TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Model Question

Exam	Regular		
Level	B.E.	Full Marks	80
Programme	All	Pass Marks	32
Year / Part	I / I	Time	3 hrs

Subject: Physics

Attempt ALL questions .Each question carries equal mark.

1. Define physical pendulum show that point of Suspension and point of oscillation are interchangeable.

OR

Define damped harmonic oscillator; find time period and frequency for under damping oscillation.

2. Define interference. Show that interference in thin film due to reflected and transmitted light are complementary.

OR

What is double refraction? Obtain the mathematical relation for linearly, circularly and elliptically polarized light.

3. Define diffraction. Derive the intensity distribution pattern of single slit due to diffraction.

4. What is the importance of laser? Discuss the laser action of He-Ne laser with labeled diagram.

5. The maximum Pressure Variation that the car can tolerate in loud Sound is about 20 N/m^2. If normal atmospheric pressure is about 10^5 Pascal what is the corresponding maximum displacement for sound wave in air of frequency 1000Hz. (density of air 1.3 $kg/m^3$and velocity of sound in air is 343 m/sec).

6. Two thin converging lenses of focal length 20 cm and 40 cm respectively are placed Coaxially 10 cm apart. An object is located at a distance 48 cm from the first lens. Find (a) Position of image (b) Position of principal point and (c) position of focal points.

7. Light is incident normally on a grating 0.5 cm wide having 2500 lines? Find the angle of diffraction for the principal maxima of two sodium line in first order spectrum. (λ_1 = 5890 Å, λ_2 = 5896Å). Are the two lines resolved?

8. A circuit has L = 10mH and C = 1μF, How much resistance must be inserted in the circuit to reduce the (undampeped) resonance frequency by 0.01%?

9. Design an electric- quadrupole. Derive the electric field intensity at point on the axial line of the quadrupole.

OR

Derive an expression for the potential at any point due to an electric dipole.

10. An air filled parallel plates Capacitor has a Capacitance of 1.3 pF. The separation of the plates is doubled and wax is inserted between them. The new Capacitance is 2.6 pF. Find the dielectric constant of the wax.

11. Define resistivity. Discuss Atomic view of resistivity and show that $\sigma = m/ne^2\tau$. Where symbols carry to their usual meaning.

12. What is the magnitude of magnetic field needed to be accelerated in the cyclotron? ($m_d = 3.34 \times 10^{-27}$kg)

13. State & explain Hall Effect. Derive an expression for Hall coefficient for an Electron.

14. A circular loop of wire 10 cm in radius carries a current 100 Amp. What is the energy density at the center of the loop?

15. Prove that the speed of electromagnetic wave is equal to velocity of light in free space.

16. Derive an expression for one dimensional time independent Schrodinger wave equation.

OR

Define tunneling effect and derive the expression for transmission coefficient for a barrier of width a and potential of height V_0.