

Q. No. 2 Part (i) Q: "Distinguish between of each."

Ans: Mechanical Waves

- Mechanical waves are those waves which require material medium to propagate from one point to another.

- They can only travel in the presence of material medium.

- Example:-

Examples include:

sound waves, waves produced in water etc.

Electromagnetic Waves

- Electromagnetic waves are those which do not require material medium to propagate from one point to another.

- They can travel both in presence and absence of material medium.

- Example:-

Examples include:

ultraviolet rays, infrared rays, microwaves etc.

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Q. No. 2 Part (ii) Q: "What is meant each physical quantity."

Ans: Sound Intensity:

The intensity of sound refers to the amount of sound energy passing per unit perpendicular area per unit time.

Formula: It is calculated as:
$$I = \frac{E}{A \times t}$$

Unit:

It is measured in Wm^{-2} (watt per metre square).

Sound Intensity Level:

Sound intensity level refers to the ratio or comparison of two known sound intensities.

Formula: It is calculated as:
$$\beta = 10 \log \frac{I}{I_0}$$

Unit:

It is measured in dB (decibels).

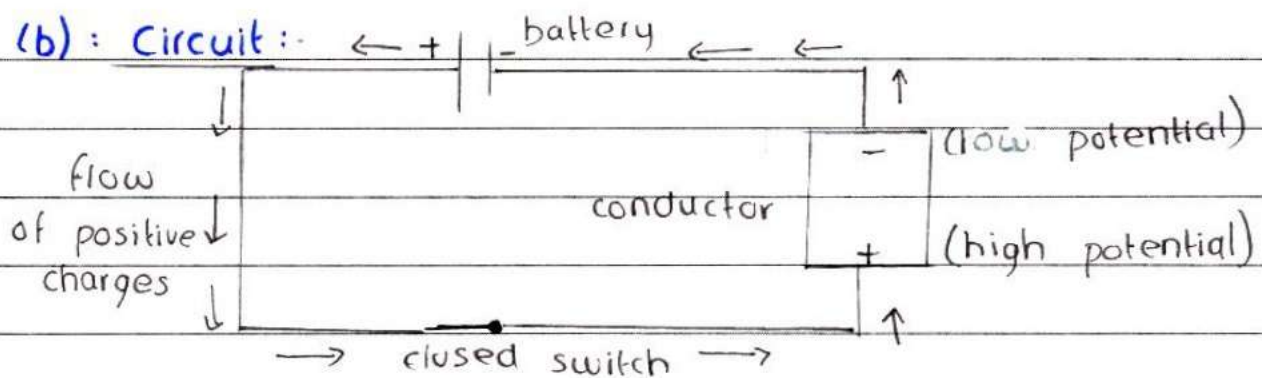
Q. No. 2 Part (iii) Q: "Describe conventional in circuit."

Ans: (a) :-

Conventional Current:

Before discovery of electron, it was thought that current is due to flow of positive charges from positive to negative terminal of battery. This assumed direction of flow of current doesn't have physical existence and is known as conventional current.

(b) : Circuit :-



Q. No. 2 Part (iv) Q: "Describe the information technology."

Ans: Hardware:

Hardware refers to the physical parts of the computer that you can see and touch.

Examples: Examples include monitor, keyboard, mouse, etc. Most important part of hardware is "CPU" which is called brain of computer.

Software: Software refers to programs and instructions that tell hardware what to do. Software enables computer to perform different operations.

Examples: Operating software (OS) is a software program that manages the computer, e.g. windows, Linux etc.

Q. No. 2 Part (v) Q: "Graph shows of A, B, C"

Ans: value of A:

At point A, 2 half lives have passed so:

$$A = \frac{1}{2^2} N = \frac{1}{4} N$$

$$A = \frac{1}{4} N$$

Value of B:

At point B, 3 half lives have passed so:

$$B = \frac{1}{2^3} N = \frac{1}{8} N$$

$$B = \frac{1}{8} N$$

Value of C: $C = 3240 + 1620 \Rightarrow C = 4860 \text{ yrs}$

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Q. No. 2 Part (vi) Q: "Explain briefly in a telephone."

Ans: Transmission of Signals in Telephone:

Electrical signals can be transmitted through wires in a telephone. First, information is converted to electrical signals at transmitter. It is sent through wires (twisted pair, coaxial cable) to receiver end where it is again converted to its original form.

		Transmitting			
Transmitter	→	medium	→	Receiver	
(mouthpiece)		(wires		(ear piece)	

Information converted
to electric signals

information converted back
to original sound

Q. No. 2 Part (vii) Q: "Find value of critical air is 1."

Ans: Given data:

refractive index of water $n_1 = 1.33$

refractive index of air $n_2 = 1$

value of critical angle $\theta_c = ?$

Solution:

$$\text{As } \theta_c = \sin^{-1} \frac{n_2}{n_1}$$

$$\theta_c = \sin^{-1} \left(\frac{1}{1.33} \right)$$

$$\theta_c = \sin^{-1} (0.75)$$

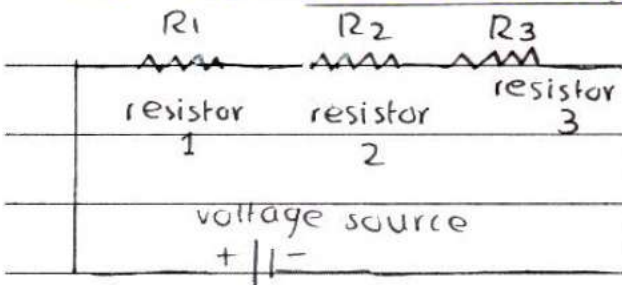
$$\boxed{\theta_c = 48.59^\circ}$$

Thus, critical angle for water is 48.59° .

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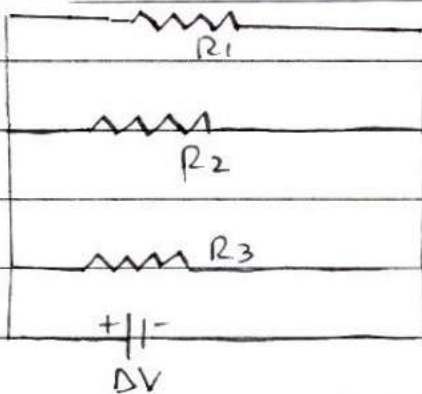
Q. No. 2 Part (viii) Q: "Draw circuit diagrams ... resistance."

Ans: (a): Series Combination:



$$R_{eq} = R_1 + R_2 + R_3$$

(b) Parallel Combination:



$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$\Rightarrow$ In parallel combination equivalent resistance R_{eq} is smaller than individual resistances R_1 , R_2 , R_3 .

Q. No. 2 Part (ix) Q: "Enlist any three word processing."

Ans: Word Processing Software:

Word processing is a type of software that enables you to use a computer for typing documents, and text etc. It has following functions:

Functions of Word Processing:

- (i): It is used for creating, editing saving and printing documents.
 - (ii): It is used for creating and editing tables.
 - (iii): It is used for formatting text, such as bolding, underlining, italicizing etc.
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Q. No. 2 Part (x) Q: " Briefly describe induced emf."

Ans: Factors Affecting Induced emf:

(i): Strength of Magnet: Greater is the strength of the magnet, greater will be induced emf.

(ii): Number of Turns of Coil: The induced emf will be greater if number of turns in the coil or solenoid are increased.

(iii): Length of Conductor: Greater is length of conductor, greater will be induced emf.

(iv): Speed with which Magnet is Moved: If the coil or magnet is moved with faster speed, the induced emf will be greater.

Q. No. 2 Part (xi) Q: "Electrical geyser in 1 hour?"

Ans: Given data:

Potential difference $V = 220 \text{ V}$

current $I = 20 \text{ A}$

time $t = 1 \text{ hour} = 60 \times 60 = 3600 \text{ s}$

Energy $E = ?$

Solution:

As $E = V \times I \times t$

$$E = 220 \times 20 \times 3600$$

$$E = 15,840,000 \text{ J}$$

Thus, electrical energy consumed will be $15,840,000 \text{ J}$.

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Use for rough work

Q. No. 3 (Page 1) Q: "Describe Ohm's Law give the unit of resistance."

Ans: OHM'S LAW:-

Ohm's law states that:

Statement: "The amount of current flowing in a conductor is directly proportional to the potential difference applied across its ends provided that the external conditions such as the temperature are kept constant."

Mathematical Derivation:-

According to Ohm's Law:

$$I \propto V$$
$$\boxed{I = \frac{V}{R}} \Rightarrow \boxed{V = IR}$$

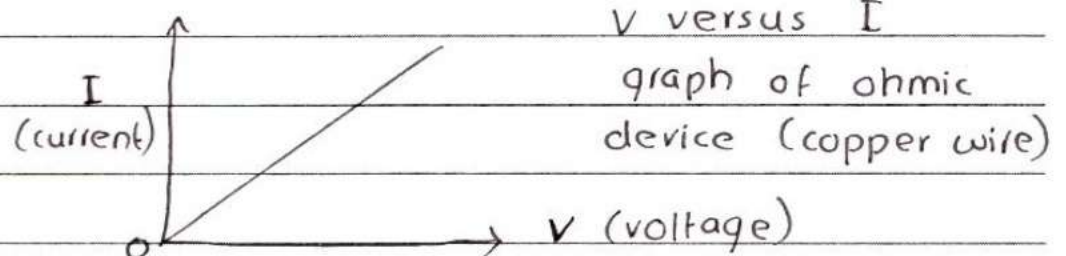
where "R" is the proportionality constant and is known as resistance.

"I" is the amount of current flowing in the circuit, and "V" is the potential difference applied to it.

Ohmic Devices:

The devices which obey Ohm's Law are termed as Ohmic devices. These are mostly metals, this is due to the reason that metals have constant resistance over wide range of voltages and have linear V/I graph.

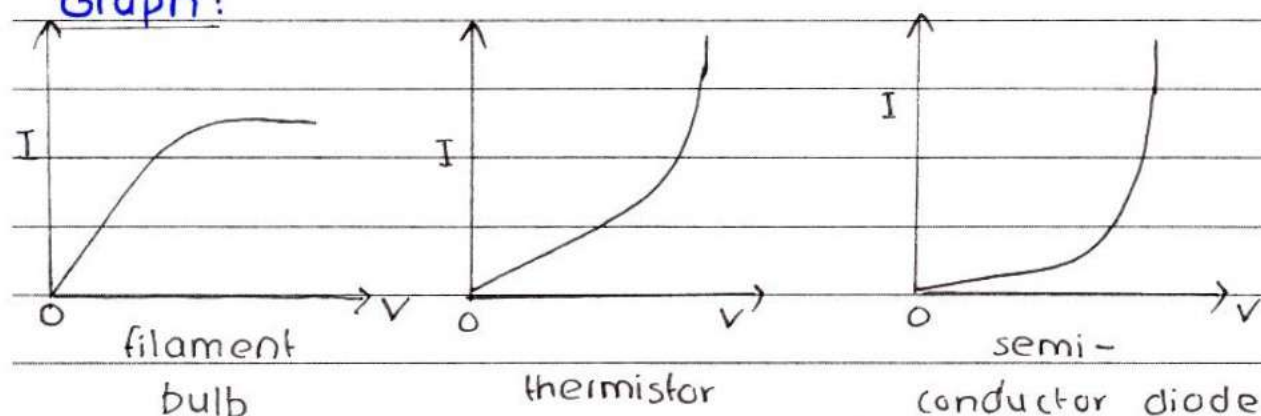
Graph:



Non - Ohmic Devices:

The devices which do not obey Ohm's law are termed as non - ohmic. They do not have constant resistance across different voltage ranges and do not have linear V versus I relationship. These devices include:

Graph:



Resistance:

Resistance is defined as opposition to flow of charges.

By Ohm's law:

$$R = \frac{V}{I}$$

Unit of Resistance:-

SI unit of resistance is ohm (Ω).

Definition: It is defined as:

"Resistance of a conductor will be one ohm if one volt potential difference produces current of one ampere in it.

$$1 \Omega = \frac{1V}{1A}$$

Following prefixes are used with Ω

1 kilo - ohm = $1 \times 10^3 \Omega$, 1 mega - ohm = $1 \times 10^6 \Omega$
etc.

Q. No. 4 (Page 1) Q: "What is meant by mutual the type of transformer."

Ans: MUTUAL INDUCTION:-

Mutual induction is the process in which change in current in one coil produces an induced emf in another coil

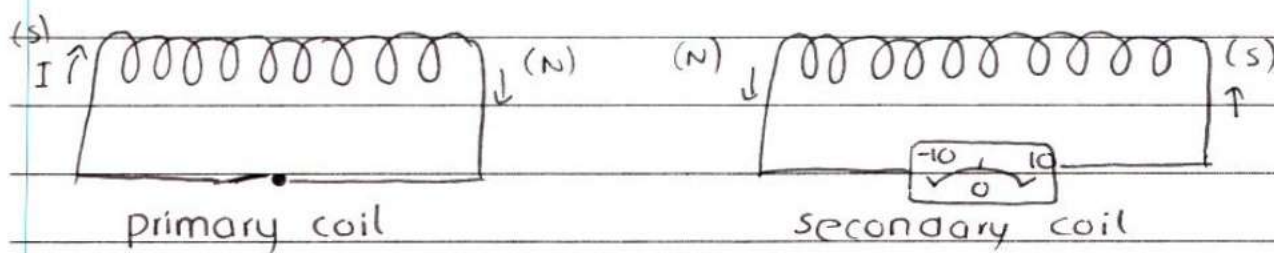
Primary coil :

The coil to which current is supplied is known as the primary coil. It is connected with battery. When switch is closed current passes through coil. When it is opened, current stops flowing.

Secondary Coil :

The coil in which emf is induced is known as the secondary coil. It is connected to galvanometer. Emf is induced when switch is closed momentarily and opened, but if it remains constantly open or closed emf is not induced.

Diagram:



Unit of Mutual Induction:

SI unit of mutual induction is Henry (H).

"Mutual induction will be one henry if current changes at rate of one ampere per second in primary coil and induces emf of one volt in secondary coil."

$$1 \text{ H} = 1 \text{ V} \times 1 \text{ s} / 1 \text{ A}$$

Q. No. 4 (Page 2)

(b): Given data:-

no. of turns in secondary coil $N_s = 20$

no. of turns in primary coil $N_p = 5$

primary voltage $V_p = 100$

secondary voltage $V_s = ?$

primary current $I_p = ?$

secondary power $P_s = ?$

Solution:-

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

$$V_s = \frac{20}{5} \times 100$$

$$\boxed{V_s = 400 \text{ V}}$$

This is a step-up transformer as voltage and no. of turns in secondary coil have increased.

$$V_s I_s = V_p I_p$$

$$I_p = \frac{V_s I_s}{V_p}$$

$$I_p = \frac{400 I_s}{100} \Rightarrow \boxed{I_p = 4 I_s}$$

$$P_s = P_p$$

$$P_s = V_p I_p$$

$$P_s = 100 \times 4 I_s$$

$$\boxed{P_s = 400 I_s}$$

Q. No. 5 (Page 1) Q: "For given logic gates make truth tables."

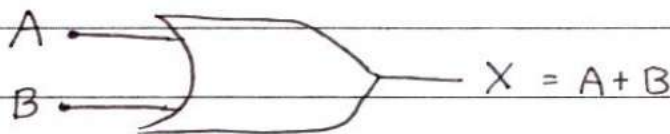
Ans: (a) OR Gate:-

OR gate consists of two inputs and one output.

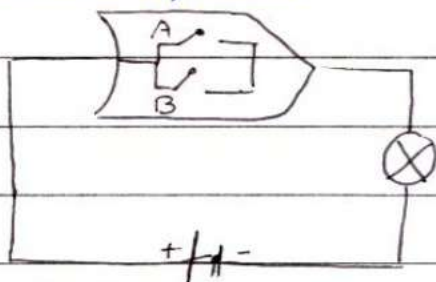
Boolean Equation:

$$X = A + B$$

Symbol:



Circuit Diagram:



Truth Table:

Inputs		Output
A	B	$X = A + B$
0	0	0
0	1	1
1	0	1
1	1	1

Explanation:

OR gate gives high output (1) when one or more than one inputs is high (1) and gives low only when both inputs are low (0).

Q. No. 5 (Page 2)

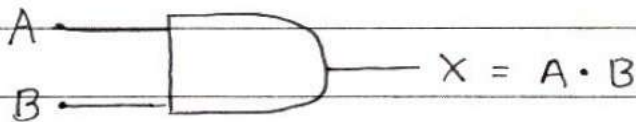
b) : AND Gate:-

AND gate consists of two inputs and one output.

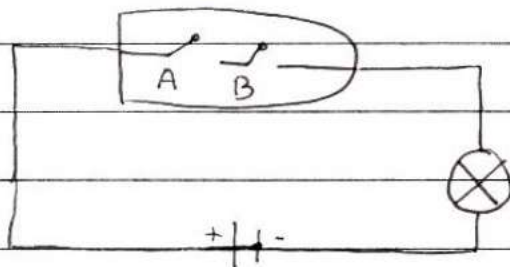
Boolean Equation:

$$X = A \cdot B$$

Symbol:



Circuit Diagram:



Truth Table:

Inputs		Output
A	B	$X = A \cdot B$
0	0	0
0	1	0
1	0	0
1	1	1

Explanation:

AND gate gives high output (1) only when both inputs are high (1) and gives low output (0) if one or both inputs are low (0).

Q. No. 6 (Page 1) Q: "A simple pendulum has time
and on moon."

Given data:-

Time period $T = 2s$

acceleration due to gravity moon $g_m = 1.6 \text{ ms}^{-2}$

acceleration due to gravity Earth $g_e = 9.8 \text{ ms}^{-2}$

length on moon $L_m = ?$

length on Earth $L_e = ?$

Solution:

$$\text{As } T = 2\pi \sqrt{\frac{L}{g}}$$

$$\Rightarrow T^2 = 4\pi^2 \frac{L}{g}$$

$$\Rightarrow L = \frac{T^2}{4\pi^2} \times g$$

Length on Moon:

$$L_m = \frac{(2)^2}{4(3.14)^2} \times 1.6$$

$$\boxed{L_m = 0.16 \text{ m}}$$

Thus, length on moon will be 0.16 m

Length on Earth:

$$L_e = \frac{(2)^2}{4(3.14)^2} \times 9.8$$

$$\boxed{L_e = 0.99 \text{ m}}$$

Thus, length on Earth will be 0.99 m

Lined area for writing the answer to Question 6.

