

# Physics – XII

## SET – I

1. Answer, in brief, **any four** questions: [4×2=8]
  - a. Why do we prefer a potentiometer to measure emf of a cell rather than a voltmeter?
  - b. The conductivity of an electrolyte is very low as compared to a metal at room temperature. Why?
  - c. What is retentivity and coercivity of a ferromagnetic material?
  - d. If the number of turns of a solenoid is doubled, keeping the other factors constant, how does the self inductance of the solenoid change?
  - e. A transformer gets heated up while in use. Why?
  - f. Can a charge particle move through a magnetic field without experiencing any force? Explain.
2. Answer, in brief, **any four** questions: [4×2=8]
  - a. If we go on increasing the wavelength of light incident on a metal surface, what changes take place in the number of electrons and energy of the electrons?
  - b. What are logic gates? Give a truth table for a two input NOR gate.
  - c. Even if a hydrogen atom contains an electron, its spectrum consists of a large number of lines. Explain how?
  - d. Write quark composition of proton and neutron.
  - e. A nucleus contains no electrons, yet it ejects them. Explain.
  - f. What do you mean by global warming?
3. Answer, in brief, **any one** question: [2]
  - A. Whistle of an approaching train is shriller, why?
  - b. When sound waves travel through a medium, does the temperature at various points remain constant? Explain.
4. Answer, in brief, **any one** question: [2]
  - a. Distinguish between wave fronts and wavelets.
  - b. Define polarizing angle. How is it related with the refractive index of the medium?

5. Answer **any three** questions: [3×4=12]
- Define drift velocity of electrons. Establish a relation between drift velocity of electrons and current density in the conductor.
  - State principle of Meter Bridge. Describe how it is used to determine the resistance of a wire.
  - Derive an expression for the force per unit length acting on each of the two straight parallel metallic conductors carrying current in the same direction and kept near each other. Why do such current carrying conductors attract each other?
  - What is Lenz's law? Deduce an expression for the emf induced in a straight conductor moving in a uniform magnetic field.
6. Answer **any three** questions: [3×4=12]
- Describe with necessary theory Thomson's method to determine specific charge of an electron.
  - What is an extrinsic semiconductor? Explain the formation of potential barrier and depletion region in a p-n junction.
  - Discuss four important properties of nuclei.
  - What are renewable and non renewable sources of energy? Write with examples. Describe the necessity of conservation of natural resources of energy to reduce energy crisis in the future.
7. Answer **any one** question: [4]
- What is a wave motion? Derive progressive wave equation in a medium.
  - Describe sound wave as a pressure wave and deduce an expression for the pressure amplitude.
8. Answer **any one** question: [4]
- What are coherent sources? Derive an expression for the fringe width in Young's double slit experiment.
  - Define Fraunhofer diffraction. How is transmission grating constructed? Describe necessary theory of diffraction grating.

### Group 'C'

9. Answer **any two** questions: [2×4=8]
- The resistance of a galvanometer coil is  $9.36\Omega$ , and the current required for full scale deflection is  $0.0224\text{A}$ . We want to convert this galvanometer to an ammeter reading  $20\text{A}$  full scale. The only shunt available has a resistance of  $0.025\Omega$ . What resistance must be connected in series with the coil?

- b. A horizontal wire, of length 5cm and carrying a current of 2A, is placed in the middle of a long solenoid at right angles to its axis. The solenoid has 1000 turns per meter and carries a steady current I. calculate I if the force on the wire is equal to  $10^{-4}\text{N}$ . ( $\mu_0 = 4\pi \times 10^{-7}\text{Hm}^{-1}$ ).
- c. A coil having inductance and resistance is connected to an oscillator giving a fixed sinusoidal output voltage of 5Vrms. With the oscillator set at a frequency of 50Hz, the rms current in the coil is 1A and at a frequency of 100Hz, the rms current is 0.625A. Determine the inductance of the coil.

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

- a. The work function for the surface of aluminum is 4.2eV. How much potential difference will be required to stop the emission of maximum energy electrons emitted by light of wavelength 2000Å? (Plank's constant,  $h = 6.6 \times 10^{-34}\text{JS}$ )
- b. A X-ray tube works at a dc potential difference of 50kV. Only 0.4% of the energy of the cathode rays is converted into  $\alpha$ -rays and heat is generated in the target at the rate of 600 watt. Estimate the current passed into the tube and the velocity of the electrons striking the target. (Mass of electron =  $9 \times 10^{-31}\text{kg}$ , charge of electron =  $1.6 \times 10^{-19}\text{C}$ )
- c. After a certain lapse of time, the fraction of radioactive polonium undecayed is found to be 12.5% of the initial quantity. What is the duration of this time lapse if half life of polonium is 139 days?

11. A wire with mass 40g is stretched so that its ends are tied down at points 80cm apart. The wire vibrates in its fundamental mode with frequency 60Hz. Calculate the speed of propagation of transverse waves in the wire and the tension in the wire. [4]

12. A beam of light after reflection at a plane mirror, rotating 2000 times per minute, passes to a distant reflector. It returns to the rotating mirror from which it is reflected to make an angle of  $1^\circ$  with its original direction. If the distance between the mirrors is 6250m, calculate the velocity of light. [3]

## SET - II

1. Answer, in brief, **any four** questions: [4×2=8]
  - a. Resistors  $R_1$  and  $R_2$  are connected in series to an emf source that has negligible internal resistance. What happens to the current through  $R_1$  when a third resistor  $R_3$  is connected in parallel with  $R_2$ ?
  - b. Draw a circuit diagram of Meter Bridge to determine the resistance of a wire. Give the formula used.
  - c. Does a charged particle moving through a magnetic field always experience a force? Explain.
  - d. Define angle of dip. What will be its value at a place where the horizontal and vertical components of earth's magnetic field are equal?
  - e. Why does acceleration of a magnet falling through a long solenoid decrease?
  - f. What is wattless current?
2. Answer, in brief, **any four** questions: [4×2=8]
  - a. The output of two-input AND gate is fed to a NOT gate. Draw the logic circuit of the combination of gates. Write down its truth table.
  - b. What is optical pumping in the production of laser?
  - c. All the nuclei have nearly the same density. Justify.
  - d. How do the mass number and atomic number of a radioactive element change in an  $\alpha$ -decay?
  - e. State Hubble's law and write its significance.
  - f. What is acid rain? Explain.
3. Answer, in brief, **any one** question: [2]
  - a. Distinguish between progressive waves and standing waves.
  - b. If the pressure amplitude of a sound wave is halved, by what factor does the intensity of the wave change?
4. Answer, in brief, **any one** question: [2]
  - a. Does the interference of light waves obey the law of conservation of energy? Explain.
  - b. What is polarized light? How is it represented?

### Group 'B'

5. Answer **any three** questions: [3×4=12]
- What is thermoelectric effect? How does the thermoe.m.f. of a thermocouple vary with increase in temperature of hot junction, keeping cold junction at 0°C? Explain.
  - Describe an experiment to verify Joule's Law of heating.
  - State and explain Biot-Savart law. Use this law to find the magnetic field due to a long straight current carrying conductor.
  - An alternating current passes through a circuit containing a resistor, a capacitor and an inductor in series. Derive an expression for the phase relation between the current and the voltage.
6. Answer **any three** questions: [3×4=12]
- Define photoelectric effect. Discuss Einstein's photoelectric equation. What is meant by stopping potential?
  - Explain the use of a p-n junction diode as a rectifier. Draw the circuit diagram of a full wave rectifier using diodes and explain its working.
  - State Bohr's postulates of hydrogen atom and use them to calculate the radius of  $n^{\text{th}}$  orbit of the hydrogen atom.
  - State the laws of radioactive disintegration. Derive a relation between the half life and decay constant of a radioactive substance.
7. Answer **any one** question: [4]
- Write down the Newton's formula for the velocity of sound in air. Explain why this formula has to be modified. Discuss Laplace's correction on it.
  - What is end correction of a pipe? Describe the different modes of vibration of air column in an organ pipe closed at one end.
8. Answer **any one** question: [4]
- State and explain Huygen's principle. Derive the laws of reflection on the basis of this principle.
  - Discuss the formation of maxima and minima due to Fraunhofer diffraction at a single slit.

### Group 'C'

9. Answer **any two** questions: [2×4=8]
- A battery of 6V and internal resistance  $0.5\Omega$  is joined in parallel with another of 10V and internal resistance  $1\Omega$ . The combination sends a current through an external resistance of  $12\Omega$ . Find the current through each battery.
  - The coil of a moving coil galvanometer has 50 turns and its resistance is  $10\Omega$ . It is replaced by a coil having 100 turns and resistance  $50\Omega$ . Find the factor by which the current and voltage sensitivities change.
  - A long solenoid of 1000 turns and cross sectional area  $2\times 10^{-3}\text{m}^2$  carries a current of 2A and produces a flux density  $50\times 10^{-3}\text{T}$  inside it. Calculate the self inductance of the coil.
10. Answer **any two** questions: [2×4=8]
- In a Millikan's oil drop experiment, a drop is observed to fall with a terminal speed  $1.4\text{mm/s}$  in the absence of electric field. When a vertical electric field of  $4.9\times 10^5\text{V/m}$  is applied, the droplet is observed to continue to move downward at a lower terminal speed  $1.21\text{mm/s}$ . Calculate the charge on the drop. (Density of oil =  $750\text{kg/m}^3$ , viscosity of air =  $1.81\times 10^{-5}\text{kg/ms}$ , density of air =  $1.29\text{kg/m}^3$ )
  - A X-ray tube works at a dc potential difference of 50kV. Only 0.4% of the energy of the cathode rays is converted into  $\alpha$ -rays and heat is generated in the target at the rate of 500 watt. Estimate the current passed into the tube and the velocity of the electrons striking the target. (Mass of electron =  $9\times 10^{-31}\text{kg}$ , charge of electron =  $1.6\times 10^{-19}\text{C}$ )
  - The energy liberated in the fission of single Uranium-235 atom is  $3.2\times 10^{-11}\text{J}$ . Calculate the power production corresponding to the fission of 1gram of uranium per day. (Avogadro constant =  $6\times 10^{23}\text{mol}^{-1}$ )
11. A stationary motion detector sends sound waves of 150KHz towards a truck approaching at a speed of 120km/hr. What is the frequency of wave reflected back to detector? (Velocity of sound in air =  $340\text{m/s}$ ) [4]
12. In Young's double slit experiment, the slits are 0.03 cm apart and the screen is placed 1.5m away. The distance between the central bright fringe and fourth bright fringe is 1cm. Calculate the wave length of light used. [3]

1. Answer, in brief, any four questions:
  - a) Will the drift velocity of electrons change if the diameter of a connecting wire is halved? Why?
  - b) Five bulbs are connected in series across 220 volt line. If one bulb is fused, the remaining bulbs are again connected across the same line. Which one of the arrangements will be more illuminated? Justify your answer.
  - c) How can the sensitivity of moving coil galvanometer be increased? Explain.
  - d) Point out the difference between Peltier and Seebeck effect in brief.
  - e) State the Faraday's laws of electrolysis.
  - f) How can a galvanometer be converted into voltmeter? Explain.
  
2. Answer, in brief, any four questions:
  - a) The accelerating voltage of a proton is increased to twice. How will its de Broglie wavelength change? Explain.
  - b) How does the conductivity of semiconductor Vary with temperature? Explain.
  - c) Define atomic mass unit (amu). Hence convert the mass of a neutron, (1840  $m_e$ ), into amu where  $m_e$  is the mass of an electron'.
  - d) Can X-ray diffraction experiment be performed by an ordinary grating? Why?
  - e) State and explain Hubble's law.
  - f) What class of quark combination one can expect in the combination of one quark and a lepton. Explain with example.
  
3. Answer, in brief, any one question:
  - a) By what factor does the velocity of transverse wave in the string change when the tension in the stretched string is increased by four times.

- b) The velocity of sound in solid is generally greater than that in gas at STP. Why? Give reason.
4. Answer, in brief, any one question:
- Two waves are represented in usual notation as  $y_1 = a_1 \sin \omega t$  and  $y_2 = a_2 \cos \omega t$ . Their intensities are  $I_1$  and  $I_2$ . What would be the ratio of their amplitudes when  $I_1 = 2I_2$ ?
  - Are light waves longitudinal? Justify your answer?
5. Answer any three questions:
- State and apply Kirchoff's rule of electrical circuits to measure the unknown resistance of a wire by metrebridge with necessary theory and circuit.
  - Relate magnetic permeability and susceptibility features of a magnetic material. Can hysteresis curve be drawn in the case of diamagnetic material? Explain on the basis of above features.
  - State Ampere's law and deduce an expression for the force between two parallel current carrying wires.
  - What is Hall effect? Explain and deduce expressions for Hall voltage and Hall electric field.
6. Answer any three questions:
- Explain photoelectric effect to write Einstein's photoelectric equation. Describe Millikan's laboratory method to determine Planck's constant.
  - How are intrinsic and extrinsic semiconductors conceptualized? Explain the biasing characteristics of a junction diode.
  - Write down the representative nuclear fission and fusion reactions. Explain, how the energy release in the case of four protons fused into doubly ionized helium can be estimated?
  - Explain the working principle of a gas laser. How is population inversion achieved for lasing action?



7. Answer any one question:
- How are beats formed when two waves are superimposed? Deduce expression for the frequency of beats so formed.
  - What correction was made in Newton's expression for the velocity of sound? Also explain how change of temperature and pressure affect the velocity of sound.
8. Answer any one question:
- What are coherent sources of light? Describe double slit experiment to find the fringe width from the experiment performed with light waves.
  - Describe Huygens's principle with figure to prove the laws of reflection and refraction of light.
9. Answer any two questions:
- A straight conductor of length 15 cm is moving with uniform speed of  $10 \text{ ms}^{-1}$  making an angle of  $30^\circ$  with uniform magnetic field of  $10^{-4} \text{ Tesla}$ . Calculate the emf induced across the length.
  - L-C-R alternating current series circuit of  $L = 1 \text{ H}$ ,  $C = 1 \mu\text{F}$  and  $R = 100 \Omega$  are connected in series with a source of frequency 50 Hz. What is the phase shift between current and voltage?
  - Resistance of a wire of length 1 m, diameter 1 mm is  $2.2 \Omega$ . Calculate its resistivity and conductivity.
10. Answer any two questions:
- Half life of  $\text{Ra}^{226}$  is 1620 years. Estimate its mass when its activity is 0.5 Curie.
  - An electron having 500 eV energy enters at right angle to a uniform magnetic field of  $10^{-4} \text{ Tesla}$ . If its specific charge is  $1.75 \times 10^{11} \text{ C kg}^{-1}$  calculate the radius of its circular orbit.
  - The first member of Balmer series of hydrogen atom has a wavelength of 6563 Angstrom. Calculate the wavelength of its second member.
11. A car travelling with a speed of  $60 \text{ Km hr}^{-1}$  sounds a horn of frequency 500 Hz. The sound is heard in another car travelling

behind the first car in the same direction with a speed of  $80 \text{ Kmhr}^{-1}$ . What frequencies will the driver of the second car hear before and after overtaking the first car if the velocity of sound is  $340 \text{ ms}^{-1}$ ?

12. A plane transmission grating having 500 lines per mm is illuminated normally by light source of 600 nm wavelength. How many diffraction maxima will be observed on a screen behind the grate

## SET - IV

1. Answer, in brief, any four questions:
- How do you expect about the directions of horizontal and vertical components of earth's magnetic intensity at pole and at equator? Give justification in terms of angle of dip.
  - A charge particle carrying a charge 'q' moves in an electric field E. If its specific charge is 'S', write an expression of its acceleration in terms of above entities.
  - Magnetic field at the centre of a solenoid is double than that at its ends. Why?
  - Lenz law follows the principle of conservation of energy. Explain.
  - Alternating current passes through a capacitor whereas direct current does not. Explain this fact on the basis of capacitive reactance.
  - What is Seebeck effect? How is this effect different from Peltier effect? Explain.
2. Answer, in brief, any four questions:
- Explain how the conductivity of a semiconductor varies with temperature?
  - Diameter of  $\text{Al}^{27}$  nucleus is  $D_{\text{Al}}$ . How can one express the diameter of  $\text{Cu}^{64}$  in terms of  $D_{\text{Al}}$ ? Explain.
  - How many types of quark you know? Name them with their electronic charges.

- d) Characteristic features of X-rays and Y-rays are similar in many aspects. Write two important features that explain the differences between these rays.
  - e) State and explain Hubble law.
  - f) Explain the difference between stimulated and spontaneous emissions of radiation.
3. Answer, in brief, any one question:
- a) Explain the difference in characteristics between ultrasonic and supersonic waves.
  - b) By what factor does the velocity of transverse wave in the string change when the tension in the stretched string is increased by four times?
4. Answer, in brief, any one question:
- a) What is the difference between wave front and wavelets in the explanation of Huygen's wave theory.
  - b) State and explain Brewster's law of polarization.
5. Answer any three questions:
- a) Explain the magnetic effect on a current carrying rectangular coil. Hence obtain expression for the torque on the coil.
  - b) Find expression for current in the case of alternating LCR series circuit and explain the phase relation between voltage and current.
  - c) Explain how the concept of self and mutual inductances are used in the working principle of a transformer.
  - d) What is Hall effect? Explain and deduce expressions for Hall voltage and electric field.
6. Answer any three questions:
- a) Write down the postulates of Bohr's hydrogen atom. Hence derive expression for energy of the third electron orbit.
  - b) Deduce the law of radioactivity and hence define half life of a radioactive sample. How much is one Curie?

- c) What is a rectifier? Describe the working principle of a full wave rectifier.
  - d) Describe the laboratory method to determine the specific charge of an electron by J J. Thomson's method.
7. Answer any one question:
  - a) What is the difference between an open and a close pipes? Explain with proper sketches for the formation of second overtones in each case. Also express the length of pipes in terms of the wavelength of sound.
  - b) What is Doppler effect? Explain this effect in case of both observer and source of sound moving toward each other.
8. Answer any one question:
  - a) What is diffraction of light? Explain the case of diffraction at a single slit. Hence show the intensity distribution in the figure.
  - b) What is polarization? prove that light is a transverse wave.
9. Answer any two questions:
  - a) An electric lamp consumes 60 W at 220V. How many dry cells of emf 1.5V and internal resistance  $1\Omega$ . are required to glow the lamp?
  - b) A circular coil has 100 turns and a mean diameter of 20 cm. It carries a current of 5A. Find the strength of the magnetic field at a point on its axis at a distance of 15 cm from the centre of the coil.
  - c) The thermo-emf  $\epsilon$  and the temperature of hot junction % satisfy a relation  $\epsilon = a\theta + b\theta^2$  where  $a = 4.1 \times 10^{-5} \text{ V}(^\circ\text{C})^{-1}$  and  $b = -4.1 \times 10^{-8} \text{ V}(^\circ\text{C})^{-2}$ . If the cold junction temperature is  $0^\circ\text{C}$  find the neutral temperature.
10. Answer any two questions:
  - a) 400 nm wavelength of light falls on a photo sensitive material of work function 2.3 eV. Compute the maximum energy of photoelectrons.

- b) What will be the amount of energy released in the fusion of three alpha particles into a  $C^{12}$  nucleus if mass of  $He^4$  and  $C^{12}$  nuclei are respectively 4.00263 amu and 12 amu.
  - c) Calculate the de Broglie wavelength of electron having kinetic energy of 400 eV.
11. Calculate the bulk modulus of a liquid in which longitudinal waves with frequency of 250 Hz have the wavelength of 8 m if the density of liquid is  $900 \text{ kg m}^{-3}$ .
  12. The separation between the consecutive dark fringes in a Young's double slit experiment is 1 mm. The screen is placed at a distance of 2 m from the slits of 1.0 mm separation. What is the wavelength of light used in the experiment?

## SET - V

### Group A

1. Answer in brief, any **FOUR** questions. **[4×2 = 8]**
  - a. A wire of resistance  $8 \Omega$  is bent into a circle. What is the resistance of wire across its diameter?
  - b. Why are thermocouples usually made by combining antimony and bismuth?
  - c. Can we achieve electrolysis by passing an a.c.? Explain.
  - d. A current carrying solenoid tends to contract, why?
  - e. What is the angle of dip at a place, where horizontal and vertical components of earth's magnetic field are equal?
  - f. A long, straight conductor passes through the centre of a metal ring, perpendicular to its plane. If the current in the conductor increases, is a current induced in the ring? Explain.
2. Answer in brief, any **FOUR** questions. **[4×2 = 8]**
  - a. What happens to ejected photoelectrons if wavelength of incident light decreases?
  - b. What are logic gates? Draw the truth table of AND gate.
  - c. The nuclear density of Hydrogen atom is X-unit. What is nuclear density of helium atom?
  - d. Why is a neutron considered to be the most effective bombarding particle in a nuclear reaction?
  - e. State Hubble's law. Mention its significances.

- f. What is the quark combination of proton and neutron?
3. Answer in brief, any **ONE** question. [1×2 = 2]
- a. How can you figure out a pot of water about to fill without observing it?
- b. What is quality of sound? On what factors does it depend?
4. Answer in brief, any **ONE** question. [1×2 = 2]
- a. Young's double slit experiment is carried in air and then entire arrangement is dipped in water. What happens to interference pattern.
- b. Can sound waves be polarized? Explain.

### Group B

5. Answer any **THREE** questions. [3×4 = 12]
- a. What is the principle of potentiometer? How will you determine the value of internal resistance of a cell using a potentiometer?
- b. Use Biot and Savart's law to find the magnetic field intensity at a point due to a long straight conductor.
- c. State Lenz law? Explain how is this law in accordance with the law of conservation of energy?
- d. Derive an expression for power in a.c. circuit. Also define power factor.
6. Answer any **THREE** questions. [3×4 = 12]
- a. Describe an experiment to determine the specific charge of an electron.
- b. Define Zener effect. Describe the working of Zener diode as a voltage regulator.
- c. Use Bohr's postulates to calculate the energy of an electron moving in the  $n^{\text{th}}$  orbit of a hydrogen atom.
- d. Differentiate between nuclear fission and fusion reaction. How energy is released in the fission of Uranium nucleus?
7. Answer any **ONE** question. [1×4 = 4]
- a. Find the apparent change in frequency of sound if observer crosses the stationary source.
- b. What are beats and beat frequency? Give the mathematical formulation and graphical treatment for the formation of beats.
8. Answer any **ONE** question. [1×4 = 4]
- b. State Huygen's principle. Prove the laws of refraction of light on the basis of Huygen's principle.
- a. Deduce an expression for the fringe width in a Young's double slit experiment.

### Group C

9. Solve any **TWO** numerical problems. [2×4 = 8]
- a. Two lamps marked 60W, 220V and 40W, 220V are connected in series across a 220V lines. What power is consumed in each lamp? Assuming that the resistance of the filament does not vary with current.

- b. A copper wire has  $10^{29}$  free electrons per cubic meter, a cross sectional area of 2.0 mm square and carries a current of 5.0 A. Calculate the force acting on each electron if the wire is now placed in a magnetic field of flux density 0.15 T which is perpendicular to the wire.
- c. A coil of 100 turns and cross sectional area  $2 \times 10^{-3} \text{ m}^2$  is placed in a field of  $8 \times 10^{-3} \text{ T}$  so that the flux enters all the turns normally. Calculate the average induced e.m.f. if the field is reversed in  $\frac{1}{50}$  second.
10. Solve any **TWO** numerical problems. **[2×4 = 8]**
- a. An electron with a velocity of  $(2\vec{i} + 3\vec{j}) \times 10^7 \text{ ms}^{-1}$  enters a region of uniform magnetic flux density of 1.10 T. Find the radius and pitch of its path.
- b. An X-ray tube operated at a d.c. potential difference of 20 KV produces heat at the target at the rate of 600 W. Assuming 0.5% of the energy of the incident electrons is converted into X-radiation, calculate (i) the number of electrons per second striking the target (ii) the velocity of the incident electrons.
- c. The isotope  ${}^{40}_{19}\text{K}$  with a half life of  $1.37 \times 10^9$  years, decays to  ${}^{40}_{18}\text{Ar}$  which is stable Moon rocks from the sea of tranquility show that the ratio of these potassium atoms to argon atom is  $\frac{1}{7}$ . Estimate the age of these rocks.
11. A sonometer wire is stretched by hanging a metal cylinder of density  $8000 \text{ kg m}^{-3}$  at the end of the wire. A fundamental note of 256 Hz is sounded when the wire is plucked. Calculate the frequency of vibration of the same length of the wire when a vessel of water is placed so that the cylinder is totally immersed. [4]
12. In Michelson's method to determine the velocity of light in air, the distance travelled by light between reflections from opposite faces of the octagonal mirror is 75 km. The image appears stationary when the minimum speed of rotation of the octagonal mirror is 5000 rotations per 10 second. Calculate the velocity of light in air. [3]

***Best of Luck***

