Roll No. _____

SVIS 303 A-2K13

B.Sc. VIth Semester Degree Examination

Physics

(Statistical Physics, Solid State Physics and Material Science)

Paper - VII (6.1)

Time : 3 Hours   Maximum Marks : 80

Instructions to Candidates:

Answer all the questions from section 'A' any five from section 'B' and any four from section 'C'.

Section - A

I.   Answer the following in **one** or **two** sentences.   **(15×1=15)**

1) What is the aim of statistical Mechanics?

2) Which distribution law is obeyed by gravitons.

3) What is fermi energy?

4) Write Einstein's equation for specific heat of a solid.

5) Write an expression for the electrical conductivity of a conductor.

6) What is a unit cell?

7) Write Bragg's diffraction equation.

8) What is an amplifier?

9) What is an intrinsic semiconductor?

10) State Curie's Law

11) What is a thin film?

12) What is sputtering phenomenon?

13) What is Hall effect?

14) What is critical magnetic field ?

15) What is eutectic temperature?

Section - B

II.   Answer any five :   **(5×5 =25)**

16) Compare the three distribution laws.

17) Write a note on phase space.

18) Obtain an expression for thermal conductivity of conductor.

19) What is density of states? And obtain its expression.

20) Explain the working principle of a solar cell.

21) What is high temperature super conductor? And write few applications.

22) Explain any one method of thin film preparation.

Section - C

III. Answer any **four** (4×10 =40)

23) Deduce the Fermi-Dirac distribution Law. (10)

24) Give the Debye's theory for Specific heat of solids. (10)

25) a) Describe the x-ray diffraction method of determining crystal structure.

    b) Explain the effect of bias voltage on depletion layer of an extrinisic semiconductor. (5+5)

26) a) Explain the preparation of thin films by physical vapour deposition method.

    b) What is lavitation? Explain its use in super conductor trains (MAGLAEV)(5+5)

27) a) What is magnetic susceptibility? Explain its variation with temperature and hence arrive at curie weiss law.

    b) Copper sulphate is paramagnetic with susceptibility is 1.68×10^{-4} at 293K. What is the susceptibility of copper sulphate at liquid nitrogen temperature (77.4k) if it obey curie law. (6+4)

28) a) Obtain an expression for Fermi energy at absolute zero.

    b) Sodium metal has 2.5×10^{28} number of free electrons per unit volume, find its fermi energy.

    Given: $h = 6.625 \times 10^{-34}$ Js

    electronic mass = 9.1×10^{-31} kg (7+3)