GARDEN CITY UNIVERSITY
EMPHASIS ON LIFE

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Dr. A P J Abdul Kalam School of Engineering
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Applied Physics (10ABTEC22112)

Course: Applied Physics Semester: I
Course Code: 10ABTEC22112

Question Bank

MODULE-1: Quantum mechanics

SL. NO.	QUESTIONS	CO/s	RBT LEVEL	MARKS
1	State Wien's displacement law & write the formula.	CO1	L1	3
2	State Plank's law for black body radiation.	CO1	L1	3
3	What is blackbody radiation spectrum?	CO1	L1	3
4	State & explain Planck's law of radiation.	CO1	L1	5
5	Show that de-Broglie's wavelength(λ) of a moving particle is $\lambda=\frac{h}{p}$.	CO1	L1	5
6	Obtain the expression Wein's law using Plank's law.	CO1	L1	5
7	Deduce the relation of Plank's law by using Rayleigh Jean's law.	CO1	L1	5
8	State de-Broglie's hypothesis and prove that $\lambda=\frac{h}{p}$.	CO1	L1	6
9	Relate the Plank's law to Wein's law and Rayleigh Jean's law.	CO1	L1	6
10	State and explain Compton effect.	CO1	L1	6
11	State and explain photoelectric effect.	CO1	L1	6
12	Show that the non-existence of electrons in the nucleus.	CO1	L1	6
13	State and explain Heisenberg's Uncertainty Principle.	CO1	L1	6
14	Find the Time independent Schrodinger wave equation for matter waves.	CO1	L1	8

16	Mention the time independent Schrodinger's wave equation to particle in 1-D potential well of infinite height and obtain the eigen values.	CO1	L1	8

MODULE-2: Semiconductor and Dielectrics

SL. NO.	QUESTIONS	CO/s	RBT LEVEL	MARKS
1	Describe dielectrics with an example.	CO2	L2	2
2	Discuss the types of semiconductors with an example.	CO2	L2	4
3	Differentiate the types of semiconductors with an example.	CO2	L2	4
4	Explain polar and non-polar dielectrics.	CO2	L2	4
5	Discuss polarization and mention its types of dielectric materials.	CO2	L2	4
6	Discuss conductor, semiconductor and insulators based on energy level diagram.	CO2	L2	6
7	Discuss law of mass action for intrinsic semiconductor.	CO2	L2	6
8	Discuss the types of polarization of dielectric material with an example.	CO2	L2	6
9	Explain Fermi level in an intrinsic semiconductor.	CO2	L2	6
10	Derive an expression for the Fermi energy and Energy gap of an intrinsic semiconductor.	CO2	L2	6
11	Derive an Clausius-Mossotti equation for 3-D cubic solid lattice for dielectrics materials.	CO2	L2	8
12	Derive an expression for hall voltage using Hall effect with a neat diagram.	CO2	L2	8
13	What is Zener diode? Discuss its I-V characteristics.	CO2	L2	8

MODULE-3: Optoelectronics

SL. NO.	QUESTIONS	CO/s	RBT LEVEL	MARKS
1	Discuss the applications of LEDs.	CO3	L2	2
2	Discuss the applications of solar cells.	CO3	L2	2
3	Illustrate the applications of semiconductor diode LASER.	CO3	L2	2
4	Describe radiative recombination mechanism in semiconductor.	CO3	L2	2

5	Describe radiative and nonradiative recombination mechanism in semiconductor.	CO3	L2	4
6	Identify the advantage and disadvantages of photodiodes.	CO3	L2	4
7	Discuss radiative and nonradiative recombination mechanism in semiconductor.	CO3	L2	6
8	Explain the structure and working of PIN photodiode.	CO3	L2	6
9	Explain the structure and working of avalanche photodiode.	CO3	L2	6
10	Describe semiconductor diode LASER using energy level diagram.	CO3	L2	8
11	Discuss the structure and working principle of LED with it's I-V characteristics.	CO3	L3	8
12	Discuss the structure and working of solar cell and mention it's applications.	CO3	L3	8

MODULE-4: Lasers and Optical Fibre

SL. NO.	QUESTIONS	CO/s	RBT LEVEL	MARKS
	Lasers			
1	Describe numerical aperture.	CO4	L2	3
2	Explain spontaneous emission using energy level diagram.	CO4	L2	3
3	Summarize the characteristics of lasers.	CO4	L2	3
4	Explain stimulated emission using energy level diagram.	CO4	L2	3
5	Describe the principle of lasers.	CO4	L2	3
6	Discuss i) induce absorption ii) spontaneous and iii) stimulated emission processes.	CO4	L2	6
7	Explain the requisites of a laser system and condition for lasing action.	CO4	L2	6
8	Deduce an equation for energy density of radiation in terms of Einstein's coefficients.	CO4	L2	8
9	Describe the construction and working of CO_2 laser with an energy level diagram	CO4	L2	8
10	Describe the construction and working of semiconductor laser with an energy level diagram.	CO4	L2	8
	Optical Fibers			
1	Describe optical fiber and show its geometry.	CO4	L2	3

2	Discuss the reasons for attenuation in an optical fiber.	CO4	L2	3
3	Discuss the radiation loss in optical fiber.	CO4	L2	3
4	What is attenuation? Give the expression for attenuation.	CO4	L2	3
5	Identify the advantages and disadvantages of optical fiber communication.	CO4	L2	6
6	Derive an expression for Numerical aperture for propagation of light in an optical fiber.	CO4	L2	8
7	Explain the types of optical fibers.	CO4	L2	8
8	Discuss the types of attenuation.	CO4	L2	8
9	Explain fiber loss and mention the factors contributing to it.	CO4	L2	8

MODULE-5: Crystal Structures

SL. NO.	QUESTIONS	CO/s	RBT LEVEL	MARKS
1	Construct the steps to determine Miller indices.	CO5	L3	3
2	Discuss unit cell and mention its types.	CO5	L3	3
3	Discuss Atomic packing factor.	CO5	L3	3
4	Illustrate coordination number for SC, BCC and FCC.	CO5	L3	5
5	Discuss miller indices and write the procedure to find the miller indices.	CO5	L3	5
6	Discuss Atomic packing factor for BCC.	CO5	L3	5
7	Discuss Atomic packing factor for SC and FCC.	CO5	L3	6
1	Differentiate between SC, BCC and FCC.	CO5	L3	6
9	Discuss unit cell and explain its types using diagram.	CO5	L3	6
10	Express the inter planar spacing in terms of Miller indices.	CO5	L3	8
11	Discuss number of atoms per unit cell and coordination number.	CO5	L3	7
12	Illustrate 7 types of crystal systems.	CO5	L3	7
13	Derive an expression for Bragg's law of X-ray diffraction.	CO5	L3	8
14	Demonstrate Bragg's X-ray spectrometer with a neat diagram.	CO5	L3	8