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Internal Assessment Test 1 – September 2019

Sub:	Engineering Physics Theory					Sub Code:	18PHY12	Branch:	CS/IS	/CIV	
Date:	18-09-2019 Duration: 90 min's Max Marks: 50 Sem / Sec: I / A,B,C,D,E,F						D,E,F and G		OE	BE	
$\frac{\text{Answer any FIVE FULL Questions}}{\text{Given: c = 3 \times 10^8 m/s;}} \text{ h = 6.625 \times 10^{-34} Js ;} \text{ k = 1.38 \times 10^{-23} J/K;} \text{ m}_{e} = 9.1 \times 10^{-31} kg;} \text{ e = 1.6 \times 10^{-19} C} $ MARKS									СО	RBT	
1 (a)	State Heisenber	rg's uncertain	ty principle ar	nd show that elec	trons	cannot exist is	n the nucleus.] [07]	CO3	L3
(b)	(b) If the output power of GaAs ($E_g = 1.4 \text{ eV}$) semiconductor laser is 5 mW, calculate the number of photons emitted per second.							er of [03]	CO4	L3
2 (a)	(a) Find the eigen function and energy eigenvalues for a particle in a one dimensional potential well of infinite height.							ell of [07]	CO3	L3
(b)	(b) Calculate the ratio of population of two energy levels involved in the He-Ne laser emitting photons of wavelength 6328 Å, at thermal equilibrium (300 K).							03]	CO4	L3	
3 (a)	Derive time independent Schrodinger wave equation for a particle moving in one dimension.							[07]	CO3	L4
(b)	Discuss the application of lasers in defence for rangefinder.							[03]	CO4	L2
4 (a)	Obtain an expression for energy density of radiation under thermal equilibrium in terms of Einstein's coefficients.							ein's [07]	CO4	L4
(b)	_		_	nction for the elected en that width of t		<u> </u>	state, if it is conf	fined [03]	CO3	L3

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5 (a) Explain the construction	and working of CO ₂ laser, with the help of suitable diagrams.	[7]	CO4	L3
(b) Calculate the de-Broglie	e wavelength of the electron moving with the speed of $5x10^6$ m/s.	[3]	CO3	L3
_	motion (SHM). Setup differential equation of motion for SHM.	[7]	CO1	L3
	g with the period of 0.1 s when loaded vertically by a mass of 200 gm in a culate its spring constant.	[3]	CO1	L3
7 (a) Derive an expression for springs.	or the equivalent spring constant for the series and parallel combinations of	[6]	CO1	L3
(b) Amplitude for the under	r damped vibrations is given by $A(t) = A_{\max} e^{-\frac{b}{2m}t}$. Find the time required	[4]	CO1	L3
	ttain amplitude 0.5 times its maximum amplitude. Given $b = 0.007 \text{ kg/s}$ and			
Q (a) Obtain the general colution	ion for the displacement of a hadron density downed assillations	[7]	CO1	L3
8 (a) Obtain the general solution	ion for the displacement of a body undergoing damped oscillations.	[/]	COI	

5 (a)	Explain the construction and working of CO ₂ laser, with the help of suitable diagrams.	[7]	CO4	L3
(b)	Calculate the de-Broglie wavelength of the electron moving with the speed of $5x10^6$ m/s.	[3]	CO3	L3
6 (a)	Define simple harmonic motion (SHM). Setup differential equation of motion for SHM.	[7]	CO1	L3
(b)	If a spring is oscillating with the period of 0.1 s when loaded vertically by a mass of 200 gm in a frictionless medium, calculate its spring constant.	[3]	CO1	L3
7 (a)	Derive an expression for the equivalent spring constant for the series and parallel combinations of springs.	[6]	CO1	L3
(b)	Amplitude for the under damped vibrations is given by $A(t) = A_{\max} e^{-\frac{b}{2m}t}$. Find the time required	[4]	CO1	L3
	for vibrating system to attain amplitude 0.5 times its maximum amplitude. Given $b=0.007\ kg/s~$ and $m=0.5kg.$			
8 (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	L2