

PG (CBCS)
M.SC. Semester- IV Examination, 2026
PHYSICS
PAPER: PHS 405



(TRANSPORT PROPERTIES AND SEMICONDUCTOR DEVICES)

Full Marks: 20

Time: 1 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP-A

Answer any **TWO** of the following questions: 2×2=4

1. What are the basic assumptions of quantum Hall effect?
2. Define current gain and injection ratio of a bipolar transistor.
3. Why a SCR is also known as a thyristor?
4. Find the expression of injection ratio of a bipolar transistor.

GROUP-B

Answer any **TWO** of the following questions: 2×4=8

5. Discuss the working procedure of p-n-p-n switching device.
6. Find the expression for drift velocity for a Gunn diode.
7. Derive the expression for the maximum value of the depletion width in a FET device.
8. Derive the relation between I_D and V_D in a JFET.

GROUP-C

Answer any **ONE** of the following questions: 1×8=8

9. Describe how two properly biased transistors can be used to represent the equivalent circuit of a p-n-p-n diode. Find the relation between the current with current transfer ratios of individual transistors. 4+4
10. Find the expression of mobility in non-degenerate semiconductor for low temperature and high temperature cases.

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