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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Supplementary Examination June 2022 (2015 Scheme)

Course Code: EC405

Course Name: OPTICAL COMMUNICATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Describe wave propagation in optical waveguide using mode theory. (9)

b) Summarise different types of bending losses in optical fiber. (4)

c) Differentiate between direct band gap and indirect band gap materials (2)

2 a) Classify optical fibers based on the refractive index profile (6)

b) A typical relative refractive index difference for an optical fiber designed for long distance transmission is 1%. Estimate the *NA* for the fiber when the core index is 1.46. Also, calculate the critical angle at the core–cladding interface within the fiber, (4)

c) Illustrate the total attenuation graph of optical fiber (5)

3 a) Describe the operation of surface emitting LED. (6)

b) What is amplified spontaneous emission noise? (4)

c) Write the working principle of laser. (5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Define quantum efficiency and responsivity of photo detector. Derive the relationship between the two. (6)

b) A silicon pin photodiode has a quantum efficiency of 60% when operated at 0.9μm. The load resistance is 4KΩ. The incident optical power is 200nW and the post deflection bandwidth of the receiver is 5MHz. Calculate the shot noise generated in the photodiode (5)

c) Write short note on the probability of error in digital receiver performance. (4)

5 a) Draw the structure and electric field distribution of PIN photodiode and describe the working. (6)

	b)	Elaborate on dark current noise generated in photodetector.	(5)
	c)	Compare direct detection and coherent detection systems	(4)
6	a)	Write down the equation of total rise time of fiber optic transmission link and discuss the significant elements that limit the system speed.	(5)
	b)	Comment on the sensitivity and selectivity of coherent receiver.	(4)
	c)	What is soliton? How is it generated? What are the advantages of soliton based optical communication systems?	(6)

PART C

Answer any two full questions, each carries 20 marks.

7	a)	Describe the principle of SOA.	(10)
	b)	Compare the performance of EDFA and SOA.	(5)
	c)	Write notes on star couplers	(5)
8	a)	Describe VLC with the help, of a block diagram. Give any five applications	(9)
	b)	What is optical isolator? Elaborate on the working of optical isolator with the help of a diagram.	(6)
	c)	Write down the characteristics of SOA	(5)
9	a)	What is TDFA? Explain its working.	(7)
	b)	What is WDM? Differentiate between CWDM and DWDM.	(8)
	c)	Write short note on add/drop multiplexer,	(5)

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