

This question paper contains 2 printed pages]

NY—44—2023

FACULTY OF SCIENCE

M.Sc. (Second Year) (Fourth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

PHYSICS

Paper—PHY-401

(Fiber Optics and Optical Fiber Communication)

(Wednesday, 6-12-2023)

Time : 2.00 p.m. to 5.00 p.m.

Time—3 Hours

Maximum Marks—75

N.B. :- (i) All questions are compulsory.

(ii) Figures to the right indicate full marks.

1. Discuss propagation of light in an optical fiber. What is the basic structure of optical fiber ? Calculate velocity of light in an optically active region of a substance at 5000 \AA and 6500 \AA . Compute the corresponding frequencies. 15

Or

- (a) Explain double crucible method for fabrication of fibers. 8
- (b) Describe numerical aperture of an optical fiber. 7
2. Discuss in detail Rayleigh scattering losses and impurity losses in an optical fiber. Explain characteristics of photodetectors. 15

Or

- (a) Explain photoemissive and photoconductive detectors. 8
- (b) Describe electrical and optical bandwidths for dispersion in optical fiber. 7

P.T.O.

3. Describe in detail liquid level type hybrid sensor and internal effect intensity modulated sensor. Explain LED analog modulation in optical fiber communication. 15

Or

- (a) Discuss digital laser transmitter. 8
- (b) Explain diffraction grating and interferometric fiber optic sensors. 7
4. Discuss important applications of integrated optical fiber communication technology and long haul communication. 15

Or

- (a) A fiber has numerical aperture of 0.30. What is the cut-off angle in degrees for this fiber, if it is surrounded by vacuum ? 8
- (b) An optical fiber has core radius 4.5 μm , numerical aperture 0.12 and single wavelength 850 nm. Calculate fundamental mode MFD of the optical fiber. 7
5. Write short notes on any *three* :
- (a) Number of modes and cut-off parameters 5
- (b) Characteristics of photodetectors 5
- (c) Pulse code modulation 5
- (d) Cut-off wavelength measurements. 5