Printed Pages: 2 **Sub Code: RAS101**

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

PAPER ID: 9001 **Roll No.** | | | | | | | | | | |

B. Tech.

(Semester-I) Theory Examination 2017 - 18

ENGINEERING PHYSICS-I

Time: 3 Hours ***Total Marks: 70***

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

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

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

SECTION B

2. Attempt any *three* parts of the following: **7 x 3 = 21**

a. Obtain Galilean transformation equations. Show that length and acceleration are invariant under Galilean transformations.

b. Derive Planck's radiation law. Show that Planck's formula for the energy distribution in a thermal spectrum is applicable for all wavelengths.

c. Give the construction and theory of plane transmission grating. Explain the formation of spectra by it.

d. What is the advantage of four level laser systems over three level laser systems? Describe the construction and working of ruby laser.

e. What is holography? Explain the basic principle of holography using construction and reconstruction of image.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(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: 7 x 1 = 7

(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: 7 x 1 = 7

(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: 7 x 1 = 7

(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: 7 x 1 = 7

(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.