



Fiber Optic Communication
(New) (1220)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** question from each unit.
5. All question carry equal marks.
6. Assume suitable data, if necessary.

UNIT - I

1. a) Describe with the aid of refractive index profile and simple ray theory. **10**
 - i) The single mode step index fiber.
 - ii) The multimode step index fiber.
 - iii) The multimode graded index fiber.
- b) Briefly compare with aid of suitable diagrams meridional and skew rays. **10**
- c) For silicon optical fiber refractive index difference for long distance transmission is 1%. Calculate **10**
 - i) NA
 - ii) Solid acceptance angle in air when core index 1.46
 - iii) ϕ_c at core - cladding interface.

UNIT - II

2. a) Explain with aid of suitable diagram edge emitter LED. **10**

- b) The quantum efficiency of a particular silicon APD is 80% for the detection of radiation at wavelength $0.9\mu\text{m}$. When the incident optical power is $0.5\mu\text{W}$ the output current from the device (after avalanche gain) is $11\mu\text{A}$. Determine multiplication factor of photodiode under these conditions. **10**
- c) Explain in detail population inversion. Discuss the strip geometry laser and distributed laser. **10**

UNIT - III

3. a) Explain ASK, FSK and PSK digital formats used for coherent optical fiber communication ? What do you mean by OOK ? Give advantages and disadvantages of each. **10**
- b) Explain optical source limitations. **10**
 i) Power
 ii) Linearity
 iii) Response
 iv) Spectral width
 v) Non Zero extinction ratio.
- c) Asynchronous heterodyne FSK receiver are commonly used for coherent light wave system. What is SNR required to operate at a BER of 10^{-9} ? Calculate the receiver sensitivity in (dBm) at 2 Gb/s in the shot noise limit by assuming 1.2 GHz receiver bandwidth, 80% quantum efficiency and a $1.55\mu\text{m}$ operating wavelength. **10**

UNIT - IV

4. a) Discuss absorption losses in optical fibers, comparing and contrasting the intrinsic and extrinsic absorption mechanisms. **10**
- b) Explain with aid of suitable diagram dispersion measurement in fiber optic. **10**
- c) Draw and power budgeting diagram for optical fiber communication. **10**

UNIT - V

5. Write short notes on. **10**
 i) Optical amplifier. **10**
 ii) WDM. **10**
 iii) Photonic switching. **10**
