Code: 15A04701 **R15**

B.Tech IV Year I Semester (R15) Regular & Supplementary Examinations November/December 2019

OPTICAL FIBER COMMUNICATION

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define critical angle and acceptance angle.
(b) Mention different types of rays that can propagate in a fibre.
(c) What is dispersion?
(d) Define scattering loss.
(e) Mention light source materials.
(f) List out the types of misalignments resulting in losses while splicing.
(g) What is detector response time?
(h) Define photo detector noise.
(i) Mention the differences between analog and digital links in optical fibre communications.
(j) What is a link power budget?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Draw the block schematic of optical communication system and explain each element in detail.
(b) List out the applications of optical communications.

OR

3 (a) Explain in detail about single mode fibres with diagrams.
(b) A silicon optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and cladding refractive index of 1.47. Determine: (i) Critical angle at core cladding interface. (ii) The Numerical aperture (NA) for the fiber

UNIT – II

4 (a) How do you find whether an optical fibre link is limited by attenuation or by dispersion?
(b) Mention different bending losses.

OR

5 (a) List out different types of attenuation losses.
(b) Derive an expression for pulse spreading in a step index multi-mode fibre due to intermodal dispersion.

UNIT – III

6 (a) What are the requirements for the materials to be used in optical fibres?
(b) Derive laser diode rate equations and resonant frequencies.

OR

7 Draw the schematic of edge emitting double hetero junction LED and explain its working in detail

UNIT – IV

8 (a) What are the requirements of photo detector?
(b) Write in detail about PIN diode.

OR

9 (a) Draw the schematic diagram of a typical optical receiver and explain.
(b) Write about quantum limit.

UNIT – V

10 (a) What are the major component choices for the system designer to design optical communication system?
(b) What is a rise time budget?

OR

11 (a) Give an account of fibre optic link power budget in detail.
(b) Write about optical system design considerations.

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