

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019

Course Code: EC472

Course Name: INTEGRATED OPTICS & PHOTONIC SYSTEMS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Derive Continuity equation in point form . (3)
- b) From the fundamental laws of electromagnetic fields, derive the Maxwell's equation for time varying field. (12)
- 2 a) Define optical waveguide and classify optical waveguide according to geometry. (5)
- b) A symmetric planar waveguide is made of glass with n_1 is 1.5 and n_2 is 1.46. The guide is excited by source of wavelength $0.85 \mu\text{m}$. What is the range of propagation constant? (3)
- c) With figure give the classification of optical structure that confine light in single dimension. (7)
- 3 a) Write notes on materials used for the construction of different waveguides. (3)
- b) Give the details of compounds used and fabrication details of semiconductor waveguides. (7)
- c) Give the classification of polymers. What are the different types of polymers? (5)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) With figure detail about the coupling efficiency calculation using end-butt coupling. (5)
- b) Optical energy can be lost from waveguide modes. Give the reason for different types of losses. (5)
- c) Describe about optical splitters. (5)
- 5 a) Explain the basic theory and fabrication of the grating couplers. (5)
- b) What is multilayer planar waveguide couplers? (5)
- c) Describe the method of Crank Nicolson scheme for solving the paraxial propagation equation. (5)

- 6 a) With figure, show how can we measure wave guide loss using prism coupled method. (5)
- b) Explain the beam propagation method based on Fast Fourier Transform. (10)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Define the following characteristics and give the expressions for modulation bandwidth, power consumption, insertion loss and Isolation of an electro optic modulator. (20)
- 8 a) With neat diagram, explain the working of an integrated optic RF spectrum analyser. (8)
- b) How can we measure the temperature using an OIC temperature sensor. (7)
- c) Compare electrons in semiconductor crystals and photons in photonic crystals. (5)
- 9 a) Give the application of nanophotonics device as sensors. (8)
- b) Compare Raman Nath optical modulator with Bragg's modulator. (12)
