P-9067

SEAT No. :

[Total No. of Pages : 4

[6178] - 2

ENGINEERING PHYSICS

(2019 Pattern) (Semester - I/II) (107002)

Time : 2¹/₂ Hours] Instructions to the candidates : [Max. Marks : 70

- 1) Q. 01 is compulsory, Answer Q2 or Q3, Q4 or Q5, Q6 or Q7, Q8 or Q9.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicates full marks.
- 4) Use of Electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.

Physical Constants : -

- Plank's constant $h = 6.63 \times 10^{-34} J_{\odot}S$
- Mass of electron $m_e = 9.1 \times 10^{-31} \text{ Kg}$
- Charge on election $e = 1.6 \times 10^{19} C$

Q1) Write the correct option with answer for the following (1 mark each). [10]

- i) The de Broglie wavelength is _____ proportional to mass of the particle and _____ proportional to velocity of the particle
 - a) Directly, directly b
 - b) Inversely, inversely,
 - c) Directly, inversely d) Inversely, directly
- ii) If a wave function is finite, single valued, continuous and normalizable it is called as
 - a) Well behaved function
 - c) Fermi function
- b) Probability function,
- d) None of these
- iii) Heisenberg Uncertainty Principle is the product of ______ in position and momentum

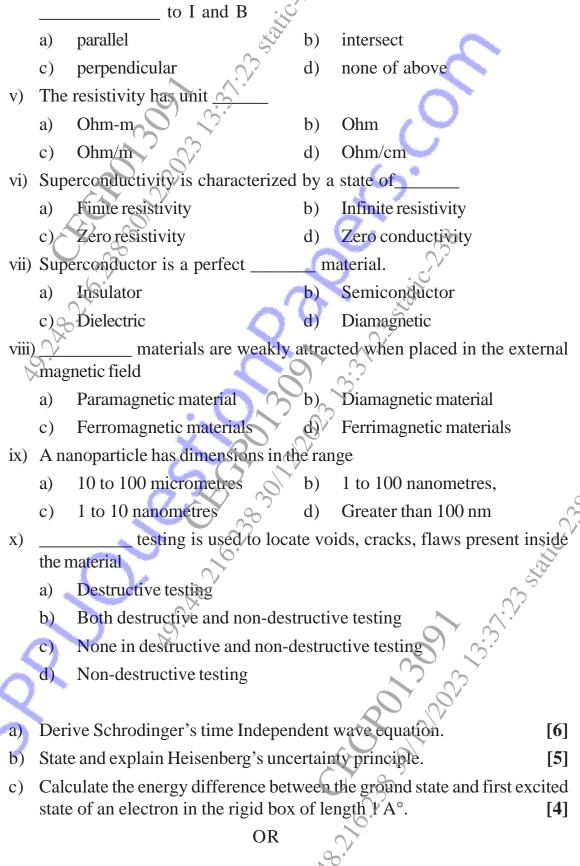
d)

- a) Difference
- c) Addition

- b) Uncertainties
 - Subtraction

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iv) In Hall effect, when a specimen caring current I is placed in transverse magnetic field B then electric field developed in specimen is



[6178]-2

2

Derive the equation for energy of the particle is enclosed in a one-**Q3**) a) dimensional rigid box (infinite potential well). [6] b) State de Broglie hypothesis. Derivê the equation of de Broglie wavelength for an electron accelerated by a potential difference "V". [5] c) An electron has a speed of 600 m/s with an accuracy of 0.005 %. Find the uncertainty in its 4 position. [4] **04**) a) Explain classification of solids on the basis of Band Theory. **[6]** b) Explain the working of PN junction diode in (a) forward bias (c) reverse bias on the basis of energy level diagram. [5] c) Calculate the mobility of charge carriers in doped silicon whose conductivity is 100 per Ω -m and the Hall coefficient is 3.6 x 10⁻⁴ m³/ coulomb. [4] OR a) Explain Hall effect. Derive the equation of Hall coefficient. **Q**5) [6] b) Prove that in intrinsic semiconductor fermi fevel lies exactly at centre between valence band and conduction band. [5] Calculate the conductivity of pure silicon at room temperature when c) [`] concentration of carriers is 1.6×10^{10} per cc [μ_e =1500 cm²/ V-sec, $\mu_{\rm h}$ =500cm²/V-sec. [4] a) Differentiate between type I and type II superconductors. **Q6**) [6] b) Define the terms: Magnetic field strength (H) i) Magnetization (M) ii) iii) Magnetic Susceptibility (χ) Magnetic Induction (B) iv) Relative Permeability (µ) v) c) Explain DC and AC Josephson effect in brief. [4] OR Explain how the information is recorded and reviewed in magneto-optical Q7a) recording devices. [6] b) State and Explain Meissner effect. Show that superconductors exhibit perfect diamagnetism. [5] c) Differentiate ferromagnetic materials and paramagnetic material. (Any two points) [4] [6178]-2 3

- Q8) a) Explain Electrical and Mechanical properties of nanoparticles. [6]
 - b) Differentiate between Non-Destructive Testing techniques and destructive [5]
 - c) Explain the applications of Naño particles in Targeted Drug Dilivery. [4]
- Q9) a) What is Non Destructive Testing? Explain Ultrasonic Testing Technique for flaw detection. [6]
 - b) Explain nano technology is used in, Automobile and electronics field.[5]
 - c) An ultrasonic pulse of frequency 130 kHz is sent through a block of steel. The echo pulse is recorded after 1.695 microseconds. If the velocity of ultrasonic in steel is 5900 m/s, calculate the thickness of the steel block and the wavelength of the pulse. [4]