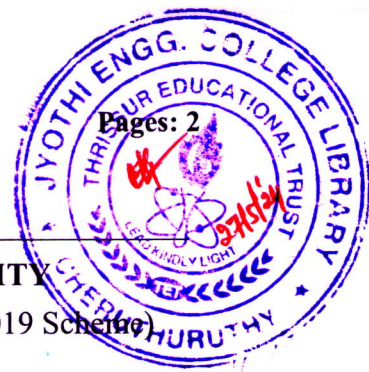


B

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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 $50\mu\text{m}$ 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 $60\mu\text{m}$ 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. (10)
Explain the main causes of attenuation.
- b) Calculate the macrobend loss of a GI fiber with index profile $\alpha=2$, core diameter of $50\mu\text{m}$, and wavelength 850nm , bent curve radius $R=2\text{ cm}$. 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)
