



M.E DEGREE EXAMINATIONS: JAN 2015

(Regulation 2014)

First Semester

COMMUNICATION SYSTEMS

P14COT103: Optical Communication Networks

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The following items consist of two statements, one labeled as the “Assertion (A)” and the other as “Reason (R)”. You are to examine those two statements carefully and select the answers to these items using the codes given below. [K₂]

Assertion(A): The intermodal dispersion in graded index fiber is controlled

Reason(R) : The refractive index decreases gradually from its maximum value at the center of the core

- a) both A and R are individually true and R is the correct explanation of A b) both A and R are individually true but R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true.

2. The refractive index of core and cladding is 1.5 and 1.49 respectively. What is the acceptance angle? [K₂]

- a) 9.95° b) 13°
c) 2° d) 90°

3. Match list I with list II and select the correct answer using the codes given below. [K₁]

List I	List II
A.SONET Path Layer	1. Actual transmission of bits
B. SONET Line Layer	2. End to end connection
C. SONET Section Layer	3. Multiplexes number of path layers
D. SONET Physical Layer	4. Framing and error control

- a) A-2, B-3, C-4, D-1 b) A-1,B-3, C-4, D-2
c) A-1, B-2, C-3, D-4 d) A-2, B-1, C-3, D-4

4. Consider Scheduling Protocol [K₂]

conversion.

17. Differentiate bit multiplexed stream and packet multiplexed stream with an example. [K₂]
18. Compare feed-forward and feedback delay lines. [K₂]
19. How chirped Fiber Bragg grating is used for dispersion compensation? [K₂]
20. What are Class I and Class III systems? What is the importance of Open Fiber Control (OFC) protocol? [K₂]

PART C (10 x 5 = 50 Marks)

21. Derive an expression for the bit rate-distance product of a Multimode step-index fiber. Hence, find bit rate-distance product if $\Delta=0.01$, $n_1=1.5$ ($\approx n_2$). [K₃]
22. What is the advantage of optical Amplifiers over conventional amplifiers? Explain the operation of Erbium Doped Fiber Amplifiers. [K₂]
23. What is frame/slot synchronization? How is it achieved in broadcast network? [K₂]
24. What is the importance of MAC protocol? Explain Slotted Aloha protocol with throughput. [K₂]
25. Explain the Access node architecture of NTT Ring Test bed with figure. What are the methods used to protect against link failure in NTT test bed. [K₂]
26. How the virtual topology design problem is converted into Mixed Integer Linear Programming (MILP). [K₂]
27. What is the limitation of WDM PON architecture? Explain how it is avoided in WRPON architecture with diagram. [K₂]
28. Explain bit interleaving and de-interleaving with necessary figures. [K₂]
29. Explain how the properties of soliton pulse are used in realizing optical AND operation [K₂]
30. A $1.55\mu\text{m}$ unchirped Gaussian pulse of 60ps width (at $1/e$ - intensity point) is launched into a fiber. Calculate the pulse width after 50km, if the fiber has a dispersion of 16ps/nm-km. [K₃]

PART D (2 x 10 = 20 Marks)

31. What is Chromatic dispersion in optical fibers? Explain the different components of chromatic dispersion and their effects. How to control chromatic dispersion. (10) [K₂]
32. a. How self healing is provided in Unidirectional Path Switched Rings and Bidirectional Path Switching Ring? (6) [K₂]
- b. How the node failure is handled in Fiber network? (4) [K₂]
