SHIKSHA CLASSES

Subject : Science-I **ANSWERS PAPER** **Total Marks : 20**
Class : X **4. Effects of electric current**

Q.1 A) Choose the correct alternative : 2

1) The phenomenon of electromagnetic induction is :

Ans: c) Producing induced current in a coil due to relative motion between a magnet and the coil.

2) The essential difference between an AC generator & a DC generator is that.

Ans: d) AC generator has split rings while DC generator has a commutator.

B) Solve the following question. (Any One) 1

1) Find the odd one out

Fuse wire, bad conductor, rubber gloves, generator.

Ans: generator

2) Why does two magnetic field of lines never intersect?

Ans: Two magnetic field lines can never intersect each other because two tangents that can be drawn from that point of intersection which will give two directions of magnetic field from same point which is impossible.

3) Match the following :

Ans:

'A'	Answer
i) Electric current	i) Ampere
ii) Electric power	ii) watt

Q. 2 : A) Give scientific reason (Any One) 2

1) For electric power transmission, copper or aluminum wire is used.

Ans: Copper or aluminum are good conductors of electricity with low resistivity, therefore they are used for electric power transmission.

2) In the electric equipment producting heat e.g. iron, electric heater, boiler, toaster etc an alloy such as Nichrome is used not pure metal.

Ans: i) Electric iron, heater etc are based on heating effect of electric current

ii) Nichrome is a resistive alloy. It allows electricity to pass through it and offers some resistance that produce heat.

iii) The amount of heat produced depends on magnitude of current and resistance offered.

iv) On the other hand pure metals have low resistivity i.e. if maximum current is passed then they can not produce more heat.

v) Therefore nichrome is used in electrical equipments and is not pure metals.

Q. 2 : B) Solve the following questions : (Any Two) 4

1) State right hand thumb rule.

Ans.:Right hand thumb rule :- Imagine the conductor to be held in right hand with the fingers curled round and thumb stretched along length. If the thumb points dirrection of current then the turned fingers indicates direction of magnetic lines of force.

2) Which appliance will consume more electrical energy, 500 W TV set in 30mins or 600 W heater in 20 mins?

Ans: Given : Case I = T. V. Case II = heater

P = 500w P = 600w

T = 30min T = 20min

= 30 x 60 sec = 20 x 60sec

Formula $P = \frac{E}{T}$

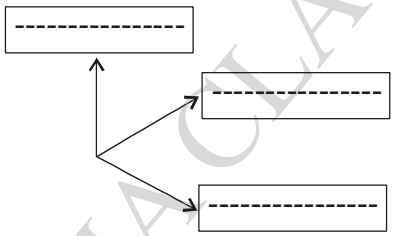
$\therefore$ E = P x T E = P x T

= 500 x 60 x 30 = 600 x 20 x 60

= 9,00,000J/s. = 7,20,000J/s.

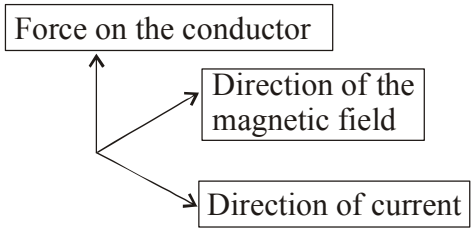
$\therefore$ Television will spend more electrical energy.

2) State fleming's left hand rule and label the following diagram.



Ans: Fleming's left hand rule :

The left hand thumb, index finger and middle finger are stretched so that they are perpendicular to each other. If the index finger is the direction of magnetic field and middle finger points in direction of current then thumb is the direction of force on the conductor.

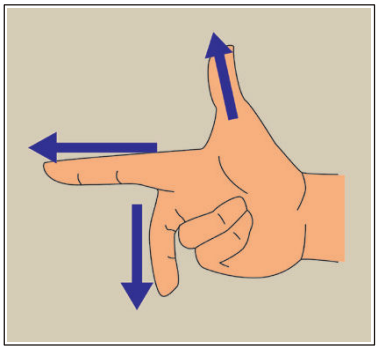


4) State Joule's law of heating.

Ans: **Joule's law of heating :** When an electric current is passed through a conductor, it produces heat mathematically $H = I^2Rt$. Heat produced is directly propertional to the square of the current, resistance and time.

Q. 3 : Solve the following questions in brief (Any 2) : 6

1) Name the following diagram and explain



Ans. : The diagram is of Fleming's right hand thumb rule.

From above figure :

i) Indicates the motion of conductor.

ii) Indicates direction of magnetic fleld.

iii) Indicates direction of induced current.

Fleming's right hand thumb rule :

i) Stretch the thumb, index finger, and middle finger of right hand in such a way that they will be perpendicular to each other.

ii) In this position the thumb indicate the direction of motion of conductor, the index finger the direction of magnetic field and middle finger shows the direction of induced current.

2) How does the short circuit occur? What is its effect?

Ans. : Short circuiting occurs when live wire & neutral wires come in contact with each other. Due to this resistance of the circuit becomes very small & huge amount of current flows through the circuit which in turn produces more heat and causes fire.

3) Heat energy is being produced in a resistance in a circuit at the rate of 100 W. The current of 3A is flowing in the circuit. What must be the value of the resistance?

Ans. : **Given :** P = 100W

I = 3A

R = ?

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

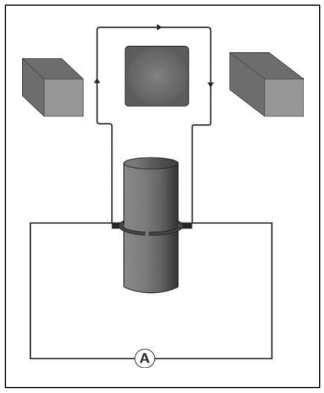
$$\therefore V = \frac{P}{I} = \frac{100}{3} = 33.3\ V.$$

$$P = VI = Vx\frac{V}{R} = \frac{V^2}{R}$$

$$P = \frac{V^2}{R}$$

$$\therefore R = \frac{V^2}{P} = \frac{(33.3)^2}{100} = \frac{1,108.89}{100} = 11\Omega$$

4) Observe the figure and answer the following questions.



a) Identify the machine shown in figure.

b) Write a use of this machine.

c) How transformation of energy takes place in this machine?

Ans.: a) This instrument shown in the figure is an electric generator.

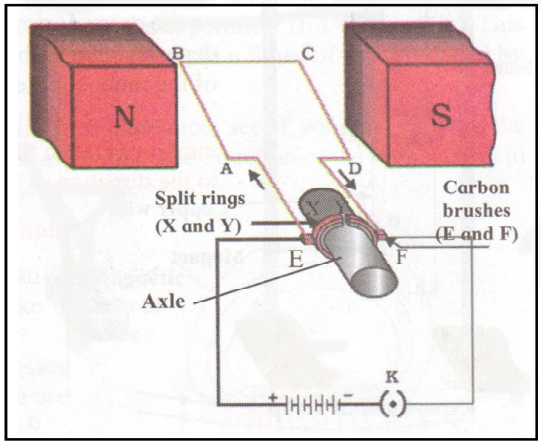
b) This machine is used to generate electricity

c) The generator generates electricity through the following transformation. Mechanical energy is converted into electic energy.

Q.4: Solve the following question. (Any One) **5**

1) Explain the construction & working of Electric motor with the help of neat & well labelled diagram.

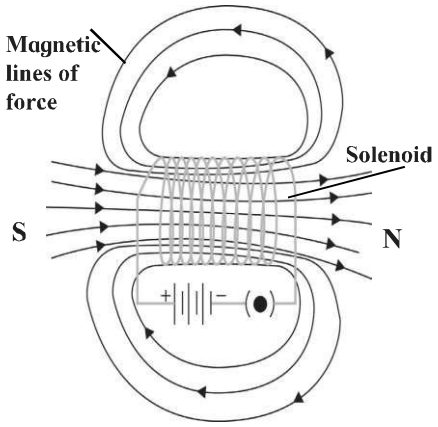
Ans. : Let the current in the coil (ABCD) of motor enters from the source of battery through conducting brush E, flow along ABCD & finally flows back. On applying Flemings left hand rule we find that force acting on arm AB due to magnetic field pushes it downwards. But the force acting on arm CD pushes it upwards. Thus, the coil and the axle rotate anticlockwise. Due to the action of split rings P & Q change their contacts with brushes. As a result current begin to flow in coil along DCBA.



2) Define solenoid. Explain magnetic field due to a current in a solenoid with diagram.

Ans. : **Soleoid :** A solenoid is a coil of copper wire with a resistive coating wound in the chain of loop and wrapped in shape of cylinder is called as solenoid.

Magnetic field produced by a solenoid :



Magnetic lines of force of a magnetic field produced by a current passsing through a solenoid coil.

1) Above figure shows a solenoid and magnetic lines of force produced by solenoid.
2) Whenever current is passed through a solenoid one end of solenoid act as north pole and other act as magnetic south pole similar to bar magnet.
3) The magnetic line of force inside the solenoid are parallel to each other.
4) The lines form concentric curves. They travel from north pole to the south pole and then inside the loop of solenoid.

Thus the solenoid has all the properties of the field produced by bar magnet.

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