Registration No:

B.Tech
PEEC4302

5TH Semester Back Examination: 2017-18
FIBER OPTICS AND OPTO ELECTRONICS DEVICE
BRANCH: ECE, ELECTRICAL, ETC, METTA, MME
Time: 3 Hours
Max Marks: 70
Q.CODE: B366
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)** Write the names of four opto-electronics devices.
- **b)** What are the advantages of Graded index fiber?
- **c)** State and explain Snell's law.
- **d)** Differentiate between thermal noise and shot noise.
- **e)** How is the fill factor defined for solar cell?
- **f)** When the mean optical power launched into an 8KM length of optical fiber is 120 µW, the mean optical fiber at the output is 3 µW, What is the overall signal attenuation in dB?
- **g)** What is Johnson noise? Write an expression for it.
- **h)** A PN photodiode has a quantum efficiency of 70% for photons of energy 1.52×10^{-19} J. Calculate the wavelength at which diode is operating?
- **i)** Give one example each of a direct band gap and indirect band gap semiconductor.
- **j)** What is quantum efficiency and responsivity?

Q2 **a)** Describe different types of losses in optical fiber due to both extrinsic and intrinsic parameter.   **(5)**
     b) Narrate double crucible method for fabricating optical fiber.   **(5)**

Q3 **a)** Explain the propagation of ray in step index and graded index fibers.   **(5)**

         Draw ray diagrams showing propagation of ray.

     b) Describe the construction and operation of PIN photodiode.   **(5)**

Q4 **a)** What are the different splicing techniques? Explain these in brief.   **(5)**

     b) Derive an expression for gain of semiconductor in an optical amplifier.   **(5)**

Q5 a) How intermodal dispersion differs from intramodal dispersion? What are different types of intramodal dispersion? **(5)**

b) Explain how can you control the refractive index of the fiber? **(5)**

Q6 (a) Explain the characteristics of LED. **(5)**

(b) What is optical cavity? How is it useful in LASER device? **(5)**

Q7 Two single mode fibers are joined together using a connector. List all possible losses that may occur. Also explain how these losses can be minimized. **(10)**

Q8 **Write short answer on any TWO:** **(5 x 2)**
a) ILD
b) Electro-optic modulator
c) Solar cell
d) Optical Connectors