

**Total Pages: 2**

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

**Course Code: PH100**

**Course Name: ENGINEERING PHYSICS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 2 marks.*

- 1 Define resonance. Give one practical example of resonance.
- 2 State the laws of transverse vibrations of a stretched string.
- 3 Distinguish between geometrical path and optical path.
- 4 Explain Rayleigh's criterion for the resolution of spectral lines.
- 5 Distinguish between plane polarized light and un-polarized light.
- 6 Show that superconductors are perfect diamagnets.
- 7 What is the physical significance of wave function?
- 8 What is Fermi energy?
- 9 What is the relation connecting reverberation time and total absorption?
- 10 What is meant by non-destructive testing of materials?
- 11 Distinguish between spontaneous and stimulated emission.
- 12 What is the physical meaning of numerical aperture?

**PART B**

*Answer any 10 questions, each carries 4 marks.*

- 13 Compare a mechanical oscillator with an electrical oscillator.
- 14 Derive the differential equation of one dimensional wave and deduce its solution.
- 15 Newton's rings are observed in the reflected light of wavelength  $5900 \text{ \AA}$ . The diameter of tenth dark ring is 0.5 cm. Find the radius of curvature of the lens used.
- 16 Light of wavelength  $5000 \text{ \AA}$  is incident normally on a plane transmission grating. Find the difference in the angle of deviation in the first and third order spectra. The number of lines per cm on the grating surface is 6000.
- 17 What is the principle of the working of a Nicol prism. Describe the method of construction of a Nicol prism.
- 18 Mention four important applications of super conductors.
- 19 Derive Schrodinger's time dependent equation for a particle.
- 20 What is phase space? Show that the volume of the unit cell in phase space of quantum state is  $h^3$ .
- 21 The dimensions of an auditorium are 60m X 15m X 10M and its interior surface have an average absorption co-efficient of 0.25. Find the reverberation time of the auditorium?

- 22 An ultrasonic source of 0.09 MHz sends down a pulse towards the sea bed which returns after 0.55 sec. The velocity of sound in sea water is 1800 m/sec. Calculate the depth of the sea and the wave length of the pulse.
- 23 Explain the recording and reconstruction of hologram.
- 24 Calculate the numerical aperture and acceptance angle of a fibre with a core index of 1.54 and a cladding index of 1.50 when the fibre is inside water of refractive index 1.33.

### PART C

*Answer any three questions, each carries 6 marks.*

- 25 Write down the differential equation of a damped harmonic oscillator and obtain its solution. Show graphically the displacement –time curve for over damped, critically damped and under damped cases of a harmonic oscillator. Mention the conditions of their occurrence.
- 26 Derive an expression for the diameter of a thin wire in air wedge experiment.
- 27 Distinguish between Type I and Type II superconductors with suitable diagrams and examples.
- 28 Write down the Schrodinger equation for a particle in a one-dimensional infinite potential well. Also derive the equation for wave function and energy.

### PART C

*Answer any three questions. Each question carries 6 marks*

- 29 Explain the production of ultrasonic waves using a piezo electric oscillator with the help of a neat labelled circuit diagram.
- 30 What are the factors affecting acoustics of buildings? Give remedies.
- 31 Explain the principle, construction and working of Helium-Neon laser with the help of energy level diagram.
- 32 What is an LED? Explain the construction and working of LED. Give two applications.

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