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B. Tech. 7th Semester (ECE) (G-Scheme)  
Examination, November-2023  
FIBER OPTICAL COMMUNICATION  
Paper-PCC- ECE-401G

Time allowed : 3 hours]

[Maximum marks : 75

*Note: Attempt five questions in total selecting one question from each unit. All questions carry equal marks.*

*Question Number 1 is compulsory.*

1. (a) Discuss effects of linewidth in optical communication.
- (b) Explain effect of waveguide dispersion.
- (c) Enumerate advantages of Quantum well lasers.
- (d) Derive equation for noise in APD.
- (e) Discuss star distribution system.
- (f) What do you understand by XPM?  $6 \times 2.5 = 15$

**Unit-I**

2. (a) Explain propagation of light in optical fiber using meridional rays. Derive necessary mathematical equation for NA and Half conical angle. 9
- (b) A silica optical fiber with a core refractive index 1.47 and a cladding refractive index of 1.44. Determine (i) Critical angle of core cladding interface (ii) NA for the fiber (iii) Acceptance angle in the air for the fiber. 6

3. (a) Explain losses due to intrinsic and extrinsic absorption in optical fiber cable in details. 9
- (b) Discuss in detail the single mode and multi-mode optical fiber cable. 6

### Unit-II

4. Discuss threshold condition for lasing. Also derive the equation for various type of efficiencies and how coupling efficiency can be improved when Laser is used as light source. 15
5. (a) Discuss working principle of APD. Also enumerate various efficiencies of APD. 8
- (b) Derive the equation for noise in APD. How it can be reduced? 7

### Unit-III

6. (a) Discuss optical termination and distribution system for a linear bus system. Also write and explain the elements of the loss equation. 9
- (b) Enumerate salient points of link budgeting. 6
7. (a) Explain working of SOA, also draw necessary diagram. 8
- (b) Discuss in detail WDM and list out salient features of WDM. 7

**Unit-IV**

8. (a) Discuss in detail the effects of Stimulating Raman Scattering in fiber optical communication system. 8
- (b) What do you understand by Soliton communication? Discuss its salient features. 7
9. Write short notes on the following:  $2 \times 7.5 = 15$
- (a) Self-phase modulation.
- (b) Four wave mixing