Optical Networking
CS802C
Contracts: 3L
Credits- 3

Optical Networks: [36 hours]
Module – 1: [10]
Optical communications - Basics of: [2]
Sources.
Transmitters.
Modulators.
Optical fiber.
Photodetectors, and
Receivers.
Switching in networks.[2]
Circuit switched.
Packet switched.
Cell switched.
Virtual circuit switched.
Burst switched (fast circuit switched).
Transmission [1]
3. Asynchronous.
4. Synchronous.
Layering in packet switched networks. [2]
8. Motivation.9. Commonly used abstraction,
9.2 Physical layer.
9.3 Data link layer.
9.4 Network layer.
9.5 Transport layer.
9.6 Application layer.
Layering in circuit switched networks. [3]
12. Physical layer.
13. Multiplexing standards.
14. Signalling - CAS, CCS.
15. SS7 concept.
Module – 2: [8]
Data plane, management plane, control plane - concept. [1]
First generation networks. [2]
l) SDH/SONET.
m) Computer interconnections - ESCON, Fiber Channel, HIPPI.
n) FDDI.
o) ATM.
p) DQDB.
Components – description. [3]
6. Mode locked laser (for ps pulses).
7. Tunable filters.
8. Multiplexers.
9. Demultiplexers.
10. Tunable wavelength convertors.
11. Optical amplifiers.
a. Fiber - EDFA.
b. SOA.
12. Tunable transmitters.
13. Tunable receivers.
14. Dispersion compensating fibers.
Multiplexing techniques. [2]
12. SDM.
13. TDMA.
14. WDMA (OFDMA).
1. DWDM.

2. SCM.
15. CDMA.

Module – 3 : [9]

Protocols for single channel broadcast networks. (recapitulation) [1]
12. ALOHA, CSMA/CD.
13. Problems with CSMA/CD.
14. Definition of high speed network.
Classification of multiple access methods. (recapitulation) [1]
11. Random access.
12. Reserved acces.
13. Scheduled access.
Multichannel multiple access protocols. [2]
3. Desirable charactersticks of protocol.
1. Scalability.
2. Fairness.
4. TTTR.
5. TTFR.
6. FTTR.
7. FTFR.
8. Problem of wavelength stability.
Multihop WDM network. [2]
xii. Shufflenet.
xiii.MSN.
Wavelength routed networks. [3]14. Mesh.
15. Ring-Traffic grooming problem.

Module – 4: [9]

IP over Optical framework. [2]
- ASON.
- MPëS.

Burst switched network (bufferless networks) [1]
All-optical circuit switches. [1]
All-optical packet switches. [3]
iii) Broadcast and select.
iv) Wavelength routed.
v) Space switch based.
vi) Discussion on various switch architectures.
vii) Packet buffering techniques.
viii)Travelling type.
ix) Recirculating type.
Protection and restoration. [2]
- Restoration mechanism.
- Restoration timing issues.
- Path protection.
- Span protection.
- P-cycles.

References:

1. WDM Networks: Biswanath Mukherjee.
2. Optical Networks - A Practical Perspective: Rajiv Ramaswamy & Kumar Sivarajan.