

10051



**B**

Reg. No. : .....

Name : .....

SECOND SEMESTER B.TECH. DEGREE EXAMINATION, MAY/JUNE 2016

**PH 100 : ENGINEERING PHYSICS**

Max. Marks : 100

Duration : 3 Hours

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Distinguish between free oscillation and damped oscillation.
2. State the laws of transverse vibrations of a stretched string.
3. What do you mean by optical path ?
4. What is grating element ? Write the grating equation in terms of grating element.
5. What is a Retardation plate ? Write the expression for the thickness of a QWP and HWP.
6. What is DC Josephson effect ?
7. How do you account for the natural line broadening on the basis of Heisenberg's Uncertainty principle ?
8. What do you mean by Fermi energy level and Fermi energy ?
9. Distinguish between reverberation and echo.
10. How ultrasonic waves are detected by thermal method ?
11. How population inversion is achieved in Ruby laser ?
12. Explain the principle of propagation of light through an optical fibre. (12×2=24)



## PART – B

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

13. What are the conditions for oscillations of a harmonic oscillator to be over damped, critically damped and under damped ? Compare the time – displacement curve in the three cases.
14. A piece of wire 50 cm long is stretched by a load of 2.5 kg and has a mass of 1.44 g. Find the frequency of the second harmonic.
15. Light of wave length 6000 Å falls normally on two glass plates enclosing a wedge shaped film. The plates touch at one end and are separated at 10 cm from that end by a wire. If the bandwidth of the interference pattern is 0.05 mm, find the diameter of the wire.
16. Light of wave length 589.3 nm is incident normally on a plane transmission grating having 6000 lines/cm. Calculate the angle at which the principal maxima of the first order is formed.
17. How do you distinguish circularly polarized light from un polarized light ?
18. Write any four applications of superconductors.
19. What are the conditions to be satisfied by a wave function ?
20. What is phase space ? With the help of Heisenberg's Uncertainty relation, show that the minimum size of the unit cell in quantum statistics is  $hf$ , where  $h$  is the Planck's constant and  $f$  is the degree of freedom of the system.
21. The dimensions of an auditorium are 60 m × 15 m × 10 m and its interior surfaces have an average absorption co-efficient of 0.25. Find the reverberation time of the auditorium.
22. Given that the velocity of ultrasonic waves in sea water is equal to 1440 m/s. Find the depth of a submerged submarine, if ultrasonic pulses reflected from the submarine is received 0.33 s after sending ultrasonic waves.
23. With the help of a neat diagram explain how a hologram is recorded.
24. A fibre cable has an acceptance angle of  $30^\circ$  and a core of refractive index 1.4. Calculate the refractive index of the cladding.



PART – C

Answer **any 3** questions. **Each** question carries **6** marks.

- 25. Write the differential equation of a forced harmonic oscillator and write its solution. Derive the expression for the amplitude and phase difference in terms of the natural frequency of the body and frequency of applied periodic force.
- 26. Derive the expression for the diameter of the  $n^{\text{th}}$  dark ring in Newton's ring interference pattern. With necessary equations explain briefly the experimental procedure to determine the refractive index of a liquid.
- 27. With the help of a neat diagram of the principal section of a nicol prism write how it produces plane polarized light and how it can be used for the analysis of plane polarized light ?
- 28. Compare M-B, B-E and F-D statistics. (3x6=18)

Answer **any 3** questions. **Each** question carries **6** marks.

- 29. What are ultrasonic waves ? Write the principle of production of ultrasonic waves by magnetostriction effect. Draw the circuit diagram of the magnetostriction oscillator. Write any two applications of ultrasonic waves.
  - 30. Define intensity of sound wave. Write the expression for the SIL in dB scale. Distinguish between threshold minimum intensity and threshold pain intensity.
  - 31. "Lasing medium with metastable state, optical resonator, and pumping mechanism are the essential requirements of a laser". How it is satisfied in He-Ne laser ?
  - 32. With a block diagram explain fibre optic communication system. (3x6 =18)
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