Roll No.							

24-PH-41

M.Sc. IV SEMESTER [MAIN/ATKT] EXAMINATION
JUNE - JULY 2024

PHYSICS
Paper - I
[Condensed Matter Physics - II]

[Max. Marks : 75] *[Time : 3:00 Hrs.]* *[Min. Marks : 26]*

Note : Candidate should write his/her Roll Number at the prescribed space on the question paper.
Student should not write anything on question paper.
Attempt five questions. Each question carries an internal choice.
Each question carries **15 marks.**

Q. 1 a) Calculate the critical current for a wire of lead having a diameter of 1 mm at 4.6 k the critical temp. for lead is Tc = 4.2k and $H_e(0) = 6.18 \times 10^4$ A/m. **(05 Marks)**

b) Explain Super Conductivity. **(05 Marks)**

c) Write down any five application of Super conductors. **(05 Marks)**

OR

a) Explain Meissner effect with derivation. **(05 Marks)**

b) Explain Curie - Weiss law for susceptibility. **(05 Marks)**

c) The applied magnetic full in copper is 10^6 A/m. if the magnetic susceptibility of copper is -0.8×10^{-5}, Calclate the flux density and the magnetization in copper. **(05 Marks)**

Q. 2 a) Explain interistial defect. **(05 Marks)**

b) Explain schottky defect. **(02 Marks)**

c) Explain Screw dislocation. **(03 Marks)**

d) What is Substitution defect. **(05 Marks)**

OR

a) Explain "V" centers and "F" centers. **(05 Marks)**

b) What is "Tilt" boundary defect. **(05 Marks)**

c) Explain elastic energy of dislocation. **(05 Marks)**

P.T.O.

Q. 3 a) Explain thin film process (Nucleation and growth). (05 Marks)

b) Explain electrical conduction in thin film. (05 Marks)

c) Explain sputtering method for preparation of thin film. (05 Marks)

OR

a) Explain laser ablation method for preparation of thin film. (05 Marks)

b) Explain study of surface topography by multiple beam interferrometer. (10 Marks)

Q. 4 a) What is "Nano Technology" and explain properties of nano materials. (7½ Marks)

b) Draw the unit cell and Brillouin zone of carbon nano tube. (7½ Marks)

OR

a) Define Carbon "Nano Tube". Explain the Fabrication of carbon nanotubes by laser evaporation method. (10 Marks)

b) Explain Electro deposition method for preparation of nano material. (05 Marks)

Q. 5 Attempt **any three** - (05 Marks each)

i) Explain AC and DC "Josephson Effect".

ii) Explain "Frenkel Defects".

iii) Explain "Hall coefficient" Quantum size effect in thin film.

iv) Explain M-H curve for a ferro magnetic materials.

v) Write any five application of nano material only in (Medical and Space Research).

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