Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PEEE 5301

Sixth Semester Examination – 2013

OPTOELECTRONICS DEVICES AND INSTRUMENTATION

BRANCH : AEIE / EEE / ICE / IEE / EIE

QUESTION CODE : A 251

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest. The figures in the right-hand margin indicate marks.*

1. Answer the following questions : 2×10

   (a) Define Refractive Index of an optical wave guide.

   (b) Write the expression of the Electric Field vector of a light wave polarized in x-direction and propagating in z-direction.

   (c) What will happen of a polarized light passes through an Isotropic medium ?

   (d) What is the maximum value of the angle of incident on a fibre tip so that the light is guided ?

   (e) List various components used in optoelectronic devices and instrumentation.

   (f) Distinguish between spontaneous emission and stimulated emission.

   (g) Write few properties of Laser.

   (h) What is modulation in optoelectronics instrumentation ?

   (i) State Electro-Optic effect.

   (j) Write the physical variables which can be measured using optical gyroscope.

2. (a) Explain propagation of Electric and Magnetic Field Vectors in free space and in a medium along with necessary mathematical expression describing the propagation of the fields. 5

P.T.O.

(b) Explain the phenomena of two-beam interference of light wave. How bright and dark fringes are produced ? 5

3. (a) Briefly describe the procedure of construction of an Optical Fibre. Write materials used for making Optical Fibre. 5

(b) Explain the phenomena of Dispersion of Optical Rays through Step-Index fibre. Is it a desirable property ? 5

4. (a) Describe construction and principle of operation LED. Draw necessary diagrams. 5

(b) What are the conditions of oscillations in Laser Emission ? What is Population Inversion ? 5

5. (a) Describe principle of operation of Gas and Semiconductor Lasers. 5

(b) Describe principle of operation of PIN and APD Photodiode. 5

6. (a) With a suitable diagram describe construction and principle of operation of Mach-Zehnder Interferometer. 5

(b) With suitable diagram, explain principle of measurement of Pressure. 5

7. (a) Explain method of measurement using Modulation Technique based on Polarization of light wave. 5

(b) Briefly explain the architecture of OTDR and OFDR distributed fibre optic sensors. 5

8. Answer any **two** of the following : 5×2

(a) Losses in Optical Fibre

(b) Pulsed and continuous type Lasers.

(c) Intensity modulation in Optoelectronics.