Code No: R10203/R10 **Set No. 1**

I B.Tech II Semester Supplementary Examinations, August 2014
ENGINEERING PHYSICS -II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are matter waves. Explain their properties.
   (b) Show that the wave length λ associated with an electron of mass, m and Kinetic energy, E is given by$\lambda = \frac{h}{\sqrt{2mE}}$, where h is planck's constant.
   (c) Calculate the wavelength associated with an electron with energy 2000eV [8+4+3]

2. (a) Explain briefly the classical free electron theory of metals.
   (b) Derive an expression for electrical conductivity on the basis of classical free electron theory. [8+7]

3. (a) State and explain Bloch theorem in a periodic potential field.
   (b) Explain the classification of solids into conductors, semiconductors and insulators. [7+8]

4. (a) What is ferromagnetic Hysteresis? Explain retentivity and coercivity. Explain ferromagnetic hysteresis on the basis of Domain theory?
   (b) Classify & Distinguish ferromagnetic materials on the basis of the hysteresis loop. [8+7]

5. (a) What is the Superconductivity? Explain Meissner effect.
   (b) Mention few industrial applications of superconductors.
   (c) Calculate the critical current which can flow through a long thin superconducting wire of aluminium of diameter 10^{-3}m. The critical magnetic field for aluminium is 7.9x10^3amp/m. [6+5+4]

6. (a) What is ionic polarizability? Derive an expression for the ionic polarizability. Explain frequency dependence of ionic polarizability.
   (b) If all the molecular dipoles in a 1.0 cm radius water drop are pointed in the same direction, calculate the intensity of polarization. Dipole moment of the water molecule is 6 x 10^{-30} C-m. [9+6]

7. (a) Derive an expression for carrier concentration in intrinsic semiconductor.
   (b) The forbidden gap in pure silicon is 1.1eV. Compare the number of conduction electrons at temperatures 37^0C and 27^0C. [11+4]

8. (a) What are nanomaterials? Why do they exhibit different properties?
   (b) Write the applications of Nano Technology. [9+6]

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Code No: R10203/R10 **Set No. 2**

I B.Tech II Semester Supplementary Examinations, August 2014
ENGINEERING PHYSICS -II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is quantum computer? Explain the advantages of quantum computing over classical computation.
   (b) Explain briefly about multiple qu bit. [8+7]
2. (a) Mention different mechanisms responsible for electrical resistance in metals.
   (b) Find the temperature at which there is 1% probability of a state with an energy 0.5 eV above Fermi energy level will be occupied [8+7]
3. (a) Discuss the motion of an electron in a periodic potential field and explain the formation of energy bands.
   (b) What is the effective mass of an electron? Derive the expression for the effective mass of an electron moving in energy bands of a solid. [7+8]
4. (a) Write the classification of Magnetic Meterial.
   (b) Explain hysteresis loop observed in ferromagnetic materials.
   (c) The area of the hysteresis loop between B and H is 100 m^2. Each unit space along the vertical axis represents 0.001 $Wb/m^2$and each unit space along the horizontal represents 40A/m. Determine the Hysteresis loss per cycle. [6+5+4]
5. (a) Explain the following:
   (i)Flux quantization.
   (ii)Penetration depth.
   (b) Explain critical magnetic field of a superconductor as a function of temperature.
   (c) For lead, Tc = 7.2K. Calculate the ratio of penetration depth at 3K to that at 0K. [6+5+4]
6. (a) Define dielectric polarizability and susceptibility.
   (b) Derive the expression for electronic polarizability.

(c) The dielectric constant of helium, measured at 0^0 C and at one atmosphere is 1.0000684; under these conditions the gas contains $2.7x10^{25}$atoms/m^3. Calculate the atomic radius. [4+7+4]

7. (a) Distinguish between conductors, insulators and semiconductors.

   (b) The intrinsic carrier density at room temperature in Ge is 2.37X 10^{19} /m^3. If the electron and hole mobilities are 0.38 and 0.18 m^2 /v/s respectively, calculate the resistivity. [9+6]

8. (a) What is Quantum Confinement? Explain density of states for various types of Quantum Confinement.

   (b) Explain Ball Milling process and Sol-Gel process in nanomaterials. [8+7]

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Code No: R10203/R10 **Set No. 3**

I B.Tech II Semester Supplementary Examinations, August 2014
ENGINEERING PHYSICS -II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the Physical significance of Wave function.
   (b) Derive time dependent Schrodinger wave equation. [7+8]
2. (a) Explain briefly the classical free electron theory of metals.
   (b) Derive an expression for electrical conductivity on the basis of classical free electron theory. [8+7]
3. (a) State and explain Bloch theorem in a periodic potential field.
   (b) Explain the classification of solids into conductors, semiconductors and insulators. [7+8]
4. (a) Define the following terms
   (i)Magnetic permeability
   (ii) Magnetic susceptibility
   (iii) Coercivity and
   (iv) retentivity
   (b) Derive the relation between B, H and I
   (c) A magnetic material has intensity of magnetization of 1550 A/m and flux density of 0.0022Wb/m^2. Calculate the magnetizing force and relativity permeability of the material. [8+4+3]
5. (a) Write general properties of superconductors.
   (b) Draw the magnetization curves for Type-I & Type-II superconductors and mention different regions.
   (c) The lead material works as superconductor at a temperature of T_c = 7.26K. If H_0= 8 x 10^5 A/m find critical magnetic field at 5K. [6+5+4]
6. (a)Deduce the relation between polarizability (α) and relative permittivity$\in_r$.
   (b) Explain briefly the Ferro electricity and Piezoelectricity. [7 + 8]

7. (a) Explain Hall Effect. Show that for a p-type semiconductor the hall coefficient $R_H = 1/ne$.
   (b) write any four applications of Hall effect. [11+4]

8. (a) What are the types of Carbon nanotubes? Mention their properties
   (b) How the physical and chemical properties of nano-particles vary with their size? [10+5]

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Code No: R10203/R10 **Set No. 4**

I B.Tech II Semester Supplementary Examinations, August 2014
ENGINEERING PHYSICS -II
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is a quantum computer? Explain briefly how it works.
   (b) What is Bloch's Sphere and describe any two properties of it. [8+7]

2. (a) Explain briefly the classical free electron theory of metals.
   (b) Derive an expression for electrical conductivity on the basis of classical free electron theory. [8+7]

3. (a) Explain the formation of allowed and forbidden energy bands on the basis of the Kronig- Penny model.
   (b) Write short notes on "effective mass" $(\mathbf{m}^*)$ of an electron. [8+7]

4. (a) Define the following
   (i)Magnetic moment
   (ii) Intensity of magnetization
   (iii) Magnetizing force
   (iv) magnetic flux density
   (b) Explain the origin of magnetic moment at the atomic level.
   (c) Find the relative permeability of a ferromagnetic material if a field of strength 110 A/m produces a magnetization of 3300 A/m. [8+5+2]

5. (a) Distinguish the variation of resistivity with temperature in normal and superconductors.
   (b) Mention important property changes that occur in materials when they change from normal to superconducting state.
   (c) Distinguish energy gap in semiconductors and superconductors. [4+7+4]

6. (a) Describe the various of processes of dielectric polarization.
   (b) Derive expressions for electronic & ionic polarizabilities. [9+6]

7. (a) Derive an expression for carrier concentration in intrinsic semiconductor.
   (b) The forbidden gap in pure silicon is 1.1eV. Compare the number of conduction electrons at temperatures 37^0C and 27^0C. [11+4]

8. (a) Write a detailed note on nano science and nanotechnology
   (b) Describe briefly the fabrication methods of nanomaterials [7+8]

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