Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1,S2(S,FE) Examination May 2021(2015 Scheme)

Course Code: PH100

Course Name: ENGINEERING PHYSICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 2 marks. Marks

1	What is the effect of damping on the angular frequency and time period of an oscillator?	(2)
2	Define wavelength and frequency of a wave.	(2)
3	What is an interference filter?	(2)
4	What is Rayleigh's criterion for resolution?	(2)
5	Differentiate between circularly polarized light and elliptically polarized light.	(2)
6	What are Cooper pairs in superconductors?	(2)
7	State and explain Heisenberg's uncertainty principle	(2)
8	Even at very low temperatures, fermions do not condense into the lowest energy of the system. Why?	(2)
9	Distinguish between musical sound and noise.	(2)
10	What are ultrasonic waves ?Give any two properties of them	(2)
11	What is population inversion? Give its importance in laser.	(2)
12	What is photovoltaic effect?	(2)

PART B

Answer any 10 questions, each carries 4 marks.

13	Compare electrical and mechanical oscillators.	(4)
14	A rope of mass **0.55Kg** is stretched between two supports **30 m** apart. If the tension in the rope is **150N**. What time will a pulse take to travel from one support to the other?	(4)
15	Interference fringes are formed in a thin air wedge using sodium light of wavelength **5893Å**. When observed normally, **10** fringes are found in a distance of **1 cm**. Calculate angle of the wedge.	(4)

16 What is the highest order spectrum which may be seen with monochromatic light of wavelength **6000Å** by means of diffraction grating with **5000 lines/cm**? (4)

17 Define a half wave plate and deduce the expressions for the thickness of half wave plate made of positive and negative crystal materials. (4)

18 State and explain Meissner effect with the help of appropriate diagrams. Show that super conductors act as perfect diamagnetic substances. (4)

19 Obtain time dependent Schrodinger equation. (4)

20 What is Phase Space? Obtain the smallest volume of a cell in phasespace for a quantum system. (4)

21 The dimensions of an auditorium are **60m x 15m x10m** and its interior surfaces have an average absorption coefficient of **0.25**. Find the reverberation time of the auditorium. (4)

22 Explain any two methods of detection of ultrasonics. (4)

23 Explain the method of construction and re-construction of image in holography. (4)

24 An optical fibre has core of refractive index 1.5. The difference in refractive indices is 0.018. Calculate (i) refractive index of cladding (ii) acceptance angle and (iii) numerical aperture of the fibre. (4)

PART C

Answer any three questions, each carries 6 marks.

25 Write the differential equation of a Damped harmonic oscillator whose damping force is proportional to its velocity and obtain the solution for the same. (6)

26 Derive the necessary equation to determine refractive index of a liquid using Newton's rings. (6)

27 Explain the principle, construction and working of a Nicol Prism. (6)

28 a) Compare BE and FD statistics. (6)

b) Explain significance of Fermi energy.

PART D

Answer any three questions, each carries 6 marks.

29 Define reverberation and reverberation time. What is the significance of reverberation time? Compare reverberation and echo. (6)

30 Explain how sound navigation and ranging is done using ultrasonic waves. (6)

An ultrasonic wave of frequency **0.1 MHz** is sent towards the seabed returns

after **0.6 s**. Calculate the depth of the sea. Velocity of sound in sea water is **1800 m/s**.

Give any two applications of ultrasonic waves in medical field.

31 What are Einstein's coefficients? Using Einstein's coefficients show that at normal conditions rate of spontaneous emission is predominant. What are the conditions required to increase stimulated emission? (6)

32 What are fibre optic sensors? Explain the working of intensity modulated sensor. (6)

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