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Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **SH152U - Engineering Physics**

Generated At : **19-04-2022 10:38:40**

Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

1) Solve any three sub questions

- a) What are Polaroids? Give construction and working of Polaroids [05]
- b) A lecture hall of 15 x 12 x 5 meters dimensions has an average absorption coefficient 0.2. Calculate reverberation time. If 14.30 micro watt source is used in the hall, calculate ultimate intensity in the hall [05]
- c) What is interference? Explain construction and working of Michelson's interferometer. [05]
- d) Give industrial and engineering applications of Laser. [05]

2) Solve any three sub questions

- a) State Heisenberg's uncertainty principle. Calculate the De-Broglie wavelength of 2 eV photon and an electron with kinetic energy of 2eV. [05]
- b) A specimen of germanium is doped with donor impurity atoms at the rate of one impurity atom for 10^6 atoms of germanium. Assuming all the impurity atoms being ionized and density of Ge atoms as 4.2×10^{28} atoms/m³, find the resistivity of the doped germanium if the electron mobility is 0.36m²/Vs. [05]
- c) A thin transparent film of refractive index 1.6 is introduced normally in the path of one of the interfering rays in Michelson's interferometer which is illuminated by the light of wavelength 5000 Å. If 500 fringes cross the field of view, calculate the thickness of the film. [05]
- d) What are diamagnetic and paramagnetic substances? Compare the properties of diamagnetic and paramagnetic substances. [05]

3) Solve any three sub questions

- a) Define hysteresis and draw hysteresis curve and explain it. List two hard and soft magnetic materials. [05]
- b) What is Magnetostriction effect? Explain Magnetostriction effect for production of ultrasonic waves. [05]
- c) Compute the minimum uncertainty in the location of a 2 gm mass moving with a speed of 1.5 m/s and the minimum uncertainty in the location of an electron moving with a speed of 0.5×10^8 m/s, given that the uncertainty in momentum is $\Delta p = 10^{-3} p$ for both. [05]
- d) Explain motion of electron in one dimensional potential well. [05]

4) Solve any five sub questions

- a) Define: i) Forward biasing ii) Fermi-level iii) conduction band [03]
- b) What are matter waves? Give the properties of matter waves. [03]
- c) Calculate the acoustic intensity level at a distance of 10 meters from a source emitting energy at the rate of 3.14 watts, using reference intensity of 10^{-12} m⁻². [03]
- d) Give applications of ultrasonic waves. [03]
- e) What is wave function? Give physical significance of wave function. [03]
- f) Give advantages and disadvantages of top-down and bottom-up approaches in nanotechnology. [03]

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