Hall Ticket Number:

Code No. : 1208

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

BE I Year II – Semester (Main) Examinations, July - 2015

Engineering Physics – II

(For CSE, ECE, and IT Branches)

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** questions from **Part-B***

Part-A (10 X 2=20 Marks)

1. An electron is bounded in one dimensional infinite potential box has width 2.5Å. Calculate the lowest three permitted energy values of the electron.
2. Write short notes on line defects of crystals.
3. Explain BCS theory in super conductors.
4. What is the concept of Fermi energy?
5. Classify the solids into conductors, insulators and semiconductors on the basis of band theory of solids.
6. Assuming that there are 5×10^{28} atoms/m^3 in copper, find the Hall coefficient.
7. Distinguish inertial and non-inertial frames of references.
8. A rod of length 100cm is in a satellite moving with a velocity that is one half of the velocity of light relative to laboratory. What is the length of the rod as determined by an observer in the satellite and in the laboratory?
9. Define the effective mass of electron in semiconductor.
10. What are nano particles? Why do they exhibit different properties?

Part-B (5 X 10=50 Marks)

11. a) Apply Schrodinger's wave equation to a particle in Infinite Square well potential and obtain wave function and energy values. [6]
    b) What is Burger's vector? In what direction do the Burger's vector lie with respect to (i) An edge dislocation (ii) Screw dislocation. [4]

12. a) Discuss different types super conductors and mention their general properties. [7]
    b) n-type semiconductor specimen has Hall coefficient equal to 3.66×10^{-4} m^3/columb. The conductivity of the specimen is found to be 112 ohms/m. Calculate charge carrier density and mobility at room temperature. [3]

13. a) Derive an expression of continuity equation in semi conductors by considering holes as charge carriers. [7]
    b) In a doped semi conductor there are 4.5×10^{24} holes and 1.25×10^{14} electrons per cubic meter. What will be the carrier density in an undoped specimen? Electron and hole mobilities are 0.38m^2 /Vs and 0.18 m^2 /Vs respectively. Calculate conductivity of the intrinsic semiconductor. [3]

14. a) Using Lorentz transformations derive an expression for length contraction and time dilation. [6]
    b) Deduce Einstein's mass energy relation $E=mc^2$, considering the variation of mass with velocity. [4]

15. a) Describe the top-down and (sol-gel method) by which nano particles are fabricated. [6]
    b) Write any six applications of nano materials. [4]

16. a) What is Hall Effect? Deduce the expression for Hall coefficient and Hall Voltage in case of a semiconductor. [6]
    b) What are Bravais lattices? Describe seven crystal systems. [4]

17. Answer any **two** of the following:
    a) Explain the construction and principle LED. [5]
    b) Derive the expression for relativistic mass. [5]
    c) Working principles of TEM. [5]

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