M.E. DEGREE EXAMINATIONS: DECEMBER 2009

First Semester

COMMUNICATION SYSTEMS

COM503: Optical Communication Networks

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. What are the applications of optical switches in networks?

2. What are the uses of directional coupler in optical networks?

3. What are the benefits of SONET/SDH over PDH?

4. Distinguish between shared protection and dedicated protection in SONET ring.

5. Differentiate between single hop and multihop optical networks.

6. What are the advantages of wavelength routed networks over broadcast-and-select networks?

7. What is Graph coloring problem? Define chromatic number of a graph.

8. Define the term traffic grooming in optical networks.

9. What are the various approaches of increasing transmission capacity in optical systems?

10. Distinguish between transparent and opaque optical networks.

PART B (5 x 16 = 80 Marks)

11. a) Derive the power transfer function of the Mach-Zehnder interferometer, assuming only one of its two inputs is active.

(OR)

   b) (i) Explain the parameters used to characterize the suitability of switch for optical networking applications. (8)

     (ii) Discuss the major parameters to be considered in building large optical switches. (8)

12. a) What is MAC protocol? Explain the technique of DT-WDMA with scheduling and show its performance characteristics.

(OR)

   b) What is broadcast-and-select optical network? Describe how message transmission is achieved in various single hop and multihop network topologies.

13. a) Discuss the multiplexing techniques of SONET/SDH in detail.

(OR)

b) Explain the span switching and ring switching protection mechanisms in a bi-directional line switched ring with four fibers (BLSR/4).

14. a) Prove the following theorem:

Theorem: In a line network with N nodes, all online light path requests with load L can be supported using atmost L x ceil $[\log_2{}^N]$ wavelengths without requiring wavelength conversion.

Based on the proof, write pseudo code for an algorithm to perform wavelength assignment.

(OR)

b) (i) Explain the key functions of OXC in a large optical network. (8)

(ii) Describe the various configurations of all-optical OXC and their characteristics. (8)

15. a) Explain the construction, operation and applications of

(i) Tunable delays (8)

(ii) Optical Phase lock loop (8)

(OR)

b) What is the need for buffering in photonic packet switched (PPS) networks? Describe the various types of buffering techniques adopted in PPS.

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