Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: B.Tech**
Sub_Code: REI5D004

5th Semester Regular/Back Examination: 2024-25
SUBJECT: Fiber Optics and Instrumentation
BRANCH(S): AEIE, EIE
Time: 3 Hours
Max Marks: 100
Q.Code: R375

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the materials used for construction of LED?
b) Correlate quantum efficiency with light intensity.
c) Write down the components of optical transmitter.
d) What are the materials used for construction of optical fiber?
e) What is power lunching?
f) Justify the importance of coupling.
g) Distinguish between Phototransistor and solar cells.
h) List the methods used to maintain polarization in fiber.
i) What are the advantages of fiber-optic sensor?
j) Distinguish between optical sensor and non-optical sensor.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Explain the construction of two types of LED in details.
b) Describe the construction and working of PIN photodetector.
c) Discuss the concept of SNR in photodetector.
d) Explain the laser oscillation and its utility.
e) Explain TE & TM modes.
f) Analyze how numerical aperture is related to total internal reflection.
g) Explain different types of optical fibers.
h) Explain equilibrium numerical aperture.
i) Why modulation is required in optical fiber communication system?
j) Describe the method for the measurement of flow and voltage.
k) Explain displacement sensor in details.
l) What is the fundamental principle behind OFDR?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	**(a)**	Draw and explain the block diagram of optical fiber transmission system.	**(8)**
	(b)	With neat diagram, explain the construction & working of APD.	**(8)**
Q4	**(a)**	Explain source to fiber power lunching and its associated calculations.	**(8)**
	(b)	With a neat sketch, explain the electromagnetic spectrum.	**(8)**
Q5	**(a)**	Explain sensing techniques for measurement of acceleration and current.	**(8)**
	(b)	Explain the working principle of fiber optic gyroscope.	**(8)**
Q6	**(a)**	Analyze the amplification and resonance properties inside Laser.	**(8)**
	(b)	Explain the principle behind OTDR and its applications in fiber optic testing.	**(8)**