U.S.N | | | | | | | | | | |

P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; February / March - 2022

Optical Communication Systems and Networks

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Apply the knowledge of physics to explain basic optical laws, various optoelectronic devices and its structures.

CO2: Analyze the causes for different losses in an optical communication link.

CO3: Develop a solution for optical communication systems for specified characteristics.

CO4: Examine the methods to improve coupling efficiency and signal to noise ratio of the communication system.

Co5: To Enrich the knowledge about optical communication systems and networks.

Note: ***I) PART - A*** *is compulsory.* ***Two*** *marks for each question.*

II) PART - B*: Answer any* ***Two*** *sub questions (from a, b, c) for Maximum of* ***18 marks*** *from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	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 a cladding refractive index of 1.47. Determine; i) Critical angle at core cladding interface ii) Numerical apertures for the fiber	2	L1	CO1	PO1
b.	A photodiode is constructed of GaAs. Which has a band gap energy of 1.43 eV at 300 K. Determine the long wave length cutoff.	2	L1	CO2	PO2
c.	Define optical circulators and mention any two applications.	2	L1	CO1	PO1
d.	Define; i) Stimulated emission ii) Spontaneous emission.	2	L1	CO1	PO1
e.	Mention the features of reconfigurable OADM.	2	L1	CO5	PO2
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	Derive an expression for maximum acceptance angle of an optical fiber.	9	L3	CO3	PO3
b.	With a neat diagram, describe the bending losses that occur in optical fibers.	9	L2	CO2	PO2
c.	Explain the working of Fabry Perot resonator cavity for laser diode with relevant diagram.	9	L2	CO2	PO1
	UNIT - II	**18**			
2 a.	Illustrate the representation of a PIN photodiode circuit with an applied reverse bias also explain the energy band diagram for PIN photodiode.	9	L2	CO1	PO1
b.	Describe the types of fiber splicing techniques with relevant figures.	9	L2	CO1	PO1
c.	With a neat diagram, explain optical power loss model for a point to point link.	9	L2	CO2	PO2

Contd… 2

	UNIT - III	**18**			
3 a.	Describe the configuration of an eye diagram showing key performance parameters with the relevant diagram.	9	L2	CO4	PO1
b.	Discuss the following with neat diagram: i) Multichannel amplitude modulation ii) Subcarrier multiplexing	9	L2	CO1	PO1
c.	With a neat diagram, explain the working principle of Mach-Zender interferometer multiplexer.	9	L2	CO1	PO1
	UNIT - IV	**18**			
4 a.	Describe an IP over SONET network with the layered view of an IP over ATM over SONET network.	9	L3	CO5	PO2
b.	Explain circuit switched and packet switched network with relevant multiplexing types.	9	L3	CO5	PO2
c.	Describe the distributed Raman amplifier using a backward propagating pump.	9	L2	CO1	PO1
	UNIT - V	**18**			
5 a.	Explain two types of frame structures used in SONET.	9	L2	CO5	PO2
b.	With a neat diagram, explain different types of OADM architecture.	9	L2	CO5	PO2
c.	Briefly discuss the network management functions by showing overview of network management in optical network.	9	L3	CO5	PO2

* * * *