STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2008-09 & thereafter)

SUBJECT CODE : PH/MC/SS64

B.Sc. DEGREE EXAMINATION APRIL 2012
BRANCH III - PHYSICS
SIXTH SEMESTER

REG. No._____

COURSE   :   **MAJOR – CORE**
PAPER   :   **SOLID STATE PHYSICS**
TIME   :   **30 MINS.**   **MAX. MARKS : 30**
SECTION – A
TO BE ANSWERED IN THE QUESTION PAPER ITSELF
ANSWER ALL QUESTIONS: **(30 x 1 = 30)**

I. CHOOSE THE CORRECT ANSWER:
1.   Which of the following has the hydrogen bonding?
        a) CH_4 b) C   c) HF   d) C_SCl

2.   When the bond length is decreased, the bond energy
        a) remains constant   b) also decreases
        c) increases   d) none of the above

3.   Which bond is available in the three states of matter?
        a) Metallic bond   b) covalent bond
        c) Ionic bond   d)Vander wall's bond

4.   A combination of one cation vacancy and one anion vacancy
        a) Schottky defect   b) lattice defect
        c) Frenkel defect   d) Edge dislocation

5.   Frenkel and schottky defects together are called
        a) Electronic defects   b) Schottky defects
        c) Intrinsic defects   d) Extrinsic defects

6.   Which type of point defect is dominant in alkali halides?
        a) Schottky defect   b) Interestitialcies
        c) Frenkel defect   d) point defect

7.   The mass of an electron varies with variation in
        a) Electrostatic field   b) Magnetic field
        c) Gravitational field   d) speed

8.   The electrical conductivity of a conductor may be increased by
        a) increasing its temperature   b) decreasing its temperature
        c) increasing its vibrations   d) decreasing its temperature and vibrations

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9.   Electrical conductivity at absolute temperature T is related to its thermal conductivity K as
        a) $K / \sigma T = L$ b) $\sigma KT = LC$ c) $\sigma / KT = L$ d) None of the above

10.   Above the Curie temperature a magnetic material becomes
        a) Ferromagnetic   b) Paramagnetic   c) Diamagnetic d) None of the above

11.   Ferrities are
          a) Ferromagnetic materials   b) nonmagnetic materials
          c) Ferroelectric materials   d) Ferri magnetic materials

12.   The diamagnetic susceptibility is
          a) Positive always   b) negative always
          c) Zero always
          d) Depending on the material and can be positive, zero (or) negative

13.   Soft super conductors observe
          a) Silsbee's rule   b) Meissner effect
          c) both a & b   d) None of the above

14.   When isotopic mass increases the critical temperature of a superconductor
        a) Increases   b) decreases   c) remains unchanged

15.   Which of the following can be Type I superconductor?
          a) Pb   b) Nb   c) Nb_3 Ge

II.   FILL IN THE BLANKS:

16.   Cohesive energy in case of VanderWaals bonding is in the range of ………………….

17.   Surface defects are ……………….. dimensional defects.

18.   In N – type semiconductor, the Hall Coefficient is ……………….

19.   Magnetostriction is the phenomenon of …………………….

20.   The second London equation explains ……………………. Effect

III.   STATE WHETHER TRUE OR FALSE:

21.   Metallic bond is an unsaturated covalent bond.

22.   Impurities give rise to compositional defects.

23.   Hall effect can be used to determine whether the given material is metal, insulator (or) Semiconductor.

24.   Chromium steel is not a permanent magnetic material

25.   Critical magnetic field increases if temperature decreases.

IV.   ANSWER IN ONE OR TWO SENTENCES:

26.   Define cohesive energy.

27.   Mention any two applications of crystal imperfections (or) point defects.

28.   Define Hall Effect.

29.   Mention any two uses of soft magnetic materials

30.   What is Meissner effect?

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SECTION - B
ANSWER ANY FIVE QUESTIONS: **(5X 5 = 25)**

1.   What is Madelung constant? Obtain the value of madelung constant for a Nacl crystal.

2.   Explain the difference between edge and Screw dislocation. What is Burger vector?

3.   Mention the postulates of classical free electron theory.

4.   Give the theory of Hall effect in the case of a semiconductor.

5.   Explain the Weiss theory of paramagnetism.

6.   Compare soft and hard magnetic materials on basis of Hysteresis loop. Give
        examples.

7.   Explain BCS theory of superconductors.

SECTION - C
ANSWER ANY THREE QUESTIONS: **(3 X15 = 45)**

8.   Explain with examples the ionic and covalent bonding in crystals.

9.   What is Frenkel defect? Obtain an expression for the number of Frenkel defects for an
        Nacl crystal.

10.   Obtain an expression for electrical and thermal conductivities. Derive Widemann –
        Franz law.

11.   Discuss Langevins theory of paramagnetism.

12.   Derive Londons'equation for superconductivity.

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