Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
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) How we can classify optical fibers in accordance with refractive index profile? Explain with neat diagrams. (5)

   b) What are photonic crystal fibers? Explain the classification of PCF with neat diagrams. (10)

2 a) Compare spontaneous emission and stimulated emission of LASER. (5)

   b) Explain the different types of scattering losses. (10)

3 a) What is Amplifier Spontaneous Emission Noise? (5)

   b) What is dispersion? Explain the different types of dispersion .Why single mode fiber are used in commercial communication systems? (10)

PART B
Answer any two full questions, each carries 15 marks.

4 a) With the help of necessary figures, describe the working of an IMDD system. (5)

   b) Explain the construction and avalanche multiplication of APD with neat diagram and outline the advantages and disadvantages as a detector for optical fibre communications. (10)

5 a) Write the concept of link power budget and rise - time budget. (5)

   b) Design an optical fiber link for transmitting 15Mb/s of data for distance of 4 km with BER of 10^{-9}. Assume typical values. (10)

6 a) Compare quantum efficiency and responsivity of pin diode. (5)

   b) Write the basic concept of solition generation, and also write the advantages of soliton based communication system. (10)

PART C
Answer any two full questions, each carries 20 marks.

7   a)   What are optical Amplifiers? Explain the Woking any two with neat diagrams.   (8)

    b)   What are the advantages of SOA over EDFA?   (5)

    c)   What is a grating? A plain transmission grating posses 5000 rulings /cm. What is   (7) the angle of second order diffraction produced by the grating for a wave length of 1550 nm?

8   a)   What is a tunable optical filter?   (5)

    b)   Explain the working principle of OTDR. How refractive index is calculated using   (10) it?

    c)   Explain the principle of Raman Amplifier. What are the advantages and   (5) disadvantages of Raman amplifier?

9   a)   Explain add/drop multiplexers.   (6)

    b)   Explain the working of EDFA with necessary diagrams.   (8)

    c)   With block diagram explain free space optical communication system. Write the   (6) advantages and disadvantages of the system.

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

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)	Draw the block diagram of a light wave system. Mention the advantages of Optical fiber Communication system.	(5)
	b)	Explain the working principle of laser action? How a semiconductor diode functions like a laser diode?	(10)
2	a)	Differentiate between spontaneous and stimulated emission.	(5)
	b)	Explain the mode theory for the propagation of light in optical fiber.	(10)
3	a)	Explain the Modified Chemical Vapor Deposition process in fiber fabrication.	(5)
	b)	Explain the Numerical Aperture of an optical fiber with neat diagram. Calculate the fractional index change for a given optical fiber if the refractive indices of the core and cladding are 1.563 and 1.498 respectively. Also, calculate (i) numerical aperture (ii) angle of acceptance in air.	(10)

PART B
Answer any two full questions, each carries 15 marks.

4	a)	Briefly explain the different selection criteria for detectors using in optical communication.	(5)
	b)	Draw the schematics of pin photodiode and APD and explain its working.	(10)
5	a)	What is meant by responsivity? How it is related to quantum efficiency?	(5)
	b)	A transmitter has an output power of 0.1mW. It is used with a fiber having NA=0.25, attenuation of 6dB/Km and length 0.5 km. The link contains two connectors of 2dB average loss. The receiver has a minimum acceptable power (sensitivity) of -35dBm. The design has allowed a 4dB margin. Calculate the link power budget.	(10)

6   a)   An InGaAs pin photodiode has λ=1300 nm, I_D = 4 nA, η = 0.90, R_L == 1000 Ω, and the surface   (5)
           leakage current is negligible. The incident optical power is 300nW (-35 dBm) and the receiver bandwidth is 20 MHz. Find the various noise terms of the receiver.

    b) What are the essential components required for establishing a point- to point link.   (10)
          What are the various losses associated with it? Explain with neat optical power loss model.

PART C
Answer any two full questions, each carries 20 marks.

7   a)   Explain the Fiber Bragg Grating technology and point two applications.   (7)

    b)   Explain the working of Semiconductor Optical Amplifier.   (7)

    c)   Compare the performance of different optical amplifiers.   (6)

8   a)   Explain the working principle of EDFA. Give the advantages of EDFA.   (10)

    b)   How does an OTDR work? Draw the typical OTDR trace. Name two faults that   (10)
          can be detected by OTDR.

9   a)   Explain with block diagram the working of optical add/drop multiplexer. Explain   (7)
          why it is required in optical communication system.

    b)   Explain the working of TDFA.   (7)

    c)   What is Li Fi technology?   (6)

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