

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

**Course Code: PH100**

**Course Name: ENGINEERING PHYSICS**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions. Each question carries 2 marks*

Marks

- |    |   |     |
|----|---|-----|
| 1  | What is meant by amplitude resonance? Give any two examples.                              | (2) |
| 2  | Define frequency and wavelength of a wave.  | (2) |
| 3  | What are non reflecting films?  | (2) |
| 4  | Compare interference and diffraction of light.  | (2) |
| 5  | What is Kerr effect? Give the equation.   | (2) |
| 6  | Write down four important applications of Super conductors.                               | (2) |
| 7  | What is tunnelling effect?  | (2) |
| 8  | Define phase space.   | (2) |
| 9  | Define intensity of sound .Give the values of threshold of hearing and threshold of pain. | (2) |
| 10 | What is meant by non destructive testing (NDT)? Name an NDT technique?                    | (2) |
| 11 | Define the terms population inversion and meta stable level.                              | (2) |
| 12 | What is an LED? Give its working principle.   | (2) |

**PART B**

*Answer any 10 questions. Each question carries 4 marks*

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|----|---|-----|
| 13 | The frequency of a tuning fork is 250 Hz and its Q-factor is $4 \times 10^4$ . Find the relaxation time. Also calculate the time after which its energy becomes $1/10$ of its initial undamped value.                               | (4) |
| 14 | a Obtain the differential equation of the oscillation of an electric circuit.   | (2) |
|    | b Compare it with mechanical oscillator.  | (2) |
| 15 | a What is Rayleigh's criterion for spectral resolution?   | (2) |
|    | b Obtain the expression for resolving power of a plane transmission grating.  | (2) |
| 16 | What is the higher order spectrum which may be obtained with a light of wavelength $5500 \text{ \AA}$ using a plane transmission grating having 4500 lines per cm.  | (4) |
| 17 | The refractive indices of Quartz for light of wavelength $5890 \text{ \AA}$ are 1.5539 for ordinary ray and 1.5634 for extra ordinary ray. Calculate the required thickness of the Quartz crystal for making a) a QWP and b) a HWP. | (4) |
| 18 | a What is Meissner effect?  | (2) |
|    | b What are Type I and Type II Superconductors (any two points)?   | (2) |
| 19 | a What are the important postulates of Bose-Einstein Statistics?  | (3) |
|    | b Write down the distribution equation of BE Statistics.  | (1) |
| 20 | State Uncertainty principle. Using this principle calculate the uncertainty in frequency of the emitted radiation if the uncertainty in time of an excited atom is  | (4) |

$5 \times 10^{-8}$  s.

- 21 The volume of a hall is  $6000 \text{ m}^3$ . It has a total absorption of  $150 \text{ m}^2$  sabin. If the hall is filled with audience who add another  $80 \text{ m}^2$  sabin, find the difference in reverberation time. (4)
- 22 An ultrasonic source of  $0.085 \text{ MHz}$  sends down a pulse towards the sea water which returns after  $0.6$  sec. The velocity of sound in water is  $1800 \text{ m/s}$ . Calculate the depth of the sea and wavelength of pulse. (4)
- 23 With the help of a diagram explain how a hologram is recorded? (4)
- 24 Give any four advantages of optical fibre over conventional transmission lines? (4)

### PART C

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

- 25 Considering transverse vibrations of a stretched string derive one dimensional wave equation. (6)
- 26 a Draw the neat diagram of air wedge experiment. (2)  
b Derive an expression for the bandwidth of the interference fringes using this arrangement. (4)
- 27 Given two Nicol prisms and a Quarter wave plate. How can we produce and analyse plane, circularly and elliptically polarized light. (6)
- 28 Starting from the time dependent equation, derive Schrodinger's time independent wave equation. (6)

### PART D

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

- 29 Define Reverberation and Reverberation time. (6)  
What is the significance of Reverberation time? Compare Reverberation and Echo.
- 30 a What is inverse piezoelectric effect? (2)  
b Describe the method of producing ultrasonic waves using this effect. (4)
- 31 a Draw the energy level diagram and explain the working of He-Ne laser. (5)  
b What are the important applications of He-Ne Laser? (1)
- 32 a Define numerical aperture and fibre acceptance angle of an optic fibre. (2)  
b Derive an expression for numerical aperture (NA) of a step index fibre. (4)

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