

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 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) | Explain the mode theory for propagation of light in optical fiber?   | (9) |
|   | b) | Draw and explain the Outside vapour-phase deposition process in fiber fabrication?   | (6) |
| 2 | a) | Write the working principle of LASER and compare it with LED using neat diagrams.  | (9) |
|   | b) | A graded index fiber with parabolic refractive index has $n_1=1.48$ and $n_2=1.46$ if core radius is $20\mu\text{m}$ . Find the number of modes at $1300\text{nm}$ and $1550\text{nm}$ ? | (6) |
| 3 | a) | Explain different types of intramodal dispersion and derive the expression for pulse spread and dispersion factor for each case.   | (8) |
|   | b) | Explain different types of bending losses in optical fibers?   | (4) |
|   | c) | What is meant by Surface emitting LEDs?  | (3) |

**PART B**

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

- |   |    |  |     |
|---|----|--|-----|
| 4 | a) | Derive an expression for receiver sensitivity and also explain quantum limit .   | (8) |
|   | b) | Explain the physical principles of PIN photodetector?  | (7) |
| 5 | a) | Discuss the rise-time budget analysis in an optical fiber link and write about its advantages.   | (9) |
|   | b) | A given APD has a quantum efficiency of 65 % at a wavelength of $900\text{nm}$ . If $0.5\mu\text{w}$ of optical power produces a multiplied photocurrent of $10\mu\text{A}$ . Find the multiplication factor $M$ ? | (6) |
| 6 | a) | Briefly discuss the fundamental receiver operation in optical communication.   | (6) |
|   | b) | Write the advantages of Soliton based communication and explain the generation of soliton wave.  | (5) |

- c) A photodiode is constructed of GaAs, which has band gap energy of 1.43 eV at 300 K. What is the cutoff wavelength of this device? (4)

**PART C**

*Answer any two full questions, each carries 20 marks.*

- 7 a) Explain the operational principle of an OTDR and write the important performance parameters. (7)
- b) Compare the working between FP-SOAs and TW-SOAs. (8)
- c) Write a short note on Tunable optical filters? (5)
- 8 a) Explain the operation of Erbium-Doped fiber Amplifier. List out the different advantages. (12)
- b) What is meant by Fiber Bragg Grating? Write any one application in detail. (8)
- 9 a) What are the differences between fused fiber coupler and waveguide coupler? (8)
- b) Write the general characteristics and working principle of Raman Amplifier. (8)
- c) Why reconfigurable OADMs are more preferred in metro networks? (4)

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