Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (S, FE) / S7 (PT) (S) Examination May 2024 (2019 Scheme)

Course Code: ECT413

Course Name: OPTICAL FIBER COMMUNICATION

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1	How different optical fibres are classified?	(3)
2	Calculate the V-number and the number of modes supported by the step index fiber having n_1=1.53, n_2=1.5 and with a core radius of 50μm operating at 1500nm.	(3)
3	Explain the different types of bent losses.	(3)
4	Give short notes on fusion splicing?	(3)
5	List out the disadvantages of avalanche photodiodes.	(3)
6	Compare LEDs and laser diodes.	(3)
7	Explain the typical applications of optical amplifiers.	(3)
8	Explain the typical features of semiconductor optical amplifiers.	(3)
9	Write short notes on free space optics.	(3)
10	Explain the different WDM standards.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Explain the structure and principle of photonic crystal fibres also explain the different types of photonic crystal fibres.	(10)
	b)	A graded index fiber having parabolic profile of refractive index has NA=0.3 in air and a core diameter of 60μm and supports 742 guided modes. Calculate the wavelength of light propagating in the fiber.	(4)

OR

12	a)	Explain the different modes in planar waveguide.	(7)
	b)	Illustrate the differences between loose buffered cable and tight buffered cable.	(7)

Module II

13 a) Explain how attenuation affect the transmission of signal through the fibers. Explain the main causes of attenuation. (10)

b) Calculate the macrobend loss of a GI fiber with index profile $\alpha=2$, core diameter of 50μm, and wavelength 850nm, bent curve radius R=2 cm. The core refractive index is 1.45, NA=0.21, $\Delta=0.02$. (4)

OR

14 a) What is meant by dispersion? Explain the different types of dispersion in fibers. (10)

b) Explain different linear scattering losses. (4)

Module III

15 a) With neat diagrams, explain the structure and working of PIN photodiodes. (7)

b) Explain the operation of semiconductor Injection laser with neat sketches. (7)

OR

16 a) What are the main LED structures? Explain the operation of double heterojunction LED. (10)

b) Explain the different types of noise in photodetectors. (4)

Module IV

17 a) Explain the operation and working of semiconductor optical amplifier (SOA) and what are the different types of SOAs. (10)

b) Give brief notes on TDFA. (4)

OR

18 a) Explain the working and operation of EDFA also give the different architectures (10)

b) What are the different ways to accomplish gain flattening in EDFA? (4)

Module V

19 a) Explain the operation of a typical WDM system also give the advantages of WDM. (10)

b) Explain the role of tunable filters in WDM. (4)

OR

20 a) With neat sketches, explain the operation of optical time domain reflectometer for fault detection. (10)

b) Explain the operation of Add/drop Mux. (4)

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