

CRM08.

Rev 1.11

BS(PHY)

<11/02/2022>

CONTINUOUS INTERNAL EVALUATION - 2

Dept: BS(PHY)	Sem / Div: I/A,B,C	Sub: Engineering Physics	S Code:21PHY12
16/02/2022	Time: 3-4:30 pm	Max Marks: 40	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

QN	Questions	Mark s	RBT	CO's
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PART A

1	a State the assumptions of Planck's law of Black body radiation and reduce Planck's law to Wien's law and Rayleigh Jeans law. b State and explain de Broglie's hypothesis and prove that wavelength of an accelerated electron is $\lambda = \frac{1.226 \text{ nm}}{\sqrt{V}}$	8	L1& L2	CO2
	c The inherent uncertainty in the measurement of time spent by a nuclei in the excited state is $1.4 \times 10^{-10} \text{ s}$. Calculate the uncertainty that results in its energy in the excited state.	4	L3	CO2

OR

2	a State and explain Heisenberg's Uncertainty principle. Prove that electrons cannot exist inside the Nucleus of an atom.	8	L1& L2	CO2
	b Starting from Schrodinger's time independent wave equation, derive the expression for energy Eigen value and Eigen function for an electron present in 1-d potential well of infinite depth.	8	L1& L3	CO2
	c An electron is bound in a one dimensional potential well	4	L3	CO2

of width 1\AA , but infinite wall height. Find its energy values in the ground state and in the first two excited states.

PART B

3	a What is Laser. Give two examples of Laser. Explain the terms (a) spontaneous emission, (b) stimulated emission (c) induced absorption.	8	L1& L2	CO3
	b 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.	8	L1& L2	CO3
	c The average output power of laser source emitting a laser beam of wavelength 632.8nm is 5mW . Find the number of photons emitted per second by the laser source.	4	L3	CO3

OR

4	a Explain requisites of a laser system. Define the terms Population inversion and meta-stable state (Conditions of Laser action).	8	L1& L2	CO3
	b Derive the expression for energy density of radiation at equilibrium in terms of Einstein's coefficients.	8	L3	CO3
	c The ratio of population of two energy levels is 1.059×10^{-30} . Find the wavelength of light emitted by spontaneous emissions at 330K .	4	L3	CO3

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 11/2/22