

Code: 20EC4601A

**III B.Tech - II Semester – Regular / Supplementary Examinations  
APRIL 2024**

**OPTICAL COMMUNICATIONS  
(ELECTRONICS & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
<b>UNIT-I</b>					
1	a)	Explain the block diagram of Optical Fiber Communication with neat diagram.	L2	CO1	7 M
	b)	Discuss the advantages of optical fibers over conventional coaxial cables.	L2	CO1	7 M
<b>OR</b>					
2	a)	What is the concept of total internal reflection? Explain with a suitable example.	L2	CO1	7 M
	b)	A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.5 and cladding refractive index of 1.47. Determine: (i) The critical angle at the core-cladding interface. (ii) The NA for the fiber. (iii) The acceptance angle in air for the fiber.	L3	CO1	7 M

<b>UNIT-II</b>					
3	a)	Explain about reach through avalanche photo diode.	L2	CO2	7 M
	b)	A photo diode has quantum efficiency of 65 %. When photons of energy $1.5 \times 10^{-19}$ J are incident on it? (i) What is the wavelength of the photo diode? (ii) Calculate the incident optical power required to obtain a photo current of 2.5, when the photo diode is operating as described above.	L4	CO2	7 M
<b>OR</b>					
4	a)	Explain different structure of lasers with neat sketches. .	L2	CO2	7 M
	b)	Compare surface emitters and edge emitter LEDs.	L3	CO2	7 M
<b>UNIT-III</b>					
5	a)	What is a fiber coupler? For a 2 x 2 fiber coupler, input power is 200 $\mu$ w, throughput power is 90 $\mu$ w, coupled power is 85 $\mu$ w and cross talk power is 6.3 $\mu$ w . Compute the performance parameters of the fiber coupler.	L3	CO3	7 M
	b)	What are the underlying principles of the WDM techniques?	L3	CO3	7 M
<b>OR</b>					
6	a)	Illustrate the operation of wavelength division multiplexing.	L3	CO3	7 M

	b)	List the advantages and disadvantages of using WDM in optical fiber communication system.	L3	CO3	7 M
<b>UNIT-IV</b>					
7	a)	Explain Digital modulation formats for optical transmission.	L2	CO4	7 M
	b)	Explain Optic Heterodyne Receivers with neat diagram.	L2	CO4	7 M
<b>OR</b>					
8	a)	Illustrate and explain Laser diode Modulation with neat diagram.	L3	CO4	7 M
	b)	Explain Thermal and Shot Noise, Amplifier Noise.	L2	CO4	7 M
<b>UNIT-V</b>					
9	a)	Discuss Analog System design in optical communication.	L3	CO5	7 M
	b)	Explain applications of Optical fiber.	L2	CO5	7 M
<b>OR</b>					
10	a)	Explain with the neat diagram the digital signal transmission through an optical data line.	L3	CO5	7 M
	b)	Explain Fibreless transmission.	L2	CO5	7 M