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**BTECH**  
**(SEM V) THEORY EXAMINATION 2025-26**  
**OPTICAL COMMUNICATION**

TIME: 3 HRS

M.MARKS: 70

**Note:** Attempt all Sections. In case of any missing data; choose suitably.

**SECTION A**

**1. Attempt all questions in brief.**

**2 x 07 = 14**

Q no.	Question	CO	Level
a.	Define goos- haenchen shift in optical fiber waveguide.	1	K1
b.	Explore why the Refractive Index (R.I.) of core and cladding are different. Which one has greater R.I. and why.	1	K2
c.	What are the causes of attenuation in optical communication?	2	K2
d.	Suppose a laser diode radiates red light with wavelength of 650 nm. Calculate the energy of a single photon?	3	K3
e.	What are advantages and disadvantages of Avalanche Photodiodes.	4	K1
f.	Define the term Photoluminescence.	4	K1
g.	Define Coherent Detection.	5	K1

**SECTION B**

**2. Attempt any three of the following:**

**07 x 3 = 21**

a.	What is the relationship between acceptance angle and refractive indices of core, cladding and medium for a light ray incident on fiber core? Calculate Numerical aperture of step index fiber having core refractive index of 1.57 and cladding refractive index as 1.40.	1	K3
b.	Discuss various kinds of losses that an optical signal might suffer while propagating through fiber, which is most important one? What is the effect of these losses on light power and pulse shape?	2	K2
c.	Draw the structures of edge-emitting LED and surface emitting LED and explain the operation	3	K2
d.	Describe the different source-fiber coupling techniques used in optical fiber communication systems. Compare LED-fiber and laser-fiber coupling methods	4	K3
e.	Write a short note on: 1.Free Space Optics (FSO) 2.Multimultiplexing Transmission Techniques	5	K2

**SECTION C**

**3. Attempt any one part of the following:**

**07 x 1 = 07**

a.	Draw and Explain the optical fiber communication system and Describe each component in detail.	1	K2
b.	What do you mean by Numerical Aperture of an optical fiber? Derive an expression for Acceptance angle of optical fiber.	1	K3

**4. Attempt any one part of the following:**

**07 x 1 = 07**

a.	What do you mean by mode coupling? Explain the various irregularities in the fiber of its causes.	2	K2
b.	What is mean by dispersion? Describe the Intramodal dispersion.	2	K2



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Printed Page: 2 of 2

Subject Code: BEC057

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**5. Attempt any one part of the following: 07 x 1 = 07**

a.	Define population inversion. Derive the threshold condition for laser oscillation to sustain	3	K3
b.	Discuss the LASER diode principle, modes and threshold conditions.	3	K2

**6. Attempt any one part of the following: 07 x 1 = 07**

a.	Describe the working principle of PIN photodiode with proper diagram.	4	K2
b.	Explain the source-to-fiber power launching concept in optical communication systems. Derive the expression for launched power considering geometrical and Fresnel losses.	4	K3

**7. Attempt any one part of the following: 07 x 1 = 07**

a.	Explore Power Penalty in optical communication. Also Explain Different Types of Power Penalties. Explore Error Control Techniques in detail.	5	K3
b.	Draw and explain the block diagram of optical receiver. How it is different from Optical photodiodes. Explain its advantages.	5	K2

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