Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Regular and Supplementary Examination December 2021 (2015 Scheme)

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

1 a) Derive the equation for radiative recombination efficiency or internal quantum efficiency. (7)

b) Derive the equation for threshold condition for lasing operation and derive the expression for threshold gain. (8)

2 a) Write short notes on hetero-junction laser. (7)

b) Briefly describe the heat sources in optoelectronic devices. (8)

3 a) Describe the structure and working of DBR lasers. (7)

b) Describe the structure and working of tunneling based lasers. (8)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Describe the materials used and principles of operation of white light sources based on wavelength converters. (5)

b) Calculate the change in refractive index in GaAs for an applied electric field of $2x10^5$ V/cm. (5)

c) Explain the material properties and applications of nitride light emitters. (5)

5 a) Explain the structure and working of Raman-Nath modulator. (5)

b) Calculate the value of Vπ for GaAs amplitude modulator when the wavelength of the incoming light is 1.1 μm. The waveguide is 1 μm thick and 1.5 mm long. (5)

c) Differentiate between electro-optic and acousto-optic modulators. (5)

6 a) What is electro-optic effect? Explain how this effect can be used for modulating the phase of the optical signal. (8)

b) With the help of an emission spectrum, explain the generation of white light by trichromatic sources. (7)

PART C

Answer any two full questions, each carries 20 marks.

7	a)	Explain the process of optical detection using APD photo diode.	(10)
	b)	Explain the working of optical directional couplers with suitable sketches.	(10)
8	a)	Write short notes on fiber optic multiplexers.	(5)
	b)	Describe the applications of optical circulators and isolators.	(5)
	c)	With the aid of suitable diagrams explain the working of liquid crystal display.	(10)
9	a)	Explain in detail the fabrication and working of OEIC integrated transmitter.	(10)
	b)	Discuss in detail the working of optical bistable devices.	(10)

****