

TILOTTAMA SECONDARY SCHOOL

Assignment-2077

Class : 12

Subject: Physics

F.M. : 75

P.M : 27

**Group A**

1. **Attempt any four questions :** [2×4=8]
  - a. Will the drift velocity of electrons change if the diameter of connecting wire is halved?
  - b. Why do we prefer potentiometer to measure emf of cell rather than a voltmeter?
  - c. Why does a current carrying solenoid tend to contract?
  - d. The vertical and horizontal components of Earth's magnetic field at a place are equal. What is the angle of dip at the place?
  - e. Can a transformer be used with D.C?
  - f. Why is a choke coil preferable to resistor in an A.C circuit?
2. **Attempt any four questions :** [2×4=8]
  - a. Why are alkali metals suitable for photoelectric emission?
  - b. An electron and proton have same kinetic energy. Which of the two has greater de Broglie wavelength?
  - c. What is nanotechnology? Explain in brief.
  - d. Why is hydroelectricity more preferable than fossil fuel energy?
  - e. Two nuclei have mass number in the ratio 1:2. What is the ratio of their nuclear densities?
  - f. What are quarks? Write the quark composition of a neutron.
3. **Attempt any one question :** [2×1=2]
  - a. Although the density of solid is high, the velocity of sound is greater in solids. Why?
  - b. What are fundamental note, harmonics and overtones?
4. **Attempt any one question :** [2×1=2]

- a. Can we obtain interference pattern if two coherent sources are separated by a distance less than the wavelength of light?
- b. When an ordinary beam of light is polarized, does its intensity vary?

**Group B**

5. **Attempt any three questions:** [4×3=12]
  - a. Discuss the mechanism of metallic conduction. Derive a relation between current and drift velocity of electrons in the conductor.
  - b. State Faraday's law of electrolysis. How will you verify faraday's second law experimentally?
  - c. State and explain Biot-savart law. Use this law to find the magnetic field intensity at a point due to long straight current carrying conductor?
  - d. An a.c passes through a circuit containing a resistor and inductor in series. Derive an expression for the impedance of the circuit.
6. **Attempt any three questions :** [4×3=12]
  - a. Describe J.J Thomson experiment to determine specific charge of electron?
  - b. What is avalanche effect and Zener effect? Describe with necessary theory the use of Zener diode as voltage regulator.
  - c. What is LASER? Describe the working of He-Ne LASER.
  - d. State the laws of radioactive disintegration and derive decay equation.
7. **Attempt any one question :** [4×1=4]
  - a. What is the principle of superposition of waves? Discuss how stationary waves are formed and hence derive stationary wave equation.

b. What is Doppler's effect in sound? Obtain an expression for the apparent frequency when both the source and observer are moving away from each other.

8. **Attempt any one question :** [4×1=4]

- State and explain Huygen's principle and use it to verify the laws of refraction of light.
- What is diffraction of light? Discuss Fraunhofer's diffraction of light at a single slit.

### Group c

9. **Attempt any two questions :** [4×2=8]

- A battery of emf 1.5 V has a terminal P.d of 1.25 V when a resistor of 25 ohm is joined to it. Calculate the current flowing, internal resistance and terminal P.d when a resistance of 10 ohm replaces 25 ohm resistor.
- What is the maximum torque acting on a galvanometer coil of 50 turns and dimensions 5 cm×2 cm carrying current of 1 mA is placed in a magnetic field of flux density 0.01 T?
- A long solenoid of 1000 turns and cross section area  $2 \times 10^{-3} \text{ m}^2$  carries a current of 2A and produces a flux density  $52 \times 10^{-3} \text{ T}$  inside it. Calculate the self inductance of the coil.

10. **Attempt any two questions :** [4×2=8]

- Light of wavelength 600 nm falls on a photosensitive plate of workfunction 1.9 eV. Find the speed and kinetic energy of emitted photoelectrons. [ $h = 6.62 \times 10^{-34} \text{ JS}$ , mass of electron =  $9.1 \times 10^{-31} \text{ kg}$ , charge of electron =  $1.6 \times 10^{-19} \text{ C}$ ]
- Find the wavelength of first line of Balmer series, if the wavelength of second line of this series is  $4.86 \times 10^{-7} \text{ m}$ .
- The energy liberated in the fission of  $\text{U}^{235}$  is  $3.2 \times 10^{-11} \text{ J}$ . Calculate the power production corresponding to the

fission of 1 gm of Uranium per day. [Avogadro's constant =  $6 \times 10^{23} \text{ mol}^{-1}$ ].

- A piano string 1.5 m long is made of steel of density  $7800 \text{ kgm}^{-3}$  and young's modulus  $2 \times 10^{11} \text{ N/m}^2$ . It is maintained at a tension which produces an elastic strain of 1% in the string. Calculate the frequency of transverse vibration of string when it is vibrating in third mode of vibration. 4
- In Young's double slit experiment, the separation of four bright fringes is 2.5 mm, when the wavelength used is  $6.2 \times 10^{-7} \text{ m}$ . The distance from the slits to the screen is 0.8 m. Calculate the separation of two slits. 3