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# SA—18—2025

## FACULTY OF SCIENCE

## B.Sc. (Third Year) (Sixth Semester) EXAMINATION

## APRIL/MAY, 2025

PHYSICS

(Fiber Optic Communication-XV)

**(Friday, 11-4-2025)** **Time : 10.00 a.m. to 12.00 noon**

*Time*—2 *Hours* *Maximum Marks*—40

***N.B.*** *:—* (*i*) *All* questions are compulsory.

(*ii*) Use of non-programmable calculator and log table is allowed.

1. Using simple ray theory describe the mechanism for the transmission of the light within the optical fibre. Briefly discuss with the aid of suitable diagram what is meant by acceptance angle for an optical fibre. Show that how this is related to the fibre numerical aperture and refractive indices for the fibre core and cladding. 15

*Or*

(*a*) Describe various types of optical fibres. 8

(*b*) Derive an expression for guided modes of step index multimode fibre. 7

2. Explain intermodal dispersion. Derive an expression for intermodal dispersion in multimode step index fibre. 15

P.T.O.

*Or*

(*a*) Derive an exression for the cut-off wavelength. 8

(*b*) A graded index fibre with a parabolic refractive index profile core has a R.I. at the core axis of 1.5 and a relative index difference of 1%. Estimate the maximum possible core diameter which allows a single mode operation at a wavelength of 1.3 μm. 7

3. Write notes on (any *two*) : 10

(*i*) Advantages of single mode fibre

(*ii*) Modes in graded index fibre

(*iii*) Normalized frequency

(*iv*) Snell's law.