 7 = 14$

 $7 \ge 3 = 21$ 

### **SECTION C**

### 3. Attempt any *one* part of the following:

- (a) Deduce the relativistic velocity addition theorem. Show that it is consistent with Einstein's second postulate.
- (b) What do you mean by time dilation? Establish a relation for it. At what speed should a clock be moved so that it may appear to lose 1 min each hour?

### 4. Attempt any *one* part of the following:

- (a) What is the concept of de-Broglie matter waves? Describe Davisson-Germer experiment and prove that electrons possess wave nature.
- (b) Find an expression for the energy states of a particle in a one –dimensional box. Determine the probability of finding a particle trapped in a box of length L in the region from 0.45L to 0.55L for the ground state.

### 5. Attempt any *one* part of the following:

- (a) Discuss the formation of interference fringes due to a wedge-shaped thin film seen by normally reflected monochromatic light and obtain an expression for the fringe width.
- (b) Obtain an expression for the intensity distribution due to Fraunhofer diffraction at a single slit. A light of wavelength 6000Å falls normally on a slit of width 0.10 mm. Calculate the total angular width of the central maximum.

### 6. Attempt any *one* part of the following:

- (a) Explain the phenomenon of double refraction and discuss the various characteristics of ordinary and extraordinary rays. Find the thickness of a quarter wave plate of quartz for light of wavelength 5893 Å. The refractive indices for ordinary and extraordinary rays are 1.544 and 1.553 respectively.
- (b) What do you mean by optical activity? Give Fresnel's theory of optical activity and derive the necessary expression for the optical rotation.

### 7. Attempt any *one* part of the following:

- (a) Explain single mode and multimode fibers. Differentiate between characteristic properties of single mode and multimode fibers.
- (b) Explain dispersion and attenuation in optical fiber. The optical power, after propagating through a 500 m long fiber, is reduced to 25% of its original value. Calculate fiber loss in dB/km.

7 x 1 = 7

 $7 \ge 1 = 7$ 

# $7 \times 1 = 7$

 $7 \times 1 = 7$ 

# 7 x 1 = 7