

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

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|---|----|---|-----|
| 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 1300nm and 1550nm? | (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.

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|---|----|---|-----|
| 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 900nm. 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)
