

Reg. No. :

Question Paper Code : 20102

M.E/M.Tech.DEGREE EXAMINATION, JANUARY 2011.

First Semester

Communication Systems

251102 – OPTICAL COMMUNICATION NETWORKS

(Regulation 2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Can a coupler be made wave length selective? Where are these couplers widely used?
2. How SOAS differ from EDFAS?
3. List the responsibilities of the four sublayers of the SONET.
4. Is it possible to integrate the OXT and OLT systems together in one piece of equipment? Specify the drawback of the above integration.
5. Given a network topology and a set of end-to-end light path requests the wavelength assignment must obey what constraints.
6. From the Fiber optics point of view which topology is the most difficult to implement?
7. Show a schematic for an optical multiplexer to create a packet – interleaved TDM stream.
8. What are the advantages of photonic packet switched networks?
9. How will you control dispersion in SOAs?
10. A Soliton optical fiber link is operating at $1.55\mu\text{m}$ ($\beta_2 = -1\text{ps}^2/\text{km}$). If the separation between the two neighbouring solitons is 12 in normalised units, for 10 Gb/s bit rate, upto what distance transmission is limited.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive the power transfer function of the Mach – Zehnder interferometer, assuming only one of its two inputs is active. (8)
- (ii) Derive the power transfer function of the Fabry – Perot filter. (8)

Or

- (b) Discuss how optical filters are used in optical networks as
- (i) Filters (4)
- (ii) A multiplexer or demultiplexer and (6)
- (iii) A wavelength router. (6)
12. (a) For fixed n , what is the value of P
- (i) that maximises the throughput of the DT – WDMA protocol. (8)
- (ii) For fixed W and G , find out the value of L , that maximises the throughput of the basic SA/SA protocol. For a modified SA/SA protocol what is the value of L what is the inference to be made about the choice of control and data packet sizes. (8)

Or

- (b) For a collision – less transmission, will a lightning network do justification? Which topology will be suitable for distributing the transmitted power equally to all station without inducing much loss? Bring out its salient features.
13. (a) Compare the features of the hybrid
- (i) Electronic/optical approach with a purely optical approach.
- (ii) Show how ATM and WDM networks combined, controlled and managed.

Or

- (b) Given a network topology, a set of end-to-end light path requests, determine a route and wavelength(s) for the requests using the minimum possible number of wavelengths (Assume suitable data of your choice).
14. (a) Bring out the salient features of 2G optical networks that are capable of providing packet switched service at the optical layer.

Or

- (b) Give the block diagrams of RITENET WRPON architecture and a broadcast and select PON architecture.

15. (a) For high speed networks how will you provide resilience against failure and handle node failures.

Or

- (b) List down the various sources of intra – channel cross talk and interchannel cross talk and the methods of overcome them.
