

Reg No.: _____

Name: _____

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

Course Code: EC469

Course Name: OPTO ELECTRONIC DEVICES

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 Franz-Keldysh effect in semiconductors with necessary diagrams? | (5) |
| | b) Explain the types of semiconductors based on band gap structures with relevant diagrams. | (10) |
| 2 | a) Discuss deep level transitions in semiconductor | (5) |
| | b) What are QW lasers? Explain its constructional features | (10) |
| 3 | a) Discuss axial and transverse modes in laser | (5) |
| | b) Explain working principle of DFB laser with the aid of suitable diagram | (10) |

PART B

Answer any two full questions, each carries 15 marks.

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| 4 | a) What is the basic principle of white LED | (5) |
| | b) Describe the structure and working of InGaN/GaN laser diodes | (10) |
| 5 | a) Discuss the principle of optical memory | (5) |
| | b) Explain the working principle of electro-optic modulators with suitable diagrams | (10) |
| 6 | a) Explain the principle of white light LED, based on phosphor converters | (5) |
| | b) What is meant by acousto-optic effect? Explain Raman-Nath modulator | (10) |

PART C

Answer any two full questions, each carries 20 marks.

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| 7 | a) Explain the principle of organic LED | (5) |
| | b) Draw the structure of Schottky barrier photodiode and give an application | (7) |
| | c) A silicon APD has a quantum efficiency of 65% at a wavelength of 900nm. Suppose a $0.5\mu\text{W}$ of optical power produces a multiplied photocurrent of $10\mu\text{A}$, find the multiplication factor M. | (8) |
| 8 | a) Explain the principle of attenuators | (5) |
| | b) Discuss the principle of tunable optical filters | (7) |
| | c) Explain the principle of operation of a 1:1 fiber optic directional coupler with a | (8) |

diagram

- 9 a) Explain working principle of circulator with neat sketch (5)
- b) Discuss the construction and working principle of PIN photodiode (7)
- c) An InGaAs APD has a quantum efficiency of 60% at $1.55\mu\text{m}$ in the absence of multiplication. It is biased to operate with $M=12$. Calculate the photocurrent if the incident optical power is 20nW . What is the responsivity when $M=12$? (8)
