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

Total number of printed pages – 2

B. Tech

PEEE 5301

Sixth Semester Back Examination – 2015

OPTOELECTRONICS DEVICES AND INSTRUMENTATION

BRANCH (S) : AEIE, EEE, EIE, IEE

QUESTION CODE : M 375

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 acceptance angle of a fiber.

   (b) Mention the losses responsible for attenuation in optical fibers.

   (c) Define external quantum efficiency of a photo-detector.

   (d) What is impact ionization ?

   (e) What is opto-electronic integration ?

   (f) Mention the applications of an OTDR and OFDR.

   (g) What are the three kinds of polarization ?

   (h) Define receiver sensitivity of photo receiver ?

   (i) Determine the refractive indices of the core and the cladding material of a fiber if numerical aperture is 0.33 and refractive index difference $\Delta = 0.014$.

   (j) What is intra modal dispersion ?

2. (a) Explain block diagram of an optical fiber system. 5

   (b) Briefly explain the reason for pulse broadening due to material dispersion in optical fibre. 5

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3. (a) Explain the principle of operation of optical detectors. An intrinsic photodetector in fabricated from GaAs whose band gap energy is 1.43 eV at 300 °K. Determine the wavelength above which the photo detector will cease to operate. 5

(b) Differentiate LEDs and LASER diodes. 5

4. Derive the wave equations for step-index fibers using the ray and mode theory. 10

5. (a) How is silicon RAPD operated ? How does it differ from PIN photodiode ? 5

(b) Briefly explain the principle of operation of an LED with suitable diagram. 5

6. (a) What is the difference between phase velocity and group velocity ? An optical signal of wavelength (λ) propagates in a medium of refractive index (η). What is the value of phase velocity, group velocity and group refractive index ? 5

(b) Explain linear and non-linear scattering losses. 5

7. (a) What is Intensity Modulation with direct detection method ? Explain its fundamental concepts for various modulation formats. 5

(b) Explain the working principle of fiber optic gyroscopes. 5

8. Write short notes any **two** of the following : 5×2

(a) Distributed sensors

(b) Optical Interference

(c) Electro-Optic Effect

(d) Voltage and current measurement techniques.