Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1(S) Examinations May 2026 (2024 Scheme)

Course Code: GZPHT121

Course Name: PHYSICS FOR PHYSICAL SCIENCE AND LIFE SCIENCE

Max. Marks: 60 Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

		CO	Marks
1	What is stimulated emission? What are the factors affecting the rate of stimulated emission?	1	(3)
2	Compare step index and graded index fibers.	1	(3)
3	What are the necessary conditions for obtaining interference of light? Give one example of interference in daily life.	2	(3)
4	Distinguish between Fresnel and Fraunhofer classes of diffraction.	2	(3)
5	Explain the physical significance of a wave function in quantum mechanics.	3	(3)
6	Explain why electron cannot exist inside the nucleus of an atom on the basis of Heisenberg's uncertainty principle.	3	(3)
7	Distinguish between longitudinal and transverse waves with one example each.	4	(3)
8	What is piezoelectric effect? Draw the circuit diagram for the generation of ultrasonic waves using the piezoelectric effect.	4	(3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module-1

9	a)	Describe the construction and working of a ruby laser with a detailed diagram.	1	6
	b)	What is meant by pumping and why is it necessary in a laser?	1	3
10	a)	With a neat diagram, derive an expression for Numerical Aperture of a step index fibre.	1	6
	b)	Evaluate the numerical aperture and acceptance angle of a step index fibre with core of refractive index is 1.54 and cladding of refractive index is 1.49 when light is launched from air.	1	3

Module-2

11	a)	Explain the theory of formation of interference fringes in a parallel thin film under reflected light, with a neat diagram, and derive condition for minimum intensity.	2	6
	b)	In an air wedge, ,the fringes were 0.015 cm apart when observed with a light of wavelength 5770 Å. Calculate wedge angle in radian.	2	3
12	a)	What is a diffraction grating? Derive the grating equation for the diffraction maxima.	2	6
	b)	Light of wavelength 6000 Å is incident normally on a grating having 5000 lines/cm. Calculate the angular separation between 2^{nd} order and 3^{rd} order spectra.	2	3
		Module-3		
13	a)	Derive Time dependent Schrodinger equation.	3	6
	b)	Calculate de Broglie wavelength of an electron accelerated through 200 Volt. Assume charge of electron 1.6×10^{-19} C, mass of the electron $9.1\text{x}10^{-31}$ kg and $h=6.625\text{x}10^{-34}$ Js.	3	3
14	a)	Derive the general expression for energy eigen value of a particle confined in an infinite square well potential.	3	6
	b)	An electron is confined to one dimensional potential box of length 2 nm. Calculate the lowest permissible quantum energy of the electron. Assume mass of the electron $9.1\text{x}10^{-31}$ kg and $h=6.625\text{x}10^{-34}$ Js.	3	3
		Module-4		
15	a)	Formulate differential equation for a transverse wave on a stretched string and obtain the expression for fundamental frequency of the wave.	4	6
	b)	Calculate speed of transverse wave in a stretched string of length 2.5 m and mass 0.012 kg under a tension of 80 N.	4	3
16	a)	Explain any three factors affecting the acoustics of a building and give remedial methods for each factor mentioned.	4	6
	b)	The volume of a hall is 9000 m^3. The wall area is 500 m^2 and the floor area is 600 m^2. The average absorption coefficient of the hall is 0.225. Find reverberation time.	4	3

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