Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

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

1	a)	Define: (i) Numerical Aperture (ii) Acceptance Cone	(4)
	b)	What are the advantages of APD over PIN photo diode? Explain about APD with neat sketches.	(7)
	c)	Determine the cut off wavelength for a step index fiber for single mode operation with core refractive index of 1.62, cladding refractive index of 1.58 and core diameter 0.8.	(4)
2	a)	How optical fiber is produced using Modified Chemical Vapour Deposition (MCVD).	(5)
	b)	Differentiate between Intrinsic and Extrinsic fiber optic sensors.	(4)
	c)	What is the use of fiber optic gyroscope? Explain its working with neat diagram.	(6)
3	a)	Explain different source coupling techniques.	(5)
	b)	How attenuation and dispersion are measured?	(10)

PART B
Answer any two full questions, each carries 15 marks.

4	a)	What are the different variations of the Michelson interferometer? Explain any Inter ferometric method to test Prism & Lens.	(10)
	b)	Summarize your idea on the formation of interference patterns.	(5)
5	a)	How an optical spectrum analyzer works? Explain with neat block diagram.	(8)
	b)	Derive Einstein coefficients and explain how it helps to evaluate the ratio of rate of spontaneous emission to the rate of stimulated emission.	(7)
6	a)	Derive expression for the threshold optical gain needed for lasing.	(6)
	b)	What is optical pumping? Why it is needed?	(4)
	c)	Discuss about any type of Gas Laser.	(5)

PART C
Answer any two full questions, each carries 20 marks.

7	a)	Prepare short notes on the application of lasers in	(20)
		i. Distance Measurement	
		ii. Monitoring atmospheric pollutants	
		iii. Anemometry	
		iv. Scribing of Materials	

8   a)   List out advantages of using lasers in material processing.   (5)

      b)   Explain about commonly used precise technique for brain surgery with schematic   (10)
           diagram.

      c)   How medical diagnosis can be done with Laser?   (5)

9   a)   Explain how cancer can be treated optically.   (10)

      b)   Describe different medical applications of lasers.   (10)

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