A–1186

Total Pages : 3 **Roll No. .....**

MSCPH-551

M.Sc. Physics (MSCPH)

Optoelectronics

Examination February, 2026

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

(Long Answer Type Questions) (2×19=38)

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Explain energy band theory and mechanism of electric conduction in a conductor, insulator and semiconductor. How the conductivity of pure semiconductor is affected by adding different impurities ?

2. Explain about the material used in Photovoltaic cell and describe the effect of temperature on Photovoltaic cell ?

3. Explain the operation of photodiode and its applications. How can a phototransistor have converted into photodiode ?

4. Distinguish between working of step index and graded index optical fibres. Obtain an expression for numerical aperture in their cases.

5. Write short notes on the following :

   (a) Photoconductive Cell

   (b) Alloy Semiconductor

   (c) Hetero-junction Diodes

   (d) Lasers

Section–B

(Short Answer Type Questions) (4×8=32)

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Explain intrinsic and extrinsic semiconductors.
2. Explain the electric field effect on absorption in semiconductors.
3. What is phototransistor ? How does it differ from an ordinary transistor and photodiode ?
4. Explain LED lighting and power factor.
5. Explain Avalanche photo diodes.
6. Discuss about various light sources for optical fibre with special references to Laser diode.
7. Explain solar energy spectrum and I-V characteristics of Photovoltaic device.
8. Explain quantum well lasers.

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