R22 Regulation *Subject code: 4P8DB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VIII Semester Regular Examinations, May 2026

OPTICAL FIBRE COMMUNICATIONS

(ECE)

Maximum Marks: 60 Date:04.05.2026 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Define Optical Fiber Communication	1M	1	L1
b)	What is Acceptance Angle in optical fiber?	1M	1	L1
c)	List different types of dispersion.	1M	2	L1
d)	Explain Pulse Broadening.	1M	2	L2
e)	What is Laser Diode Threshold Condition?	1M	3	L1
f)	Define Quantum Efficiency.	1M	3	L1
g)	Differentiate between PIN and APD.	1M	4	L2
h)	What is Detector Response Time?	1M	4	L1
i)	What is Wavelength Division Multiplexing	1M	5	L1
j)	Define Rise Time Budget.	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	A. Describe the principle of Total Internal Reflection and its role in optical fiber propagation. B. Analyze the effect of V-number on mode propagation in optical fibers.	5M 5M	1	L2 L4
	OR			
3	A. Explain mode coupling and its impact on signal transmission. B. Apply the concept of acceptance angle and NA to determine light coupling efficiency.	5M 5M	1	L2 L3
4	A. Explain different attenuation mechanisms in optical fibers. B. Compare material dispersion and waveguide dispersion.	5M 5M	2	L2 L3
	OR			
5	A. Apply attenuation concepts to calculate signal power loss over distance. B. Explain group delay and its significance in optical communication.	5M 5M	2	L3 L2

6	A. Explain source-to-fiber coupling mechanisms. B. Analyze joint losses in multimode and single-mode fibers.	5M 5M	3	L2 L3
	OR			
7	A. Compare LED and Laser Diode as optical sources. B. Apply the concept of quantum efficiency to evaluate source performance.	5M 5M	3	L3 L3
8	A. Explain the working principle of PIN and APD photodetectors. B. Analyze the effect of temperature on avalanche gain in APD.	5M 5M	4	L2 L4
	OR			
9	A. Explain receiver configuration for digital communication. B. Analyze factors affecting detector response time.	5M 5M	4	L2 L4
10	A. Apply link power budget analysis for a given optical system. B. Analyze rise time budget in optical fiber links.	5M 5M	5	L3 L4
	OR			
11	Explain point-to-point optical link design.	10M	5	L2