Roll Number:_____

Thapar Institute of Engineering and Technology, Patiala

School of Physics & Materials Science

MID SEMESTER EXAMINATION

B. E. (First Year): Semester-I (2019-20) | Course Code: UPH004

Course Name: Applied Physics

30th September, 2019

Time: 2 Hours, M. Marks: 50 | Name Of Faculty: **MKS, SDT, ALK, PUL, SOJ, RKR, SDV, DKS, PPS**

Note: Attempt all questions in given sequence. Assume missing data, if any, suitably. Symbols have their usual meaning.

Q1	(a)	Assuming the damping to be proportional to velocity, develop a differential equation for damped harmonic oscillator. Using suitable figure, explain the conditions for underdamped, critically damped and overdamped cases.	(8)
	(b)	The logarithmic damping decrement of an oscillator is 0.2. Calculate the percentage change in amplitude of the oscillator after one complete cycle.	(4)
	(c)	True or false. Justify your answer. "Eddy currents should always be avoided."	(4)
Q2	(a)	Describe the principle, construction and working of piezoelectric oscillator for production of ultrasonic waves.	(8)
	(b)	Let the reverberation time be 1.8 s for an empty hall and 1.5 s when a curtain cloth of 5×5 m^2 is suspended at the centre of the hall. If the dimensions of the hall are $10 \times 8 \times 6$ m^3, calculate the absorption coefficient of the curtain cloth.	(4)
	(c)	True or false. Justify your answer. "Presence of flexible materials increases the reverberation time".	(4)
Q3	(a)	Derive the wave equations for electric/magnetic field of electromagnetic waves in a conducting medium. Hence, prove that amplitude of the field vector decays exponentially inside a conductor.	(10)
	(b)	Calculate the divergence and curl of the vector, $\vec{v} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$.	(4)
	(c)	True or False. Justify the statement using relevant Maxwell's equations. "Electric monopoles exist but magnetic monopoles don't exist".	(4)