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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
BE I Year II – Semester (Main) Examinations, July - 2015

Engineering Physics – II
(For Civil, Mechanical and EEE 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. Obtain Miller indices of a plane which has intercepts 1, 2 and 3 units in a simple cubic unit cell.
2. What is the physical significance of the wave function?
3. Define various types of ensembles in statistical mechanics.
4. Distinguish between Bosons and Fermions.
5. What is Hall Effect?
6. Explain magnetic levitation in superconductors.
7. What is SONAR? and explain.
8. Explain the terms reverberation and reverberation time.
9. What are the differences of top-down and bottom-up approaches?
10. Distinguish between bulk, thin and nano particles.

Part-B (5 X 10=50 Marks)

11. a) A particle is in motion along a line between $x = 0$ and $x = a$ with zero potential energy. At points for which $x < 0$ and $x > a$, the potential energy is infinite. Derive an expression for the wave function associated with the particle in such an infinite square well potential. [7]
- b) The glancing angle corresponding to first order reflection in crystal is 30° . When X-Ray beam of wavelength 1.75 Å is used, calculate interatomic spacing. [3]
12. a) Derive Fermi-Dirac distribution law. [7]
- b) Distinguish between Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac statistics. [3]
13. a) Derive an expression for carrier concentration of electrons in conduction band of an intrinsic Semiconductor. [6]
- b) Distinguish between insulators, semiconductors and conductors on the basis of band theory of solids. [4]
14. a) Describe how ultrasonic waves are produced using magnetostrictive transducer? [7]
- b) Calculate the fundamental frequency of vibration when a quartz crystal of 0.15 cm thickness is vibrating in resonance. Given Young's modulus of quartz is $7.9 \times 10^{12} \text{ Nm}^{-2}$ and density of quartz is 2650 kgm^{-3} . [3]
15. a) How the electrical and optical properties of materials change when their size is changed to nano? [4]
- b) Describe how chemical vapour deposition (CVD) technique is used to prepare nano materials. [6]
16. a) Explain the Bravais lattices and its seven crystal systems. [5]
- b) Describe phase space in statistical mechanics. [5]
17. Answer any *two* of the following:
 - a) High T_c super conductors. [5]
 - b) Conditions for good acoustics of a building. [5]
 - c) Elementary ideas on Carbon Nanotubes. [5]