HAE-003-001602 Seat No. _____

B. Sc. (Sem. VI) (CBCS) Examination

June / July - 2017

Physics : P - 602

(Statistical Mech., S.S.P & Plasma Physics) (New Course)

Faculty Code : 003
Subject Code : 001602

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Write answer of all questions in main answer book.
(2) All questions are compulsory.
(3) Figures on right side indicates marks.
(4) Symbols have their usual meaning.

1 Answer all questions in short : **20**

(1) Who had developed quantum statistics ?
(2) What is fermions ?
(3) The minimum volume of cell in a phase space is _____.
(4) At high temperature B-E distribution approaches to _____.
(5) According to whom, crystal containing n-atoms must be considered as a system of 3n-coupled harmonic oscillators ?
(6) Which phenomena explains Richardson-Dushman equation ?
(7) Write the equation of Bragg's law for X-ray diffraction.
(8) What happens in the powder method when the reflected ray is thrown back by an angle 180° ?
(9) Rotating crystal method is applicable to single crystal specimen only - is this a true statement ?
(10) In the superconducting state, super conductors are perfect _____.

(11) Type-2 superconductors have more than one critical magnetic fields (H_C) - is it true ?

(12) Kammerlingh Onnes found that the resistance of mercury drops suddenly to almost zero when the temperature falls below _____ °K.

(13) When the dimensions of a superconductor increases under a stress its transition temperature T_C _____.

(14) What happened to the critical magnetic field when the size of super conductor is reduced below 10^{-4} cm ?

(15) In case of thermotropic liquid crystals, the molecular ordering changes with _____.

(16) Which crystal have rod like molecules ?

(17) In which type of crystal molecular ordering is changed by varying the concentration ?

(18) When the layer of ZnS : Mn is excited by ultraviolet or X-rays it emits _____ luminescence.

(19) Electrical conductivity of plasma increases with increase in _____.

(20) Who gave the theory of PLASMA oscillations ?

2 (a) Write short answers to any three of the following : **6**

(1) Explain microstates and macrostates.

(2) Explain in brief the Dulong and petit law.

(3) What are bosons and boltzons ?

(4) How the superconducting properties of metals can be changed ?

(5) Explain in brief thermodynamic probability.

(6) Discuss the wave and particle properties of X-rays.

(b) Write answers to any three of the following : **9**

(1) Give comparison of M-B, B-E and F-D statistics in brief.

(2) Derive equation of volume in phase space in terms of momentum.

(3) Explain Thermotropic liquid crystals.

(4) Obtain Stefan-Boltzmann law of energy density using Planck's formula.

(5) Explain experimental set up of rotating crystal X-ray diffraction method.

(6) Write application of plasma.

(c) Write in detail : (any two) **10**

(1) Derive the distribution law for F-D statistics.

(2) Derive Plank's law for Black body radiation.

(3) Write note on applications of liquid crystals.

(4) Discuss the features of Laue's X-ray diffraction pattern.

(5) Discuss : the sterling's approximation.

3 (a) Write short answer to the following : (any three) **6**

(1) Explain in short the change in heat capacity in super conducting state.

(2) What is plasma ?

(3) Explain "Critical magnetic field" in case of super conductivity.

(4) What is larmour orbiting ?

(5) Explain luminescence.

(6) What is photo ionization of atoms ?

(b) Give answer to the following : (any three) **9**

(1) Explain Miessner effect of superconductivity.

(2) Write a note on cholesteric liquid crystals.

(3) Discuss London's theory of superconductivity.

(4) Explain PLASMA oscillations.

(5) Explain "Bremsstranhlung" in case of plasma.

(6) Discuss ionization of atoms and molecules.

(c) Write in detail : (any **two**) **10**

(1) Describe the method of production of plasma in absence of any gas.

(2) Discuss influence of magnetic field, current strength stress impurity and size on superconductivity.

(3) Write detailed note on luminescence is sulphide phosphors.

(4) Write a note : Applications of super conductivity.

(5) Write detailed note on properties of PLASMA.
