Optical Networks(16EC3813)

Unit-1

1.a. Describe how optical signals are multiplex and demultiplex based onwavelength.

b. Describe the operation of fabry-perot filter .

2. a. Explain the working principle of Fiber brag grating.

b. Explain the working principle of acoustic optical tunable filter.

3. a. Draw the structure of Mach-Zehnder type interferometer and explain how phase modulation is converted into intensity modulation.

b. What are the different types of optical fiber couplers and explain their working?

4. a. Explain multiplexing techniques.

b. Explain the following i. Isolators ii. Circulators

5. Explain the working principle of high channel count multiplexer using suitable diagrams.

6. a. Explain working principle of optical amplifier.

b. Explain the working principle of Erbium-Doped Fiber Amplifiers.

7. How are the following elements constructed? Explain their role in WDM networks.

(i) Arrayed waveguide grating. (ii) Mach-Zehnder interferometers.

8.a. Explain the use of pump sources for amplifier.

b. Explain Pump Sources for Raman Amplifiers.

9. a. Explain Subcarrier Modulation and Multiplexing.

b. Describe demodulation process using an Ideal Receiver.

10. a. Explain the Wavelength Conversion using Optoelectronic Approach.

b.Explain the Wavelength Conversion usingOptical Gating.

Unit-2

1. a. What is the importance / use of SONET/SDH in optical communications?

b. Discuss in detail about SONET / SDH and give their transmission formats.

2. a. What are the routing strategies in an optical network? Give examples.

b. Explain about rerouting in WDM networks with sparse wavelength conversion.

3. a. Briefly discuss the SONET/SDH Rings.

b. Discuss in detail multiplexing and frame structure of SONET/SDH.

4. a. Explain ATM function in detail.

b. What are the routing strategies in an optical network? Give examples.

5.a. Explain SONET/SDHPhysicalLayer

b. Discuss Elements of a SONET/SDH Infrastructure

6.a.Discuss Storage-AreaNetworks

b. Explain Fiber Channel.

7.a. Explain IP (Internet Protocol).

b. Discuss IP Routing and Forwarding

8.a. Explain quality of service.

b.Draw the Storage-Area Networks

9.a. Multiprotocol Label Switching

b. MPLS applications in an IP network.

10.Explain the following.i. SONET/SDH Rings

ii. QOS

iii.MPLS

Unit-3

1. a. Explain the functions of WDM network.

b. Discuss wavelength-routing mesh network that provide light paths to its users, such as SONET boxes and IP routers

2.a. Explain the importance of optical line terminal.

b. Discuss the working principle of optical line terminal.

3.a. Explain the importance ofoptical line amplifier

b. Discuss the working principle of optical line amplifier.

4. a. Explain about optical cross connectors.

b. Discuss the key functions of optical cross connectorsin large networks.

5.a. Explain the importance of cost trade off in designing networks.

b. Discuss cost trade-offs in designing networksusing light path topologies that can be deployed over a fiberring topology.

6.a.Explain the importance of multiplexing in optical networks.

b. Explain the working principle of Add/Drop Multiplexer.

7. Explain Dimensioning Wavelength-Routing Networks.

8. Discuss wavelength-routing network design using LTD and RWA Problems

9. Explain Cost Trade-Offs using Detailed Ring NetworkExample

10. Explain classes of statistical traffic models used in solving the dimensioningproblem.

Unit-4

1. a.Brief about Network Management Functions.

b. Discuss Optical Layer Services and Interfacing.

2. Discuss the Layers within the Optical Layer.

3.a. Brief about Multivendor Interoperability.

b. Explain interoperability between WDM systems from different vendors.

4.a. Explain the importance of Fault management

b. Explain the impact of Transparency on light paths.

5.a.Brief the basic concepts of survivability

b. Explain Protection in SONET/SDH using Point-to-Point Links and Self-HealingRings .

6. Explain Protection in IP network with example.

7. a. Explain the importance of Optical Layer Protection.

b. Explain the Optical Layer Protection with an example.

8.a. Discuss Service Classes Based on Protection.

b.Brief about Optical Layer Protection Schemes

9.a. Importnae of internetworking between layers.

b.Describe how protection in the network can becoordinated between all the layers

10. Explain the following

i. Bidirectional Line-Switched Rings

ii.Policing

Unit-5

1.a. Brief about access network.

b. List the different types of services that must be supported by an access network.

2.a. Explain the importance of access network.

b. Draw the access Network Architecture and explain each block.

3. a.Explain the HFCapproach in a network.

b.Explain the FTTC approach in a network.

4.a. Define photonic packet switching.

b. Draw and explain the routing node in thepacket switching network.

5.a. Explain the importance of Optical Time Division Multiplexing

b. Explain theFunction of a bit-interleaved optical multiplexer.

6.Describe the operation of optical multiplexer to create the bit-interleaved TDM stream.

7. Describe the operation of optical multiplexer to create the packet-interleavedTDM stream.

8.a.Define synchronization.

b. Explain the synchronization of two periodicstreams by introducing a delay ΔT in the top stream relative tothe bottom stream.

9.a. Explain the header processing.

b. Explain Buffering.

10. a. Explain about optical burst switching

b. Explain about Bit Interleaving