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GIET UNIVERSITY, GUNUPUR – 765022

M. Tech (First Semester – Regular) Examinations, June – 2021

MPEEC 1032 – OPTICAL NETWORKS

(E.C.E)

Time: 2 hrs

Maximum: 50 Marks

The figures in the right hand margin indicate marks.

PART – A

(2 x 10 = 20 Marks)

Q1. Answer **ALL** questions

- a. What is open shortest path first (OSPF) routing protocol?
- b. Short notes on optical line terminals.
- c. What are the network management functions?
- d. Explain with neat diagram about path, span, and ring switching.
- e. How dual homing can handle hub node failures?
- f. What is wavelength continuity constraint (WCC)?
- g. What is the blocking probability for light path requests?
- h. What is passive optical networks (PON)? What are the advantages of deploying PON?
- i. What is IP over WDM?
- j. Explain the 1:1 optical multiplex section (OMS) protection

PART – B

(6 x 5 = 30 Marks)

Answer ANY FIVE questions

Marks

- | | |
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| 2. Define SONET/SDH. Explain the elements of SONET infrastructure with different network configuration? | (6) |
| 3. Consider a four-node linear network with nodes A, B, C, and D in that order. There are three wavelengths $\lambda_1, \lambda_2, \lambda_3$ available and are given OADMs that drop two fixed channels. That is, you can put in OADMs that drop either λ_1, λ_2 , or λ_2, λ_3 , or λ_1, λ_3 . Now consider the situation where you need to set up the following light paths: AB, BC, CD, AC, BD. What OADMs would you deploy at each of the nodes? Suppose at a later point the light path traffic changes and now we need to replace light paths AC and BD by AD and BC. What changes would you have to make to support this new traffic? | (6) |
| 4. Explain the significance of topology management and route computation in a given optical network | (6) |
| 5. Why optical layer protection is needed? Explain optical multiplex section dedicated protection ring (OMS-DP Ring) and 1:N transponder protection scheme. | (6) |
| 6. Consider the five-node fiber topology shown in Figure 1 on which IP bandwidth is to be routed between IP router node pairs over a WDM network. The bandwidth demands are given for each node pair in the following table. Assume that all demands | (6) |

are bidirectional and that both directions are routed along the same path using the same wavelengths in opposite directions.

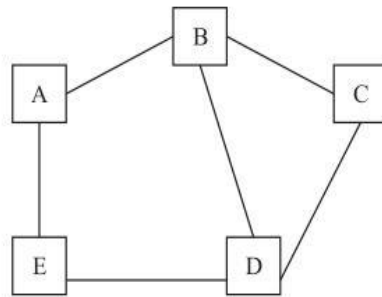


Figure 1

Gb/s	B	C	D	E
A	15	25	5	15
B		5	35	15
C			15	25
D				5

- a) Assuming OC-192c (10 Gb/s) trunks are used, complete an equivalent table for the required number of light paths (that is, wavelengths) between each pair of nodes.
- b) Using the given physical topology, and assuming that there are no wave-length conversion capabilities contained within the optical cross connects at the nodes, specify a reasonable wavelength-routing design for each light path. Clearly label each wavelength along its end-to-end path through the network.

7. How OTDM is different from wavelength division multiplexing (WDM)? (6)
8. A ring network with two intermediate adjacent nodes A and B, each with an OADM. OADM at node A adds wavelength λ_1 and the OADM at node B drops the adjacent wavelength λ_2 . Suppose the minimum received power is set at -30 dBm and the transmit power is set at 0 dBm. Adjacent channel crosstalk at the receiver must be less than 15 dB. Assume that signals are added and dropped by the OADMs with no loss. What is the crosstalk suppression required at the OADM for the adjacent channel? How does this change with the link loss between the two nodes? (6)

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