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

PAPER ID : 9602 **Roll No.** | | | | | | | | | | |

B. Tech.

(SEM. I) THEORY EXAMINATION 2011-12

ENGINEERING PHYSICS—I

Time : 2 Hours *Total Marks : 50*

SECTION—A

1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. **(2×5=10)**

   (a) What do you understand by variant and invariant under the Galilean Transformations ?

   (b) Two independent sources could not produce interference, why ?

   (c) What will effect the intensity of principal maximum of diffraction pattern when single slit is replaced by double slit ?

   (d) How can you say that He-Ne Laser is superior to Ruby Laser ?

   (e) Why modal dispersion is negligible in single mode fiber ?

SECTION—B

2. Attempt any **three** parts. All parts carry equal marks. **(5×3=15)**

   (a) The mass of a moving electron is eleven times its rest mass. Find its kinetic energy and momentum.

(b) White light falls normally on a film of a soapy water whose thickness is 1.5×10^{-5} cm and refractive index 1.33. Which wavelength in the visible region will be reflected most strongly ?

(c) What must be the minimum number of lines per cm in a half inch width grating to resolve the wavelength 5890 and 5896 Å ?

(d) The refractive indices of quartz for right handed and left handed circularly polarized light of wavelength 6300 Å are 1.53915 and 1.53921 respectively. Calculate the angle of rotation produced by quartz plate of thickness 0.5 mm.

(e) A communication system uses a 10 km fiber having a loss of 2.5 dB/km. Compute the output power if the input power is 500 micro watts.

SECTION—C

Note :– Attempt **all** questions of this section. All questions carry equal marks.

3. Attempt any **one** part of the following : **(1×5=5)**

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

(b) Show that no particle can attain a velocity larger than velocity of light.

4. Attempt any **one** part of the following : **(1×5=5)**

(a) Explain the phenomenon of interference in thin films due to reflected light.

(b) Explain how the Newtons experiment can be used to determine the refractive index of a liquid.

5. Attempt any **one** part of the following : **(1×5=5)**

(a) What is diffraction grating ? Derive an expression for dispersive power of grating and explain it.

(b) What do you understand by the resolving power of an optical instrument ? Explain the Rayleigh criterion of resolution.

6. Attempt any **one** part of the following : **(1×5=5)**

(a) Describe the construction and working of a Nicol Prism.

(b) Draw a neat transition level diagram of He-Ne Laser and describe its method of working.

7. Attempt any **one** part of the following : **(1×5=5)**

(a) Describe various types of optical fiber based on modes and core refractive index.

(b) Explain the principle of holography and discuss its characteristics.