



**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET UNIVERSITY)**

M.Sc. (Third Semester – Regular) Examinations, December – 2025
24MPHPC23003– Condensed Matter and Materials Physics
(Physics)

Time: 3 hrs

Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A**(2 x 5 = 10 Marks)**Q.1. Answer *ALL* questionsCO # Blooms
 Level

- a. Write the formula for percentage of error.
- b. Show that susceptibility of a superconductor is -1 ?
- c. What is Meissner effect?
- d. Discuss the properties of X-ray.
- e. Write the applications of Scanning Electron Microscope.

CO1	K1
CO2	K1
CO3	K1
CO4	K2
CO5	K1

PART – B**(10 x 5 = 50 Marks)**Answer ALL the questionsMarks CO # Blooms
 Level

2. a. Discuss the principle and instrumentation for Differential Scanning Calorimetry Analysis (DSC).

10 CO1 K1

(OR)

- b. Discuss Josephson effect? Derive the equation for an AC Josephson effect?

10 CO1 K2

- 3.a. Discuss the construction and principle of Scanning Electron Microscope.

10 CO2 K1

(OR)

- b. Discuss the principle and instrumentation for Differential Thermal Analysis (DTA).

10 CO2 K1

- 4.a. Define the concept of Reciprocal Lattice. Derive an expression for Reciprocal Lattice of BCC.

10 CO3 K2

(OR)

- b. Write the concept of Reciprocal Lattice. Derive an expression for Reciprocal Lattice of FCC.

10 CO3 K2

- 5.a. What is penetration depth? Derive an expression of 2nd order differential penetration depth equation in terms of magnetic field?

10 CO4 K2

(OR)

- b. Discuss the principle and instrumentation of Atomic Force Microscopy with neat diagram.

10 CO4 K1

- 6.a. Discuss in detail about the e-phonon-e- interaction in terms of Feynman diagram?

10 CO5 K1

(OR)

- b. Discuss about the Construction of Fermi surface. Discuss in detail about the experimental methods for study of Fermi surface.

10 CO5 K2

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