CONTINUOUS INTERNAL EVALUATION- 2

Dept:FY	Sem / Div:II/D,E,F	Sub: Engineering Physics	S Code:18PHY22
Date:30/08/21	Time: 3:00pm to 4:30pm	Max Marks: 50	Elective:N
Note: Answer any 2 full questions, choosing one full question from each part.			

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QN		Questions	Marks	RBT	COs
		PART A			
1	a	Give four Maxwell's equation in differential form in vacuum and hence derive the electromagnetic wave equation in terms of electric field using Maxwell's equations.	10	L2	CO2
	b	Define eigen function and eigen value. Setup one-dimensional time independent Schrodinger wave equation	10	L1&L2	CO3
	c	Determine constant C, such that vector $A=(x+ay)a_x+(y+bz)a_y+(x+cz)a_z$ is solenoidal	5	L3	CO2
		OR			
2	a	Describe the concept of Divergence. What is its physical significance? Derive Gauss' divergence theorem	10	L2	CO2
	b	With a proper energy level diagram explain the working of semiconductor laser. Explain the working of laser range finder.	10	L2	CO3
	c	A pulsed laser emits photons of wavelength 780nm with 20mW average power/pulse. Calculate the number of photons contained in each pulse if the pulse duration is 10ns	5	L3	CO3
		PART B			
3	a	State and explain de Broglie's hypothesis. Derive an expression for de Broglie wavelength of an accelerated electron.	10	L2	CO3
	b	State and explain Heisenberg's Uncertainty principle, show that electrons do not exist inside the nucleus.	10	L1&L2	CO3
	c	A particle of mass $0.5MeV/C^2$ has kinetic energy 100eV. Find its de Broglie wavelength, where C is the velocity of light.	5	L3	CO3
		OR			
4	a	Mention the three different vibrational modes of CO_2 molecule. With a neat energy level diagram explain the construction and working of CO_2 laser.	10	L2	CO3
	b	Define population inversion and metastable state and obtain an expression for energy density of radiation in terms of Einstein coefficients.	10	L1&L2	CO3
	c	An electron is bound in a one-dimensional potential well of width $1A^0$, but infinite wall height. Find its energy values in the ground state and in the first two excited states.	5	L3	CO3

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