PHYSICS 10th

REVIEW QUESTIONS NOTES

(ACCORDING TO ALP)

Name:_____

Roll No:_____**Section:**_____

CHAPTER NO. 10: SIMPLE HARMONIC MOTION AND WAVES
Review Questions

- **Write short answers of the following questions:**

10.1. What is simple harmonic motion? What are the nnecessary conditions for a body to execute simple harmonic motion?
(LHR 13-I) (SG 14-I) (SW 14-II) (RWP, BP, GW, LHR 15-I) (DG, MN 15-II

Ans: **Simpe Harmonic Motion:** Simpe harmonic motion occurs **"***When the net force is proportional to the displacement from the mean position and is always directed towards the mean position***"**.

Condtions of S.H.M

i. Vibrating body has inertia.

ii. Vibrating body possess restoring force.

10.2. Think of several examples in everyday life that are simple harmonic?

Ans: The common examples are motion of ball in bowl, motion of swing, motion of simple pendulum, motion of mass attached to spring etc.

10.4. How can you define the term wave? Elaborate the difference between mechanical and electromagnetic waves? Give examples of each.
(LHR, GW 12-II) (GW 13-II) (RWP 15-I, II)

Ans: **Wave:"***A wave is disturbance in the medium which causes the particles of the medium to undergo vibratory motion about their mean position in equal intervals of time***"**.

Mechanical Waves	**Electromagnetic Waves**
• **"***Waves which require any medium for their propagation are called mechanical waves***".**	• **"***Waves which require no medium for their propagation are called electromagnetic waves***".**
Examples: Water waves, Sound waves etc.	**Examples:**Radio waves, X-rays, light waves etc.

10.5. Distinguish between longitudinal and transverse waves with suitable examples.
(LHR 12-I) (FB 14-II) (GW 15-II)

Ans:

Longitudinal Waves	**Transverse Waves**
• **"***In longitudinal waves the particles of medium move back and forth* ***along the direction*** *of propagation of waves***".**	• **"***In those waves the motion of particlesof medium is* ***peRWPendicular to the motion of wave*****".**
Examples: Sound waves etc.	**Examples:**light waves, water waves etc.

10.7. Derive a relationship between velocioty, frequency and wavelength of a wave. Write a formula relating velocity of a wave to its timeperiod and wavelength.
(LHR 12-I, 15-II) (RWP, DG 14-I)

Ans: The relation between elocity, frequency and wavelength of wave is given as:

$$v = \frac{d}{t}$$

$$t = T \; and \; d = \lambda$$

$$v = \frac{\lambda}{T}$$

The equation is the relation between speed of wave v, wavelength λ and time period T of the wave.

$$T = \frac{1}{f}$$

$$v = \frac{\lambda}{\frac{1}{f}}$$

$$v = f\lambda$$

This is called wave equation.

CHAPTER NO. 11 : SOUND WAVES
Review Questions

- **Write short answers of the following questions:**

11.1. What is necessary condition for the production of sound?
(LHR 12-13-I) (GW 13-II), 14-I) (SG, BP 14-II) (MN, FB 15-I) (BP 15-II)

Ans: *Sound is produced by vibrating bodies*. Due to vibration of bodies the air around them also vibrates and the air vibration produces sensation of sound in air.

11.2. What is the effect of the medium on the spped of soun? In which medium sound travels more faster; air, solid or liquid? Justify your answer.(LHR 12-I) (SG 14-I)

Ans: Every medium has distinct density. Speed of sound increases with the increase in density. So, the speed of sound is maximum in solids due to their high density. Speed of sound in solids is about fifteen times than that in gases and speed of sound in liquid is five times than gases.

11.4. What do you understand by the longitudinal wave? Describe the longitudinal nature of sound waves.

Ans: **Longitudinal waves:"***In longitudinal wave the particles of the medium move back and forth along the direction of propagation of wave*.**"**

Explanation: Propagation of sound waves produced by vibrating tuning fork can be understood by a vibrating tuning fork as shown in fig. before the vvibration of tuning for, density of air molecules on the right side is uniform (Fig a). When the right prong of tuning fork moves from mean position O to B (Fig b), it exerts some pressure on the adjacent layer of air molecules and produces a compression and after some time rarefaction is also produced thus this sound wave show the longitudinal nature.

PAGE # 21, FIG # 11.6 a, b, c

11.5. Sound is a form of wave. List at least three reasons to support the idea that sound is a wave.

Ans: **Reasons:** Sound is a form of wave as:

i. Sound shows reflection like waves.
ii. Sound shows refraction like waves.
iii. Sound shows diffraction like waves.

11.7. What is the difference between the loudness and intensity of sound? Derive the relationship between the two.
(LHR 12-II) (LHR 13-II) (FB 14-I) (BP, SW, RWP, DG, GW 14-II) (MN, LHR 15-II) (DG, BP, LHR 15-I)

Ans: **Loudness of sound:"***It is the characteristics of sound by which loud and faint sound can be distinguished*.**"**

Intensity of sound:"*Sound energy passing per second thrugh a unit area held peRWPendicular to the direction of propagation of sound waves is called intensity of sound*.**"**

Relationship between loudness and intensity of sound: Loudness (L) is directly proportional to the logarithm of intensity (I).

$$L \propto \log(I)$$

$$L = K \log I \qquad \text{Here K is constant.}$$

11.8. On what factors does the loudness of sound depend? (SG 14-I) (SG 15-II)

Ans: **Factors:** Loudness of sound depends upon number of actors. Some of them are given below:

i. Amplitude of vibrating body
ii. Area of vibrating body
iii. Distance from vibrating body

11.9. What do you mean by the term intensity level of the sound? Name and define the unit of intensity level of sound.(SW 14-I)

Ans: **Intensity level of the sound:"***The difference between loudness L of unknown sound and loudness Lo is called intensity level of sound*.**"**

Unit: The unit of intensity level of sound is bel.

Bel is biger unit while decibel is a smaller unit.

1bel = 10Db

11.10. What are the units of loudness? Why dowe use logarithmic scale to describe the ragne of the sound intensitieis we hear? (FB 15-II)

Ans: **Unit of Loudness:** Loudness depends upon the physical condition of the listener. It has no specific units. It is measured in terms of intensity level whose unit is (bel).

The use of logarithmic scale is due to the following law i.e. *Loudness is directly proportional to logarithm of intensity*. So, we use logarithmic scale.

11.11. What is Difference between frequency and pitch?

(LHR 13-I) (DK 14-I) (GW 14-II) (SG, BP, DG,GW, FB, LHR 15-I) (SG, DG, MN 15-II)

Ans: **Frequency:"***Number of waves passing through a point in unit time is called frequency*.**" Pitch:"***It is the characteristics of sound by which we distinguish between a shrill and an grave sound*.**"**

Relation between frequency and pitch: Frequency is directly proportion to pitch.

PTB, PAGE # 23, FIG # 11.8

11.15. What is the audible frequency range for human ear? Does thisd range varywith the age of people? Explain. (GW, LHR 14-I) (AKM, FB 14-II) (DG, MN 15-I) (GW 15-II)

Ans: Audible frequency range is from **20Hz to 20,000H** and it varies with the age of people.

11.18. What are the uses of ultrasound in medicine? Ans:

Uses of Ultrasound:

i. In medical field, ultrasonic waves are used to diagnose and treat different ailments.

ii. Powerful ultrasound is now being used to remove blood clots formed in the arteries.

iii. Ultrasound can also be used to get the pictures of thyroid gland for diagnosis purposes.

CHAPTER NO. 12: GEOMETRICAL OPTICS
Review Questions

- **Write short answers of the following questions:**

12.4. Define refraction of light. Describe the passage of light through parallel sides transparent material. (BP 14-ii) (FB, LHR 15-I)

Ans: **Refraction of light:"***The process of bending of light as it pases from air into glass and vice versa is called refeaction of light*.**"**

Explanation: Refraction of light can be explained with the help of Fig. a ray of light IO travelling from air falls on the surface of a glass block.

At he air glass interface, the ray of light IO changes direction and bends towars the normal and travelsalogn he path OR inside the glass block. The rays IO and OR are called the incident ray and the refracted ray respectively.

12.6. What is meant by refractive index of a material? How would you determine the refractiver index of a rectangular glass slab? (GW 12-I) (LHR 14-I) (BP 15-II)

Ans: **Refractive index:"***The refractive index 'n' of a medium isd th ratio of the speed of light* **'c'** *in air to the speed of light in the medium***'v'**.

$$Refractive\ index = \frac{speed\ of\ light\ in\ air}{speed\ of\ light\ in\ medium}$$

$$n = \frac{c}{v}$$

12.7. State the laws of refraction of light and show that how they ay be verified using rectangular glass slab and pins?

Ans: **Laws of refraction of light:**

i. The incident ray, the refracted ray and the normal at the point of incidence all lie in the same plane.

ii. The ratio of thesine of the angle of incidence 'i' of the sin of angle of reftaction 'r' is always equal to a constant i.e.

$$\frac{\sin i}{\sin r} = n$$

12.8. What is meant by the term total internal reflection?

(GW 13-II) (BP 14-I) (SW, GW 14-II) (GW 15-I, II) (LHR 15-II) (SG 15-I, II)

Ans: **Total internal reflection:"***When angle of incidence is greater than critical angle then no refraction occurs but light reflects back into denser medium. Thisd phenomenon is called total internal reflection.***"**

12.9. State the conditions for total internal reflection. Ans:

Conditions for T.I.R:

i. The nagle of incidence should be greater than critical angle.

ii. The light should enter from a denser medium to a rarer medium

12.10. What is critical angle? Derive a relationship between the critical angle and the refractive index of a substance. (LHR 12-II) (SW 14-I) (SG 14-I) (DG 15-I, II)

Ans: **Critical angle:"***The angle of incidencethat causes the refracted ray in rarer medium to bend through 90^o called critical angle*.**"**

Relationship between critical angle and refactive index: The relationship for rays from denser to rare medium is.

$$\frac{1}{n} = \frac{\sin i}{\sin r} = \frac{\sin c}{\sin r} \qquad (i = c)$$

$$n = \frac{\sin r}{\sin c} = \frac{\sin 90°}{\sin c} \qquad (r = 90°)$$

$$n = \frac{1}{\sin c} \qquad (\sin 90° = 1)$$

12.12. Define the following temrs applied to a lens:

(RWP, GW 14-I) (AK 14-II) (GW 15-II) (RWP 15-I, II)

(a) Principal axis

(b) Optical centre

(c) Focal length

Ans: **Principal axis:***Each of the two surfaces of a spherical lens is a section of a sphere. The line passing through the two centres of curvatures of the lens is called principal axis*. **Optical centre:"***A point***(C)***on the principal axis at the centre of lens is called optical centre.***"**

Focal length, f:"*This is the distance between the optical centre and the principal focus*.**"**

CHAPTER NO. 13 : ELECTROSTATICS
Review Questions

- **Write short answers of the following questions:**

13.2. Describe the method of charging bodies by electrostatic induction. (FB 15-I, II)

Ans: **Method of charging bodies by electrostatic induction:** If we bring charged plastic rod near suspended neutral aluminium rod, both rods attract each other as shown in Fig. this attraction between the charged and uncharged rods shows as if both rods have unlike charges, but this is not true. Charged plastic rod produced displacement of positive and negative charges on the neutral aluminium rod which is the cause of attraction between them. But total charge on aluminium rod is still zero. This shows that a body can be charged by electrostatic induction.

Figure

13.8. Explain Coulomb's law of electrostatic and write its mathermatical form.
(LHR 12-I, II) (GW 13-II) (DG, FB, MN, SW 14-I, II) (RWP, LHR 15-I, II) (SG 15-II)

Ans: **Coulomb's law:"***The force of attraction or respulsion between two point charges is directly proportional to the product of the magnitude of charges and inversely proportion to the square of the distance between them***"**. Therefore,

Mathematical expression:

$$F = k\frac{q_1 q_2}{r^2}$$

13.9. What is meant by electric field and electric instensity?
(LHR 12-I, 13-II, 14-I, II) (GW 12-I, II) (SW, RWP, GW 14-I) (AK,M FB 14-II) (RWP, BP, GW, MN 15-I) (SG, DG, MN 15-II)

Ans: **Electric field:"***It is a region around the charge in ewhich it exerts electrostatic force on another charge*.**"**

Electric intensity:"*The strength of electric field at any point in space is called electric field intensity*."

Formula: $E = \frac{F}{q_0}$

Unit: NC^{-1}

13.10. Is electric intensity a vector quantity? What will be its direction? (FB 14-II)

Ans: **Yes,** electric intensity is vector quantity.

Direction: its direction is ame as that of the force acting on the positive charge. If the test charge free to move it will move in the direction of electric intensity.

13.11. How would you define potential difference between two points? Define its unit.
(GW 13-I) (BPM, LHR 14-II) (MN 14-I) (RWP, GW, MN 15-I) (BP 15-II)

Ans: **Potential difference:"***The energy supplied by a unit charge as it moves from one point to other in the direction of field is called potential difference*."

Unit: The unit of potential difference is **volt (V)**.

Volt:"*If one joule of work is done against electric field in bringing one coulomb positive charge from infinity to a oint in the electric field then potential at that point is one volt*."

13.12. Show that potential difference can be described as energy transfer per unit charge between the two points?

Ans: If the potential of point A is V_a and that of point B is V_b, the potential energy of the charge at these points will be qV_a and qV_b respectively.the change in potential energy
othe charge when it moves from point A to B will be equal to qVa – qVb. This energy is utilized in doing some useful work. Thus energy supplied by the charge = q(Va – Vb)

$$\therefore W = qV$$

$$\Delta V = \frac{w}{q}$$

If 'q' is one coulomb, then the potential difference between two points becomes equal to the energy supplied by the charge.

13.13. What do you mean by the capacitance of a capacitor? Define untis of capacitance.
(LHR 12-I) (GW, SG, GW, LHR, AK 14-I) (FB 14-II) (SG, DG 15-II) (BP 15-I)

Ans: **Capacitance:"***Capacitance is the ability of a capacitor to store charge*."

$$C = \frac{Q}{V}$$

One Farad: Capacitance of a capacitor in which one coulomb of charge causes a potential difference of one volt.

13.14. Derive the formula for the effective capacitance for a series combination of a number of capacitors.
(LHR 12-II) (GW 13-I) (DG, GW, FB 15-I) (MN 15-II)

Ans: **Effective capacitanceof series combination:**

i. Each cacapcitor has the same charge acros it.

$$Q_1 = Q_2 = Q_3 = Q$$

ii. The voltage of thebattery has been divied among the various capacitors. Hence

$$V = V_1 + V_2 + V_3$$

$$V = \frac{Q}{C_1} + \frac{Q}{C_2} + \frac{Q}{C_3}$$

$$V = Q(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3})$$

$$\frac{V}{Q} = (\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3})$$

iii. Thus, we can replace series combination of capacitors with one equivalent capacitor having capacitance C_T i.e.

$$\frac{1}{C_T} = \left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}\right)$$

In the case of 'n' capacitors connected in series, we have

$$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots + \frac{1}{C_n}$$

13.17. Enlist some uses of capacitors.

Ans: **Uses of capacitors:**

i. They are used for tuning transmitter and radio.

ii. They are used in fan motors.

iii. They are used in circuits of computer etc.

CHAPTER NO. 14: CURRENT ELECTRICITY
Review Questions

- **Write short answers of the following questions:**

14.1. Define and explain the term electric current.

(RWP, BP, GW 14-I) (MN, LHR 14-II) (SW 14-I, II) (FB 15-I) (BP 15-I, II) (MN, GW 15-II)

Ans: **Electric current:"***The rate of flow of electric charge through any cross- sectional area is called current.***"**

If the charge **Q** is passing through any area in time **t**, then current **I** flowing through it will be given by.

$$Current = \frac{Charge}{Time}$$

$$I = \frac{Q}{t}$$

Unit:SI unit of current is **ampere (A).**

One ampere:"*If a charge of one coulomb passed through a cross-sectional area in one second, then current is one ampere*."

14.3. What do you mean by the term e.m.f? Is it really a force? Explain.

(BP, SG, SW, MN, LHR 14-I, II)

Ans: **E.m.f:"***It is the energy supplied by a batter to a unit positive charge when it flows through the closed circuit.***"**

OR

"*The energy converted from non-electrical forms to electrical form when one coulomb of positive charge passes through the battery*."

$$e.m.f = \frac{Energy}{Charge}$$

$$E = \frac{W}{Q}$$

Unit: The unit for e.m.f is $\mathbf{JC^{-1}}$ which is equal to volt **(V)** in SI system.

E.m.f is not a force, it is actually a voltage between terminals of battery, when no current flows is circuit.

14.4. How can we differentiate between e.m.f and potential difference?

(BP, GW, LHR 14-I) (BP, SG, SW, MN, LHR 14-II) (DG, BP, 15-I, II) (GW 15-II)

Ans: **Difference between emf and potential difference:** E.m.f of a battery is total energy supplied in driving one coulomb of charge in complete circuit in which the cell is connected. The complete circuit includes cell and external circuit. Whereas, potential difference determines the energy required between two terminals of circuit to move charge (only external circuit).

14.5. Explain Ohm's law. What are its limiatations?

Ans: **Ohm's law:"***The amount of current passing through a conductor is directly proportional to the potential difference applied across its ends, provided the temperatgure and the physical state of the conductor doesd not change*."

Mathematical form:

$$V \propto I \ (T = \text{constant})$$

$$V = IR$$

Where R is the constant proportionality and is the resistance of the conductors. Its SI units is ohm, denoted by a symbol Ω.

Limitations of Ohm's law:

i. Ohm's law is applicable when temperatue of conductor is kep constant.

ii. Conductors obey Ohm's law as logn as the electric current through them is not very large.

iii. The physical state of the conductor also remains same.

14.6. Define resistance and its units. (MN 14-I, II) (DK 14-II) (LHR 14-I) (SG 15-II) (FB 15-I, II)

Ans: **Resistance:"***The property of a substance which offers opposition to the flow of current through, it is called its resistance*.**" Unit:** Its unit is **Ohm ( )**.

Ohm:"*When a potential difference of one volt is applied across the ends of a conductor and one ampere of current passes through it, its reistance will be one ohm*.**"**

14.8. Explain the energy dissipation in a resistance. What is Joule's law?

(LHR, GW 12-I) (SW, BP, SG, MN, GW, LHR 13-I) (RWP, AK, LHR 14-I, II) (BP, FB 15-I) (RWP, SG 15-II)

Ans: **Energy dissipation:** The electrical energy can be utilized for different useful puRWPoses. For example, bulb converts electrical energy itno light and heat. Heart and iron itno heat and fans into mechanical energy.

$$\textbf{Energy dissipated} = W = \boldsymbol{I^2Rt}$$

Joule's law:"*The amount of heat generatd in resistance due to flow of charges is equal to the product of square of current I, resistance R and the time duration*.**"**

Mathematical equation:

$$W = \boldsymbol{I^2Rt}$$

14.10. Discuss the main features of parallel combination of restors.

(LHR 13-I) (MN 15-I) (RWP, GW 15-II)

Ans: **Parallel combination of resistor:**

i. The voltage is same across each resistor which is equal to the voltage of the battery.

$$V = V_1 + V_2 + V_3$$

ii. The current through each resistor is not same.

$$I = I_1 + I_2 + I_3$$

$$I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}, I_3 = \frac{V}{R_3}$$

$$I = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

$$I = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)$$

$$\frac{V}{R_e} = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)$$

$$\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

iii. Hence, equivalent resistance for n resistances will be:

$$\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots + \frac{1}{R_n}$$

14.11. Determine the equivalent resistance of series combination of resistors.

Ans: **Series combination:**

i. The current passing through each resistor is the same. i.e.

$$I = I_1 = I_2 = I_3$$

ii. The total voltage in a series circuit divides among the individual resistors.

$$V = V_1 + V_2 + V_2$$

According to Ohm's law

$$V = IR_1 + IR_2 + IR_3$$

$$V = I(R_1 + R_2 + R_3)$$

We know that

$$V = IR_e$$

Put in above equation,

$$IR_e = I(R_1 + R_2 + R_3)$$

$$R_e = R_1 + R_2 + R_3$$

CHAPTER NO. 15: ELECTROMEGNATISM
Review Questions

- **Write short answers of the following questions:**

15.1. Demonstrate by an experiment that a magnetic field is produced around a straight current carrying conductor. (FB 15-II)

Ans: **Experiment:** We take a straight conductor wire and pas it verticaly through carboard and then connected the two ends with opposite battery terminals now current flows in clockwise direction. The lines of forces of the magneticfield produced around the wire would be in the form of concentric circles. If we place a compass needle at different points in the region of magnetic field, it will align along the direction of magnetic field. i.e. clock wise direction.

If we reverse the direction of the current by reversing the terminals of the battery, the compass needle also reverse its direction. The magnetic field lines will align in the anticlockwise direction.

PTB PAGE # 119, FIG # 15.1 (a, b)

15.3. You are given an unmarked magnetized steel bar and bar magnet, its north and south ends are marked N and S respectiverly. State how you you determine the polarity at each end of the unmarked bar?

Ans: When the north pople of marked bar magnet attracts the unmarked magnet this shows that there is a south pole on unmarked magnet and if magnets repel each other then there is a north pole.

15.7. Describe a simple experiment to demonstrate that a changing magnetic field can induce e.m.f in a circuit.

Ans: **Principle:***If we change the number of magnetic lines of force through a coil by moving it in the magnetic field, this will induce an e.m.f in the coil.*

Experiment: Take a bar magnet and a coil, due to relative motion of coil and bar magnet, current flows through the coil placed at different distances from the magnet.

PTB PAGE # 126, FIG 15.12 (a, b)

15.9. Describe the direction of an induced e.m.f in a circuit. How does this phenomenon relate to conservation of energy? (SG 15-II)

Ans: **Direction of induced e.m.f:****"***The induced e.m.f is always opposite to the cause which produces it.***"**

Relation between e.m.f and conservation of energy: When we put the wire loop in a magnetc field, work is done on the magnet to bring it close to coil. This work appears as electrical energy in the conductor. Hence, this phenomenon is manifestation of law of conservation of energy.

15.11. What do you understand by the term mutual induction?
(LHR 12-II) (LHR, GW 13-I) (AK, RWP, LHR 14-I) (SG , GW, FB 15-I) (SG, RWP, BP, MN, FB 15-II)

Ans: **Mutual induction:****"***The phenomenon of production of induced current in one coil due to change of current in a neighboring coil is called mutual induction.***"**

SI unit: The SI unit of mutual induction is Henry.

Henry:**"***The mutual inductance of two coil is one henry if the current to changing at the rate of one*

ampere per second in primary coil produces an e.m.f of 1 volt in secondary coil."

15.12. What is a transformer? Explain the working of transformer in connection with mutual induction.

Ans: **Transformer:**"*Transformer is an electrical device which is used to increase or decrease the value of alternating voltage*."

Working principle: Transformer works on the principle of "*Mutual induction*."

Working of a transformer: A transformer has two coils, electrically insulated from each other, but wound around the same iron core. One coil is called the primary coil. The other coil is called the secondary coil. Number of turns on the primary and the secondary coils are represented by **Np** and **Ns** respectively.

The e.m.f induced in the secondary coil, called the secondary voltage **Vs**. The secondary voltage also depends on the ratio of the number of turns on the secondary coil to the number of turns on the primary coil, as shown by the following expression:

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

CHAPTER NO. 16: BASIC ELECTRONICS
Review Questions

- **Write short answers of the following questions:**

16.7. Differentiate between analogue electronic and digital electronic. Write down the names of five analogue and five digital devices that are commonly used in everyday life.
(LHR 13-II) (SW, GW 14-I, II) (DG, FB 14-I) (BP 14-II) (BP, GW, FB 15-I) (SG , BP, GW, FB, LHR 15-II)

Ans:

Analogue Electroncis	**Digital Electronics**
"*The branch of electronic which deals with analogue quantities is called analogue electronics.*" **Devices:** Radio, Amplifier, loudspeakers, Microphone, Television.	"*The branch of electronic which deals with digital quantities is called digital electronics*." **Devices:** Computers, Radar system, Modern CD and DVD players.

16.8. State and explain for each case whether the information given by the following devices is in analogue or a digital form.

(a) A moving coil voltmeter measuring the e.m.f of a cell.

(b) A microphone generating an electric current.

(c) A central heating thermostat controlling the water pump.

(d) Automatic traffic lights controlling the flow of traffic.

Ans: (a) Provides an information in the ofmrof analogue form.

(b) In the form of analogue form.

.

(c) In the form of analogue signal

.

(d) On the asis of digital quantities.

16.9. Write down some benefits of using digital electronics over analogue electronics.

Ans: **Advantages of digital electronics:**

i. The big advantage of digital electronic is quality.

ii. There is no interference or loss of strength in digital signal travelling in an optical fibre.

iii. Digital technology in TV gives excellent view and allow you to be interactive.

iv. Smart ID cars are beign developed. Passport, national insurancecard and driving license, all of this data would be held digital in the tiny chip.

v. Now, today everything is going digital like digital cameras are fast replacing traditional film equipment.

16.10. What are the three universal logic gates? Give their symbols and truth tables.
(MN 15-I) (RWP, MN, FB 15-II)

Ans: **"**The circuit which implements the AND operation is known as AND gate.**"**

PTB PAGE # 147, FIG # 16.9

"The electronic circuit which implements the OR operation is known as OR gate.**"**

PTB PAGE # 148, FIG # 16.11

"NOT gate performs the basic logical function called inversion or complementation.**"**

PTB PAGE # 149, FIG # 16.13

CHAPTER NO. 17 INFORMATION AND COMMUNICATION TECHNOLOGY
Review Questions

- **Write short answers of the following questions:**

17.1. What is the difference between data and information? (SG 15-I) (FB 15-I, II)

Ans: **Data:"***Data is the collection of acts and figues that are used by programs to produce useful information*.**"**

Information:"*Computer processes data and converts it into useful information. Data after process is called information*.**"**

17.2. What do you understand by information and Communication Technology (ICT)?
(DG, BP, LHR 15-I) (RWP 15-II)

Ans: **Information and Communication Technology:** Information and Communication Technology is defined as the scientific methods and means to store, process and transmit vast amounts of information in seconds weith the help of electronic equipments.

17.3. What are the components of information technology" clearly indicate the function of each component.
(AK 14-I) (FB 14-II)

Ans: Components of Information Technology:

Hardware: The term hardware refers to machinery. This includes the central rocessing unit (CPU) and all of its support equipments.

Software: The term software refers to computer programmes and the manuals that support them.

Data: Data are facts and figures that are used by programs to produce useful information.

Procedures: These are set of instruction and rules to design and use information system.
These are written in manulas and documents for use.

People: Every CBIS needs people if it is to be useful, who influence the success or failure of information systems. People design and operate the software, they feed input data.

17.7 How light signals are sent through optical fibre?

Ans: **Light signals through optical fibre:** Waves of visible light have a much higher frequency than that of radiowaves. This means, rate of sending information with light beams is larger than that with radiowaves or microwaves. An optical fibre has been used as transmission channlel for this puRWPose. An optical fibre with a coating of lower refractive index is a thin strand of high-quality glass that absorbs very little light.

Light that eneers the core at one end of the optical fibre goes straight and hits the inner wall (the cladding) of fibre optics. If the angle of incidence with cladding is less than the critical angle, some of the light will escape the fibre optics and is lost.

17.11. What is internet? Internet is a useful source of knowledge and information. Discuss.
(LHR 12-I) (GW 13-15-II) (BP 15-I) (SG 15-I, II)

Ans: **Internet:"***Internet is a system inw which many computer networks all over the world are connected together to communicate with each other through communication medium*.**"**

OR

The internet is the interconnection of millions of computers.

Importance of internet: In internet, millions of computers remain connected together through well laid communication system. Thus like a telephone system any computer of any city ca n establish a connection with any other computer of any other city and exchange data or message with it. It is essential that every educated person becomes familiar with computer. The ability to use computer is basic and necessary to a person's formal education as reading, writing and arithmetic. The internet is connection of millions computers all over the world. So, people exchange information and knowledge at international level.

CHAPTER NO. 18: ATOMIC AND NUCLEAR PHYSICS
Review Questions

- **Write short answers of the following questions:**

18.1. What is difference between atomic number and atomic mass number? Give a symbolical representation of a nuclide.
(GW 12-II) (GW 13-II) (SW 14-I, II) (LHR, RWP 14-II) (DG, GW 15-II)

Ans:

Atomic number	Mass number
1. *The number of protons insde the nucleus is called the atomic number.*	**1.** *The sum of protons and neutrons present inside the nucleus of anatom is called its atomic mass nmber.*
2. Atomic number depends upon the number of protons or electron of an atom.	**2.** Atomic mass number dependsd upon the number of neutrons.
3. Atomic number is represented by **Z**.	**3.** It is representd by **'A'** which is written as: **A = Z + N**
4. It is written at the bottom left side of the symbol of an element. e.g. $_2{}^4H$.	**4.** It is written at the top left side of the symbol of an element. e.g.$_2{}^4He$.

Symbolical representation of nuclide is ^AX.

For example, hydrogen atom is represented like $_1{}^1H$.

18.2. What do you mean by the term radioactivity? Why some elements are radioactive but some are not? (LHR 13-15-I) (SG 15-II)

Ans: **Radioactivity:"***The spontaneous emission of radiation by unstable nuclei is called natural radioactivity*.**"**

Radioactive elements:"*The elements which emit such radiations are called radioactive elements.***"** e.g uranium, polonium and radium etc. the element whose atomic number is less than 82, does not emit such radiations because they are stable.

18.3. How can you make radioactive elements artificially? Describe with a suitable example. (GW 13-II) (DG 15-I)

Ans: The process in which bombardment of protons and neutrons on the stable nuclei makes it radioactive element which is also called artificial radioactivity.

When an element whose atomic number is less than 82 is bombarded with protons or neutrons, it starts emitting radiations. e.g.

$$^{1}_{0}n + {}^{23}_{11}Na \rightarrow {}^{24}_{11}Na + \gamma$$

18.4. What are the three basic radioactive decay processes and how do they differ from each other?

Ans: There are three basic radioactive decay proceses and they differ by change in the atomic number and mass number.

(a) Alpha (α) – decay

$$^{A}_{Z}X \rightarrow {}^{Z-4}_{Z-2}Y + {}^{4}_{2}He + Energy$$

Parent nuclide Daughter nuclide $\alpha - Particle$

Example:

$$^{226}_{88}Ra \rightarrow {}^{222}_{86}Rn + {}^{4}_{2}He + Energy$$

It mean in alpha decay, the proton number or **atomic number Z** of the parent nuclide reduces by **2** and its **mass number** or nucleon number **A** decreases by **4**.

(b) Beta (β) – decay

$$^{A}_{Z}X \rightarrow {}^{A}_{Z+1}Y + {}^{0}_{-1}e + Energy$$

Parent nuclide daughter nuclide β- Particle

Example:

$$^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e + Energy$$

In beta (β)-decay, **proton number Z** increases by **1** but its **mass number** remains **unchanged**.

(c) Gamma (γ) decay

$$^{A}_{Z}X \rightarrow {}^{A}_{Z}Y + \gamma$$

Parent nuclide daughter nuclide γ- Particle

(γ)-rays are usually emitted at the same moment as either an alpha or a beta particle.

18.5. Write the alpha decay process for . Identify the parent nd daught nuclei in this decay.

Ans: Alpha decay rocess of protactinium:

The decay process is given as:

$$^{234}_{91}Pa \rightarrow {}^{230}_{89}Ac + {}^{4}_{2}He$$

In this decay, $^{234}_{91}Pa$ is parent nuclei while $^{230}_{89}Ac$ is daughter nuclei.

18.6. Explain whether the atomic number can increase during nuclear decay. Support your answer with an example.

Ans: Yes, during β –decay process, the daughter nuclei has its atomic number increased by 1.

Examples:

$$^{A}_{Z}X \rightarrow {}^{A}_{Z+1}Y + {}^{0}_{-1}e + Energy$$

Parent nuclide daughter nuclide β- Particle

$$^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e + Energy$$

18.7. What do you understand by half-life of a radioactive element?

(GW 13-II) (RWP 14-I, II) (FB 14-II) (SG 15-I) (MN 15-II)

Ans: **Half life:** "The time during which half of the unstable radioactive nuclei disintegrate is called the half life of the sample of radioactive element."

The process of radioactivity is random and the rate of radioactive decay is proportional to the number of

unstable radioactive nuclei decays in a certain time.

18.8. Is radioactivity a spontaneous process? Elaborate your answer with a simple experiment.

Ans: Yes, radioactivity is a spontaneous process because such elements having atomic number more than 82 are unstable. Thee elements emit radiations naturally. That's why radioactivity is a spontaneous process.

In radioactive decay an unstable parent nuclide X changes itno a daughter nuclides Y with the emission of alpha ( ), beta ( ) and Gamma ( ) particles.

$$^{A}_{Z}X \quad \rightarrow \quad ^{A}_{Z+1}Y \quad + \quad ^{0}_{-1}e \quad + \quad Energy$$

Parent nuclide daughter nuclide β- Particle

$$^{14}_{6}C \quad \rightarrow \quad ^{14}_{7}N \quad + \quad ^{0}_{-1}e \quad + \quad Energy$$

18.9. What is meant by background radiations? Enlist some sources of backgrodun radiations. (MN 15-I) (BP, GW, FB 15-II)

Ans: **Background radiations:"***Radiations present in atmosphere due to different radioactive substances are called background radiations.***"**

Sources: Everywhere in rocks, soil, water and air of our planet (Earth) there are traces of radioactive elements. They emit the radiation every time, this natural radioactivity is called the background radiation.

18.10. Describe two uses of radioisotopes in medicine, industry or research.
(LHR 13-I) (SW 14-I) (BP, SG, FB, LHR 15-I)

Ans: **In medicine:**

i. Radio Iodine -131 is used in curing cancer of thyroid gland.

ii. P – 32 is used to diagnose the brain tumors.

In Industry

i. To locate the wear and tear of the moving parts of machinery.

ii. For the location of leaks in underground pipes.

In Research

i. P – 32, to find how well the plants are absorbing fertilizer.

18.11. What are two common radiation hazards? Briefly describe the precautions that are taken against them.

Ans: **Radiation hazards:**

i. Radiation burns, mainly due to beta and gamma radiations, which may cause redness and sores on the skin.

ii. Sterility (i.e. inability to produce children)

iii. Genetic mutations in both human and plants. Some children are born with serious deformities.

Precautions to minimize radiation dangers:

i. The sources should ony handled with tongs and forceps.

ii. The user should use rubber gloves and hands should be washed carefully after the experiment.

iii. All radioactive sources should be stored in thick lead containers.

18.12. Complete this nuclear reaction: → + ? + . Does this raeaction involve fission or fusion? Justify your answer.

Ans: $^{235}_{92}U \rightarrow ^{140}_{54}X + ? + ^{1}_{0}n$

It is a fission reaction because a heavy nucleus splites into smaller nuclei with neutrons.

18.13. Nuclear fusion reaction is more reliable and sustainable source of energy than nuclear fission chain reaction. Justify this statement with plausible arguments.

Ans: Nuclear fission is more reliable tan nuclear fission.

i. Nuclear waste doesn't produce.

ii. Small nuclei combine to form heavy and large nucleus with the evolution of large amount of heat.