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Total Number of Pages: 02

B.Tech  
PEEE5301

**6<sup>th</sup> Semester Back Examination 2017-18**  
**OPTOELECTRONICS DEVICES AND INSTRUMENTATION**  
**BRANCH: EIE, IEE, AEIE, ITE**  
**Time: 3 Hours**  
**Max Marks: 70**  
**Q.CODE:C279**

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

- Q1 Answer the following questions: (2 x 10)**
- a) An optical signal at a specific wavelength has lost 55% of its power after traversing 10 km of fiber. The attenuation will be \_\_\_\_\_ dB/km of this fiber.
  - b) A Step index fiber has a core and cladding refractive index of 1.50 and 1.46 respectively. What is the value of critical angle, numerical aperture and acceptance angle of fiber?
  - c) The Bandwidth-length product shows the \_\_\_\_\_ capacity of optical fiber.
  - d) What is the significance of double refraction?
  - e) Compare a multimode optical fiber with single mode optical fiber from application point of view.
  - f) What do you mean by dispersion in optical fiber?
  - g) What does the acronym LASER stand for?
    - a) Light Absorption by Stimulated Emission of Radiation
    - b) Light Amplification by Stimulated Emission of Radiation
    - c) Light Alteration by Stimulated Emission of Radiation
    - d) None of the above
  - h) Differentiate between SLED & ELED.
  - i) If a light travels in a certain medium and it gets reflected off an optically denser medium with high refractive index, then it is regarded as \_\_\_\_\_
  - j) What is the significance of mode index in optical fibers.
- Q2 a) Compare the APD & RAPD type optical detector. (5)  
b) Explain the optical communication system with neat sketch. (5)**
- Q3 a) An optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.48 and a cladding refractive index of 1.45.  
(a) The critical angle at the core-cladding interface; (b) The NA for the fiber.  
b) Briefly discuss the intermodal and intramodal dispersion in optical fibers. (5)**
- Q4 a) Explain the importance of optoelectronic devices for instrumentation application.  
b) Discuss the working principle of APD photodiode, explain how it differs from p-i-n photodiode. (5)**

- Q5 a)** A photodiode has a quantum efficiency of 55% when photons of energy  $1.5 \times 10^{-19}$  J are incident upon it. (5)  
(a) At what wavelength is the photodiode operating?  
(b) Calculate the incident optical power required to obtain a photocurrent of  $1.7 \mu\text{A}$  when the photodiode is operating as described above.
- b)** What do you mean by planar optical waveguide? (5)
- Q6 a)** Indicate the distinction between the fiber Splices and fiber couplers with suitable diagrams. (5)  
**b)** Explain the optoelectronics detectors with neat sketch. (5)
- Q7** Explain various type of acoustic-optic modulator with neat diagram. (10)
- Q8** Write short answer on any TWO: (5 x 2)  
**a)** Material Dispersion  
**b)** WDM  
**c)** OTDR  
**d)** Dispersion-Flattened Fibers