Q.P. Code: 18EC0438 **R18**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech IV Year I Semester Regular Examinations February-2022

FIBER OPTIC COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1	**a**	Write any two differences between step index and graded index fiber.	**L2**	**2M**
	b	What are the various types of losses in optical fiber?	**L1**	**2M**
	c	Define direct band gap materials and indirect band gap materials.	**L1**	**2M**
	d	State the signal transmission of an optical receiver.	**L1**	**2M**
	e	Define the link budget calculations.	**L1**	**2M**

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	**a**	Define critical angle and derive the expression for critical angle.	**L3**	**5M**
	b	Illustrate reflection and refraction with neat sketch.	**L2**	**5M**
		OR		
3	**a**	Explain about the Snell's law and significance of numerical aperture.	**L2**	**5M**
	b	Calculate number of modes of an optical fiber has diameter of 50μm, n1 =1.48 and n2=1.46 with operating wavelength of 0.82μm.	**L3**	**5M**

UNIT-II

4	**a**	Develop the expression for material dispersion.	**L3**	**5M**
	b	What is attenuation? Explain in detail.	**L2**	**5M**
		OR		
5	**a**	Determine the theoretical cutoff wavelength for single mode fiber.	**L3**	**5M**
	b	Explain how to minimize the micro bending losses in the fiber?	**L1**	**5M**

UNIT-III

6	**a**	Explain in detail about the surface emitting LED with neat diagram.	**L2**	**5M**
	b	Explain in detail about the quantum efficiency and LED power.	**L2**	**5M**
		OR		
7	**a**	Develop the rate equation for LASER diode.	**L3**	**5M**
	b	Explain in detail about resonant frequencies of LASER Diode.	**L2**	**5M**

UNIT-IV

8	**a**	Develop the expression for response time of a photodiode.	**L3**	**5M**
	b	Analyze photo detector receiver with simple model and equivalent circuit.	**L4**	**5M**
		OR		
9	**a**	Explain the working of depletion layer photocurrent with diagram.	**L2**	**4M**
	b	A photo diode has quantum efficiency of 65% when photon energy of 1.5×10^{-19} J. (i) Find the operating wavelength of the photo diode. (ii) Calculate the incident optical power required to obtain a photocurrent of 2.5nA.	**L3**	**6M**

UNIT-V

10	**a**	Explain about bandwidth budget.	**L2**	**5M**
	b	Explain optical amplifier and its applications.	**L2**	**5M**
		OR		
11	**a**	Summarize the system performance using rise time budget of digital systems.	**L3**	**5M**
	b	Describe about power budget with examples.	**L2**	**5M**

END