



B.Tech - Odd Sem : End Semester Exam
Academic Year:2020-2021

18PH4101 - QUANTUM PHYSICS FOR ENGINEERS

Set No: 3

Time:		Max.Marks: 100					
S.NO	Answer All Questions	Choice	Options	Marks	CO	CO BTL	COI BTL
1.	Explain the difference between crystalline and amorphous solids	choice Q-2		10Marks	CO1	2	1
2.	Describe the Body center cubic structure with a diagram			10Marks	CO1	2	2
3.	Illustrate the seven crystal systems with neat diagrams. List out any two differences between primitive and non-primitive unit cells.	choice Q-4		15Marks	CO1	2	2
4.	Explain the construction and working of a semiconductor laser with a neat energy level diagram and list some of the applications in communication and medical fields.			15Marks	CO1	2	2
5.	Illustrate the various theories of blackbody radiation	choice Q-6		10Marks	CO2	2	1
6.	Explain the concept of Compton shift			10Marks	CO2	2	2
7.	Explain the de Broglie hypothesis and de Broglie wavelength. Compute the de Broglie wavelength of electrons of energy 104 eV and compare it with the wavelength of electromagnetic radiation for which the photon has the same energy.	choice Q-8		15Marks	CO2	2	2
8.	Explain phase velocity and group velocity and also explain how Plank's theory explained Blackbody radiation successfully			15Marks	CO2	2	2
9.	Explain the physical significance of wave function	choice Q-10		10Marks	CO3	3	1
10.	Distinguish the finite and infinite potential wells with necessary diagrams			10Marks	CO3	3	2
11.	Derive the expression for energy levels of infinite 1-Dimensional potential well and extend the energy equation to 3-Dimensional potential box	choice Q-12		15Marks	CO3	3	3
12.	Consider a square well having an infinite wall at $x = 0$ and a wall of height U at $x = L$. a) For the case $E < U$, obtain solutions to the Schrodinger equation Eq. and inside the well ($0 \leq x \leq L$) and in the region beyond ($x > L$) that satisfy the appropriate boundary conditions at $x = 0$ and at $x = \infty$. b) Enforce the proper matching conditions at $x = L$ to find an equation for the allowed energies of the system. •Are there conditions for which no solution is possible? Explain.			15Marks	CO3	3	3
13.	Explain the Galileo transformation for new coordinates with necessary reference frame diagrams.	choice Q-14		10Marks	CO4	2	1
14.	Spacecraft Alpha is moving at $0.80c$ with respect to the			10Marks	CO4	2	2

	Earth. If spacecraft Beta is to pass with a speed of $0.60c$ relative to earth. Compute the dilation for each spacecraft.						
15.	Demonstrate the Time dilation concept in the special theory of relativity and derive the expression for time dilation	choice Q-16		15Marks	CO4	2	2
16.	Explain the following a) Variation of mass with velocity (b) Illustrate momentum and energy relation in the special theory of relativity.			15Marks	CO4	2	2

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