PAPER ID-310263

Roll No:

BTECH
(SEM VII) THEORY EXAMINATION 2024-25
OPTICAL NETWORK

TIME: 3 HRS   **M.MARKS: 100**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10 = 20**

Q no.	Question	CO	Level
a.	Differentiate between stimulated Brillouin scattering and stimulated Raman scattering.	1	K4
b.	Explain the concept of optical packet switching.	1	K2
c.	How would you implement a Mach-Zehnder interferometer for wavelength division multiplexing?	2	K3
d.	What is the principle of operation of optical couplers?	2	K1
e.	Explain the function of the ATM adaptation layer in optical networks.	3	K2
f.	How is Quality of Service (QoS) managed in IP networks?	3	K3
g.	Explain the concept of light path topology design in WDM networks.	4	K2
h.	What is wavelength division multiplexing (WDM)?	4	K1
i.	How would you implement synchronization in an OTDM system?	5	K3
j.	Compare optical switching with traditional electronic switching.	5	K4

SECTION B

2.   **Attempt any *three* of the following:**   **10 x 3 = 20**

Q no.	Question	CO	Level
a.	Describe the second-generation optical networks and how they differ from first-generation networks. What role does optical packet switching play in these networks?	1	K2
b.	What are the basic principles of operation for optical couplers, and how is energy conserved during the coupling process?	2	K1
c.	Analyze the differences between SONET/SDH and ATM networks in terms of their architecture and functionality in optical systems.	3	K4
d.	Describe the light path topology design in WDM networks. How does it affect the routing and wavelength assignment process?	4	K2
e.	Explain the concept of synchronization in optical networks. Why is it important for OTDM systems?	5	K2

SECTION C

3.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

Q no.	Question	CO	Level
a.	Discuss the transmission basics in optical networks, focusing on wavelength, frequency, and channel spacing.	1	K3
b.	Analyze the nonlinear effects in optical networks. How does self-phase modulation and cross-phase modulation impact the performance of optical networks?	1	K4

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4.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

Q no.	Question	CO	Level
a.	Compare and contrast the working principles of different types of optical filters	2	K4
b.	What is the impact of crosstalk on optical network performance? How can crosstalk be minimized in bidirectional optical communication systems?	2	K2

5.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

Q no.	Question	CO	Level
a.	Explain the concept of ATM in optical networks. How do ATM adaptation layers function, and why is quality of service (QoS) important in ATM networks?	3	K2
b.	Discuss the routing and forwarding mechanisms in IP networks. How does QoS influence the performance of IP-based optical networks?	3	K3

6.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

Q no.	Question	CO	Level
a.	Discuss the challenges associated with wavelength assignment in large-scale optical networks.	4	K3
b.	Analyze the cost trade-offs involved in designing WDM networks. How do factors such as network topology and wavelength reuse affect the overall cost and performance?	4	K4

7.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

Q no.	Question	CO	Level
a.	How does burst switching work in optical networks? What are the key challenges in implementing optical burst switching systems?	5	K3
b.	Evaluate the feasibility of deploying optical burst switching in a metropolitan area network (MAN). What are the main challenges and benefits of this approach?	5	K6