P P SAVANI UNIVERSITY

Second Semester of B. Tech. Examination

May 2022

SESH1210 Applied Physics

08.06.2022, Wednesday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in same answer sheet.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 **Answer the Following:** **[08]**

(i) The equation of motion of matter wave was derived by.....
(a)Heisenberg
(b)Bohr
(c) de-Broglie
(d) Schrödinger

(ii) Which of the following waves can travel with the velocity greater than the velocity of light in vacuum?
(a) Matter
(b) Electromagnetic
(c) X-rays
(d) Radio waves

(iii) O.W.U. is the unit of .....
(a) Absorption
(b) Absorption coefficient
(c) Reverberation time
(d) Loudness

(iv) SONAR is the abbreviation of .....
(a) small navigation and random
(b) sky navigation and ranging
(c) sun nuclear ranging
(d) sound navigation and ranging

(v) Bravais lattice consists of..... space lattices.
(a) Seven
(b) Eleven
(c) Fourteen
(d) Thirteen

(vi) The axial relationship of a monoclinic crystal system is given as.....
(a) $a = b = c$
(b) $a = b \neq c$
(c) $a \neq b = c$
(d) $a \neq b \neq c$

(vii) Nanoscience is the study of objects whose size is .....
(a)1-10 nm
(b) 1-100 mm
(c) 1-1000 nm
(d) 1-100 nm

(viii) The colour of the nano gold particles is.....
(a)Yellow
(b) Orange
(c) Red
(d) Variable

Q - 2 (a) Define Ultrasonic waves. Mention properties of ultrasonic waves. [04]

Q - 2 (b) X-rays of unknown wavelength give first order Bragg reflection at glancing angle 20° with (212) planes of copper having FCC structure. Find the wavelength of X-rays, if the lattice constant for copper is 3.615 Å. [04]

OR

Q - 2 (a) State and explain Bragg's law. [04]

Q - 2 (b) Calculate the fundamental frequency of vibration when a quartz crystal of thickness of 0.15 cm is vibrating at resonance. Also determine the velocity of the ultrasonic wave produced by piezoelectric oscillator. The density of the quartz crystal is 2650 Kg m^{-3} and the Young's modulus is 7.9×10^{10} N/m^2. [04]

Q - 3 **Attempt any two.** [14]

(i) Mention properties of wave function. Derive Schrödinger time-dependent equation.

(ii) Explain physical vapor deposition (PVD) with its advantages and disadvantages.

(iii) Explain principle, construction & working of scanning electron microscope with its applications.

SECTION – II

Q - 1 **Answer the Following:** [08]

(i) Which of the following is not a characteristic of LASERS?
(a) Monochromatic
(b) Coherent
(c) Divergent
(d) Intense

(ii) Which of these converts the electrical signal to optical signals?
(a) Optical photo detectors
(b) Demultiplexers
(c) Multiplexers
(d) Optical modulators

(iii) Inductor resists change in
(a) Voltage
(b) Magnetic field
(c) Current
(d) Dielectric constant

(iv) Kirchhoff's laws are useful in determining.....
(a) Current flowing in a circuit
(b) EMFs and Voltage drops in a circuit
(c) Power in a circuit
(d) All of these

(v) When a pure semiconductor is heated, its resistance .....
(a) Goes up
(b) Goes down
(c) Remains the same
(d) Can't say

(vi) A transistor is a ..... operated device.
(a) current
(b) voltage
(c) both voltage and current
(d) none of the above

(vii) In superconductivity, the electrical resistance of material becomes.....
(a) zero
(b) infinite
(c) finite

(d) none of the above

(viii) Type–II superconductors are also called ..... superconductors.
(a) hard
(b) medium
(c) magnetic
(d) soft

Q - 2 (a) Define (1)current (2)Potential Difference (3)Resistance (4)Power. [04]

Q - 2 (b) Give the difference between type-I and type-II superconductors. [04]

OR

Q - 2 (a) Explain Kirchhoff's Voltage law with an appropriate diagram. [04]

Q - 2 (b) Discuss any two applications of Superconductors. [04]

Q - 3 **Attempt any two.** [14]

(i) What do you mean by spontaneous emission and stimulated emission? Explain it with a proper diagram.

(ii) Explain the advantages of optical fiber communication over conventional one.

(iii) What is UJT? Explain the characteristic of UJT with an proper diagram.

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