TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2080 Baishakh

Exam.	Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BEI, BCT, BAM, BIE, BAG, BAS	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

Subject: - Engineering Physics (*SH 402*)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is torsional pendulum? Derive an expression for modulus of rigidity of a wire by using torsional pendulum. [1+4]

OR

Define damping force. Derive differential equation of damped harmonic motion and write its plane solution. Also explain the conditions for under damping, critical damping and over damping with sketch. [1+2+2]

2. An oscillating LC circuit consists of a 75 mH inductor and a 3.6 μF capacitor. If the maximum charge on the capacitor is 2.9 μC. What are the total energy circuit and the maximum current? [2.5+2.5]
3. The reverberation time for empty hall is 1.5 sec with 500 audiences in the hall, the reverberation time falls 1.4 sec. Find the number of persons present in the hall if the reverberation time falls down to 1.312 sec. [5]
4. Two thin converging lens each of focal length 0.15 m and 0.2 m are 0.10 m apart. An object id placed at a distance 0.24 m from the first lens. Find the positions of focal points and position and nature of image. [2+3]
5. What is interference of light? Give the necessary theory to obtain relation for path difference in the interference due to reflected light in thin film. [1+4]

OR

Show that the intensity of second order maxima is 1.62% of central maxima in Fraunhoffer" Single slit diffraction. [5]

6. What is double refraction? Explain the construction and working of Nicol prism. [1+4]
7. In a Newton's ring arrangement source emitting two wavelengths λ_1 = 6000Å and λ_2 = 5900Å is used. It is found that n^{th} dark ring due to wavelength λ_1 coincides with $(n+1)^{th}$ dark ring due to λ_2. Find the diameter of nth dark ring if the radius of curvature of lens is 90 cm. [5]
8. Draw a well labeled He-Ne Laser and its energy level diagram and explain briefly its working principle. How can it be used in scientific technology? [1+1+2+1]
9. What is quadrupole moment? Prove that the Electric field intensity on its axial line due to quadrupole varies inversely with the fourth power of distance. [1+4]

OR

Define an electric dipole. Discuss the behavior of dipole in electric field. Mention the condition for maximum torque and maximum potential energy in the electric field. [1+4]

10. Explain the term "continuous charge distribution". Derive an expression for electric intensity due to ring of uniformly distributed charge. [1+4]

11. Derive an expression for growth and decay of charges in RC series circuits. Also, show the variation of charge and current with time graphically. [4+1]

12. A copper wire has cross-sectional area $3.31 \times 10^{-6} m^2$ and carries a current of 5 A. What is the drift speed of the electrons? (density of Copper = 8.95 $gmcm^{-3}$ and Avogadro's number = 6.02×10^{23} mol^{-1}, Molar mass of copper = 64 gm) [5]

13. What is Hall mobility? Explain how will you determine the carrier charge density and sign of charge carrier from Hall experiment. [1+4]

OR

What is self inductance? Derive an expression for self inductance per unit length of a solenoid and hence prove that magnetic energy is proportional to square of magnetic field. [1+4]

14. A long coil consisting of 100 turns with diameter 100 cm carries a current of 5 A. Find the magnetic field at a point along the axis 100 cm form the center. [5]

15. Write Maxwell Equation in integral form and convert into differential form. [5]

16. An electron with kinetic energy 5 eV is incident on a barrier of height 10 eV and weidth 0.25 nm. Calculate the probability that an electron (a) will tunnel through the barrier? and (b) will be reflected? [4+1]

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