

Total No. of printed pages = 6

Et-603/OFC/6th Sem/2018/J/A

OPTICAL FIBRE COMMUNICATION

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

PART-A

Marks – 25

All questions are compulsory.

1. Fill in the blanks : 1×10=10
- (a) Light travels in _____ lines.
 - (b) Optical fibers must have _____ to keep light from leaking out.
 - (c) Fiber optics are _____ to electromagnetic waves.

[Turn over

- (d) Snells law is written as $n_i \sin i = n_r \sin r$.
- (e) If light passes from air to glass it is _____.
- (f) Speed of laser is _____ than LED.
- (g) Laser light is produced by the _____ of stimulated emission.
- (h) A common optical interface is a _____.
- (i) Detector converts optical signal into _____ form.
- (j) Fiber optic photodiodes are _____ biased.

2. State true or false : 1×10=10

- (i) Optical fiber communication relies on electrons passing through wires.
- (ii) Refractive index is the ratio of speed of light in vacuum to speed of light in a medium.
- (iii) Multimode indicates that light travels in many ways through a fiber.

- (iv) For step index fiber the boundary between core and cladding is considered abrupt.
- (v) Polarized light is made up of many waves with their electric and magnetic field oriented randomly.
- (vi) In semiconductor laser output power varies inversely with input current.
- (vii) Multiplexing is the combination of multiple signals into a single signal for transmission.
- (viii) Connectors are used to permanently join two fiber ends.
- (ix) Star type couplers are passive couplers.
- (x) In NRZ coding signal is low for 0 bit and high for 1 bit.

3. Choose the correct answers : $1 \times 5 = 5$

- (a) Refractive index for glass is (2.5/1.5).
- (b) Tree is a (directional / bidirectional) coupler.
- (c) Electrons (gain / release) energy when these drop from a higher level to a lower one.

- (d) WDM uses (one / two) or more wavelengths to carry signals.
- (e) Digital signals can withstand distortion (better / worse) than an analog signal.

PART - B

Marks - 45

Answer any five questions. $9 \times 5 = 45$

4. (a) Define acceptance angle. Where is it measured ?
- (b) What do you understand by numerical aperture ?
- (c) What is total internal reflection ?
- $2+2+2+3=9$
5. (a) What is a mode ? Explain in brief.
- (b) Discuss the method of light guiding in a graded index multimode fiber with the help of a neat diagram.
- (c) Discuss the process of light coupling from an LED to a fiber.
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6. (a) What are Edge emitting LEDs ? Discuss their light producing principles and also their working.
- (b) What is the full form of LASER ? Explain two functional differences between LASER and LED. $1+4+4=9$
7. (a) Draw and explain the block diagram of an optical transmitter.
- (b) Also discuss the working of an Avalanche Photodiode. $5+4=9$
8. (a) Differentiate between connector and coupler.
- (b) Draw neat diagrams for the T, Tree and Star coupler.
- (c) Discuss the working of directional and bidirectional coupler with the help of neat diagrams. $2+3+4=9$

9. (a) What is multiplexing ? Discuss.
- (b) What do you understand by direct modulation ?
- (c) Draw diagrams for the RZ and Manchester coding for data 10011. $3+2+4=9$