

Reg No.: _____

Name: _____

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

Course Code: AE409

Course Name: OPTICAL INSTRUMENTATION

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

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| 1 | a) Define: (i)Acceptance cone (ii)V-number | (4) |
| | b) Distinguish between Single Mode and Multi Mode fiber. | (7) |
| | c) When 3×10^{11} photons each with a wavelength of $0.85 \mu\text{m}$ are incident on a photodiode, on average 1.2×10^{11} electrons are collected at the terminals of the device. Determine the quantum efficiency and the responsivity of the photodiode at $0.85 \mu\text{m}$. | (4) |
| 2 | a) Explain how optical fiber is produced using Modified Chemical Vapour Deposition (MCVD). | (7) |
| | b) Explain fiber optic pressure sensor. | (5) |
| | c) What are Moire fringes? | (3) |
| 3 | a) Explain optical fiber splicing techniques. | (8) |
| | b) What is the use of fiber optic gyroscope? Explain its working with neat diagram. | (7) |

PART B

Answer any two full questions, each carries 15 marks.

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| 4 | a) Explain the working of Michelson interferometer. | (8) |
| | b) What are interference filters? | (3) |
| | c) Discuss how interference patterns are formed. | (4) |
| 5 | a) Write short note on optical feedback in laser | (5) |
| | b) How an optical spectrum analyzer works? Explain with neat block diagram. | (7) |
| | c) Explain the various properties of lasers | (3) |
| 6 | a) Derive Einstein coefficients and explain how it helps to evaluate the ratio of rate of spontaneous emission to the rate of stimulated emission. | (7) |
| | b) Explain any one Solid state Laser. | (5) |
| | c) Explain Q-switching. | (3) |

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Discuss the use of laser for measurement of distance. (8)
b) Explain Laser Doppler Anemometry (LDA). (12)
- 8 a) Explain the use of laser in material processing. (10)
b) Discuss the application of laser in dermatology. (10)
- 9 a) Explain the interaction between lasers and tissues. (7)
b) Explain how cancer can be treated using Laser. (7)
c) Explain the application of lasers in the removal of tumours of vocal chords. (6)
