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Total Number of Pages : 02

B.Tech  
PEEE5301

6<sup>th</sup> Semester Back Examination 2018-19  
OPTOELECTRONICS DEVICES AND INSTRUMENTATION  
BRANCH : AEIE, EIE, IEE, IT, ITE  
Time : 3 Hours  
Max Marks : 70  
Q.CODE : F270

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) Define refractive index of an optically transparent medium.
  - b) What are the materials used for manufacture of optical waveguide?
  - c) Distinguish between spontaneous emission and stimulated emission.
  - d) State electro optic effect.
  - e) Explain the term i) Polarization ii) Diffraction
  - f) Define Population Inversion.
  - g) Write the difference APD and PHOTODIODE.
  - h) Write the physical variables which can be measured optical gyroscope.
  - i) What is pumping operation in Laser operation?
  - j) Write the basic principle of operation of an optical time domain reflectometer.
- Q2**
- a) Explain the 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)
  - b) Briefly describe the procedure of construction of an optical fibre. Write materials used for making optical fibre. (5)
- Q3**
- a) Describe the construction and principle of operation LED. Draw necessary diagrams. (5)
  - b) With suitable diagram, explain principle of measurement of pressure. (5)
- Q4**
- a) Do you think noise is an important for optoelectronic devices? If Yes, derive mathematical expression for noise configuration of optoelectronic detector. (5)
  - b) A typical photo diode has a responsivity of  $0.40 \text{ AW}^{-1}$  for He-Ne laser source. The active area of the photo diode is  $2 \text{ mm}^2$ . What will be the output current if the incident flux is  $100 \mu\text{w}/\text{mm}^2$ ? (5)
- Q5**
- a) Draw a suitable diagram for Fibre optic Mach-Zehnder Interferometer sensor. (5)
  - b) A fibre optic gyroscope has circular of a diameter  $0.1\text{m}$  and the total length of the fibre used in the coil is  $500\text{m}$ . If it is operating at  $\lambda = 0.85 \mu\text{m}$ . What is the phase shift corresponding to the earth's rotation speed  $7.3 \times 10^{-5} \text{ rad/sec}$ ? (5)

- Q6** a) List the different reasons for attenuation in optical fibre and briefly explain them. (5)  
b) What are Einstein's A, B co-efficient? Find relation with them. (5)
- Q7** What is the principle of LED? Narrate various types of LED. (10)
- Q8** Write short answer on any TWO : (5 x 2)
- a) Construction and Principle of Operation Gas Laser
  - b) Fibre Optic Gyroscope
  - c) Sagnac effect
  - d) Bending Loss