K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:VII
Class:FINAL	Program:B.Tech
Branch Code:ETC	Pattern:2022
Name of Course:Optical Communication	Course Code:ETC224001
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	**Explain the following terms related to optical fiber,** **i) NA** **ii) Acceptance angle** **iii) V-Number**	(6)	CO1
Question No. 2			
2a)	Explain the Operating principle of LED with suitable sketch	(6)	CO2
Question No. 3			
3a)	**Explain** how a filter is used to separate channels in a WDM system	(8)	CO3
	OR		
3b)	**Compare** EDFA and SOA in terms of operating principle and application.	(8)	CO3
3c)	**Describe** the function of an optical cross-connect in optical mesh networks.	(8)	CO3
	OR		
3d)	**Explain** the working principle of an Erbium-Doped Fiber Amplifier (EDFA) with neat sketch	(8)	CO3
Question No. 4			
4a)	Explain the role of multiplexing in SONET/SDH networks	(8)	CO4
	OR		
4b)	Describe the physical layer architecture of a SONET/SDH network	(8)	CO4
4c)	Discuss the process of wavelength assignment in WDM networks.	(8)	CO4
	OR		

4d)	Describe the key infrastructure elements in a first-generation optical network.	(8)	CO4

Question No. 5

5a)	**Make a rise time budget for 0.85µm, 10km fiber link designed to operate at 50Mbps. The LED transmitter and the SI PIN receiver have rise times of 10ns and 15ns, respectively. The graded index fiber has a core index of 1.46, = 0.01, and D = 80ps/km-nm. The LED spectral width is 50nm. Can the system be designed to operate with NRZ format?**	(8)	CO5

OR

5b)	**Make a power budget for a short haul system of length 5 km where the required data rate is 20Mbps, BER is 1x10 -9 errors/bit and it is operating at λ = 850nm. The Si PIN photodiode has a receiver sensitivity of about -42dBm. GaAlAs LED can couple 50µW into multimode fiber with a core diameter of 50µm. The connector loss is 1dB per connector. Splices will be required at each kilometer with 0.5dB per splicing loss, and fiber attenuation loss for the fiber is 3.5dB/km.**	(8)	CO5
5c)	Explain the Numerical Aperture Measurement Technique.	(8)	CO5

OR

5d)	Compare two fiber optic sensors for use in structural health monitoring.	(8)	CO5

····· End of question paper·····