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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M. Sc. (Fourth Semester) Regular Examinations, April – 2025

22PHPE402- Condensed Matter & Materials Physics-II

(Physics)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 = 20 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Define curie temperature and Neel temperature.	CO1	K1
b. Define Density of states.	CO4	K1
c. Explain the terms spin waves and magnons.	CO1	K2
d. What is the superiority of ferroelectric materials?	CO2	K2
e. Discuss frequency dependence of dipolar polarizability.	CO2	K2
f. Write applications of the quantum dots and wire.	CO4	K1
g. Draw the DTA curve of Calcium oxalate monohydrate.	CO3	K2
h. For first order diffraction by a crystal plane having d = 2.3 A° in a solid observed at the angle of 30°. Using the same radiation and first order diffraction, Θ = 60° for another solid. Calculate the d value of second solid.	CO3	K1
i. Distinguish between polar and non- polar dielectrics with suitable example.	CO2	K2
j. What is spontaneous magnetization?	CO1	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ANY FIVE*** questions	Marks	CO #	Blooms Level
2. What are distinguishing features of ferromagnetism? Discuss Weiss theory of ferromagnetism bringing out its merits and demerits? What are ferromagnetic domains?	10	CO1	K2
3. Explain Langevin's theory of diamagnetic materials. Also write about the conclusions drawn from the theory. What is the order of susceptibility of a diamagnetic material?	10	CO1	K2
4. Explain polarization mechanism. Discuss the different polarisation mechanisms in dielectrics and their temperature dependence. Define Local field in solid dielectrics.	10	CO2	K2
5.a. Compare between SEM vs TEM characterization techniques.	5	CO3	K2
b. Distinguish among AFM vs STM techniques.	5	CO3	K2
6.. Define ferroelectric materials. Write its various classifications and applications. Explain about structure of $BaTiO_3$.Also discuss it about phase transition with respect to temperature.	10	CO2	K3
7. Explain working, principle and instrumental part of scanning electron microscope.	10	CO3	K3
8. a. Discuss about density of states for quantum well.	5	CO4	K1
b. Write a short note on CNTs and its properties.	5	CO4	K3

End of Paper