Internal Assessment Test 2 – March 2021

Sub:	Engineering Physics Theory					Sub Code:	18PHY12	Branch:	CS/IS		
Date:	01-03-2021	Duration:	90 min's	Max Marks:	50	Sem/Sec:	I/ A,B,C,D,E,F and G			OBE	

Answer any FIVE FULL Questions
Given: c = 3 × 10⁸ m/s; h = 6.625 × 10 ⁻³⁴Js; k = 1.38 × 10 ⁻²³ J/K; me = 9.1 × 10⁻³¹kg; e = 1.6 × 10⁻¹⁹C, Ɛ₀=8.854x10⁻¹²F/m

		MARKS	CO	RBT
1 (a)	Obtain an expression for amplitude and phase of vibration of a body undergoing forced vibration.	[07]	CO2	L3
(b)	Calculate the peak amplitude of vibration of a system whose natural frequency is 1000Hz when it oscillates in a resistive medium for which the value of damping/unit mass (r/m) is 0.008 rad/s under the action of an external periodic force/unit mass(F/m) of amplitude 5 N/kg, with tunable frequency.	[03]	CO2	L3
2 (a)	Describe the construction and working of Reddy shock tube	[06]	CO3	L3
(b)	Define shock waves. Mention its applications.	[04]	CO3	L3
3 (a)	Discuss the variation of Fermi factor with temperature.	[06]	CO1	L3
(b)	Discuss any two merits of quantum free electron theory.	[04]	CO1	L2
4 (a)	Derive the expression for Fermi energy at Zero Kelvin.	[05]	CO1	L3
(b)	Using the expression for carrier concentrations show that, the Fermi level lies in the middle of the energy gap for an intrinsic semiconductor.	[05]	CO2	L3

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5 (a)	What is Hall effect? Obtain an expression for the Hall coefficient.	[7]	CO1	L3
(b)	The following data are given for intrinsic germanium at 300K, $n_i = 2.4 \times 10^{19}/m^3$, $\mu_e = 0.39 m^2 v^{-1} s^{-1}$, $\mu_{h=}$ $0.1939 m^2 v^{-1} s^{-1}$ Calculate the resistivity of the sample.	[3]	CO2	L3
6 (a)	Derive the Clausius - Mossotti relation for dielectrics.	[6]	CO1	L3
(b)	An elemental solid dielectric material has polarizability $7 \times 10^{-40} Fm^2$. Assuming the internal field to be Lorentz field, calculate the dielectric constant for the material if the material has 3×10^{28} atoms/m^3.	[4]	CO1	L3
7 (a)	Obtain the general solution for the displacement of a body undergoing damped oscillations.	[7]	CO1	L3
(b)	A linear simple harmonic oscillator has time period of 1s, what is the amplitude of oscillation if its maximum velocity is 2 m/s.	[3]	CO1	L3
8 (a)	Evaluate the energy of a free electron in Copper for which probability of occupation is 2% at 100K, given that Fermi energy for Copper is 5eV.	[5]	CO3	L4
(b)	A spring loaded with 10kg executes free oscillations at a certain frequency. Evaluate the additional mass to be added to it so that it oscillates at one-tenth of its initial frequency.	[5]	CO3	L4