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PG-003-001602 Seat No. _____

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

July - 2018

Physics : Paper - P - 602

(Statistical Mechanics, Solid State Physics & Plasma Physics)

Faculty Code : 003

Subject Code : 001602

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

Instructions : (1) Figures on right side indicate marks.
(2) Symbols have their usual meaning.

1 Write the correct answer for the following questions : **20**

(1) For the particles like photons, B-E statistics is applicable.
---- Do you agree with this statement ?

(2) F-D statistics is applicable to particles which are having zero spin.
---- Is it true or false ?

(3) In M-B statistics, internal energy of particles at absolute zero temperature is taken as _____.

(4) At high temperature, Fermi distribution reduces to Maxwell-Boltzman distribution.
---- Do you agree ?

(5) An interesting feature shown by powder method is that the resolving power becomes very high when the reflected ray is thrown back at some angle. What is the value of that angle ?

(6) Write equation that represents Bragg's law.

(7) Powder-photograph method is applicable to single crystal specimen only.
---- Is it true or false ?

(8) Electrical conductivity of Plasma decreases with increase in temperature.
---- Is it true or false ?

(9) At the temperature more than boiling point, material exists in the _____ state.

(10) The nature of magnetic Bremsstrauhlung radiation will depend on the electron density.

---- Do you agree ?

(11) In Plasma Display Technology, a gas discharge plasma is created by applying magnetic field between the electrodes.

---- Is it true or false ?

(12) Which liquid crystal has twisted structure about the helical axis ?

(13) In Thermotropic liquid crystals, the molecular ordering changes with change in _____

(14) The Pure Nematic crystals are basically insulators.

---- Is it true or false ?

(15) Kammerlingh found that the resistance of mercury drops suddenly to almost zero when the temperature falls below _____ kelvin.

(16) In case of superconductors, if atomic mass of isotopes increases, its critical temperature decreases.

---- Is it true or false ?

(17) When the dimension of a superconductor increases due to stress, its transition temperature Tc _____

(18) When size of superconductor is reduced, what happens to the critical magnetic field ?

(19) When the layer of ZnS : Mn is excited by ultra-violet or X-rays, it emits yellow luminescence.

---- Do you agree ?

(20) Photo-sensitivity is defined as "photo conductivity per unit excitation _____".

2 Attempt the following :

(A) Write a short answer to the following : (Any **Three**) **6**

(1) What is Thermodynamic probability ?

(2) Explain division of phase space into phase cells and using Uncertainty principle and show that its volume is h^3.

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

(4) Explain influence of stress and frequency on superconductivity.

(5) Write Weissenberg's technique for Rotating Crystal method.

(6) Why instead of visible light, X-rays are used to determine crystal structure ?

(B) Give answer to the following : (Any **Three**) **9**

(1) Write a note on macro states and micro states.

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

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

(4) Explain Dulong and Petit law for specific heat of solids.

(5) Write a short note : Rotating crystal method.

(6) Discuss : The Sterling's theorem.

(C) Write in detail : (Any **Two**) **10**

(1) Derive the distribution formula for B-E statistics.

(2) Derive the distribution law for M-B statistics.

(3) Derive Planck's law for Black body radiation.

(4) Explain : Laue method for crystal structure.

(5) Describe Powder-photograph method to determine the structure of a crystal.

3 Attempt the following :

(A) Write a short answer to the following : (Any **Three**) **6**

(1) Define melting point and transparency temperature in case of liquid crystals.

(2) What is luminescence ?

(3) What is "Larmour orbiting" ?

(4) Discuss cyclotron radiation in Plasma.

(5) Write any four uses of superconductors.

(6) What is Photo ionization of atoms ?

(B) Give answer to the following : (Any **Three**) **9**

(1) Describe properties which do not change in superconductivity transitions.

(2) Write a note on Cholesteric liquid crystals.

(3) Describe : Meissner Effect of Flux exclusion.

(4) Discuss Thermal pinch effect in plasma.

(5) Write a note on Smectic liquid crystals.

(6) Explain trapping and its effect in case of photoconductor.

(C) Write in detail : (Any **Two**) **10**

(1) Describe : The London's theory for superconductivity.

(2) Write in detail : Applications of Plasma.

(3) Discuss how changes in states of a substance takes place when heat is supplied to it.

(4) Explain model of luminescence in sulphide phosphors.

(5) Describe the method of production of Plasma in absence of any gas.
