

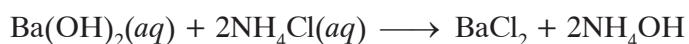
Answers to RSPL/2 (DS2)

1. The two carbon brushes are connected to the battery and touch the outer side of the two halves of the split ring connected to the coil. Thus, brushes are the contact points for the supply of electric current.

OR

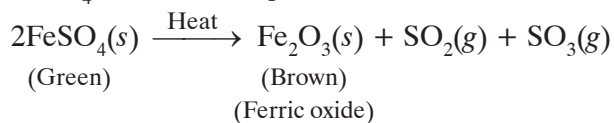
Lenz's law states that the direction of induced current is such that it opposes the change producing it.

2. Double displacement reaction will take place



3. (a) Discharge of domestic sewage and effluents from factories into it.
(b) Coliform bacteria
(c) – The coliform bacteria may increase.
– The food chains will get disrupted and it may lead to increase in mosquito larvae.
(d) Biomagnification is a phenomenon in which certain harmful chemicals enter the organisms and become concentrated at successive higher trophic levels as they travel along the food chain.

4. (a) FeSO_4 — ferrous sulphate



- (b) (i) Slaked lime
(c) (iv) Limestone
(d) Exothermic reaction
5. (c)

OR

- (c)
6. (b)
7. (b) $W = qV = 20000 \times 10 = 2,00,000 = 2 \times 10^5 \text{ J}$
8. (c) Same at all points.
9. (a)
10. (d)
11. (b)

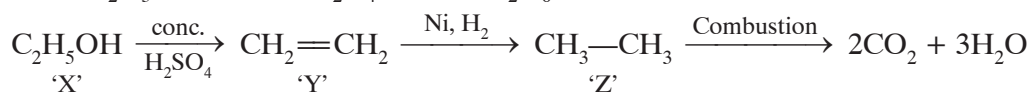
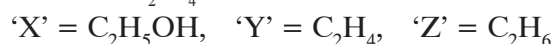
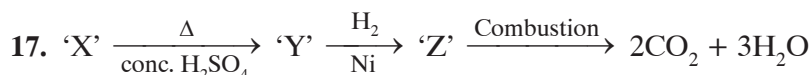
OR

- (c)
12. (d)
13. (c) Assertion is true but Reason is false.

14. (a) Both the Assertion and the Reason are correct and Reason is the correct explanation of the Assertion.
15. (a) Curry contains turmeric which is an indicator. It gives red colour in base when soap is scrubbed as soap solution is basic.
- (b) On washing with water, soap gets removed from the curry stain. As basic solution is removed, the red colour disappears.
- (c) Litmus and Turmeric

OR

- (a) Methyl orange, phenolphthalein
- (b) Substances which indicate acid or base by changing their odour in different media are called olfactory indicators.
For example, Onion
- (c) $2\text{NaOH}(aq) + \text{Zn}(s) \longrightarrow \text{Na}_2\text{ZnO}_2(s) + \text{H}_2(g)$
Sodium zincate is formed and hydrogen gas is evolved.
16. (a) Cryolite is added to the purified bauxite before it is electrolysed due to following reasons:
- (i) To lower the melting point of bauxite.
- (ii) To make the molten bauxite electrically more conducting.
- (b) Aluminium gets covered with a thin layer of Al_2O_3 when it is exposed to air. This thin layer of Al_2O_3 prevents further reaction between aluminium and air. Therefore, aluminium shows less corrosion than iron.
- (c) To protect it from rusting, iron is galvanised with zinc not copper, because zinc is more electropositive than iron while copper is less electropositive than iron.



'X'
Ethanol

'Y'
Ethene

'Z'
Ethane

18. (a) **Aqueous Humour:** It is a transparent gelatinous fluid, secreted from ciliary muscles and fills the space between the cornea and the eye lens. It provides nutrition to the eye tissues and increases the protection against dust, wind, pollen grains, etc.
- (b) **Retina:** It is a delicate membrane. It acts like a screen on which a real, inverted and diminished image of the object, is formed by the crystalline lens of the eye. It contains enormous number of light sensitive cells. These light receptors are known as rod and cone cells which generate electrical signals upon illumination. These electrical impulses are sent to the brain via optic nerves for further processing.
- (c) **Ciliary Muscle:** It modifies the curvature and thereby the focal length of the eye lens by contracting or relaxing itself to focus the image of an object on the retina according to the distance of the object.

19. (a)
$$\frac{1}{R} = \frac{1}{8\ \Omega} + \frac{1}{8\ \Omega} = \frac{2}{8}\ \Omega = \frac{1}{4}\ \Omega$$

Thus, effective resistance,

$$R = 4\ \Omega$$

(b) Total resistance,

$$R = 4\ \Omega + 4\ \Omega = 8\ \Omega$$

Voltage, $V = 8\ \text{V}$

$$\text{Current, } I = \frac{\text{Voltage}}{\text{Resistance}} = \frac{8\ \text{V}}{8\ \Omega} = 1\ \text{A}$$

(c) Potential difference across $4\ \Omega$ resistor

$$= \text{Current} \times \text{Resistance}$$

$$= 1\ \text{A} \times 4\ \Omega = 4\ \text{V}$$

20. $f = -15\ \text{cm}$, $v = -10\ \text{cm}$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

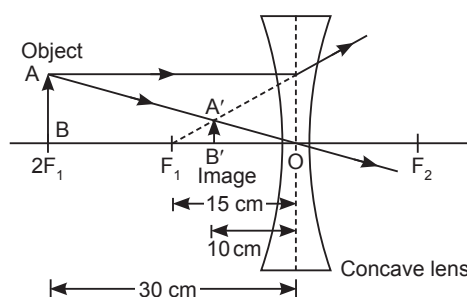
$$\Rightarrow \frac{1}{-15} = \frac{1}{-10} - \frac{1}{u}$$

$$\Rightarrow \frac{1}{u} = \frac{-1}{10} + \frac{1}{15}$$

$$\Rightarrow \frac{1}{u} = \frac{-3+2}{30} = \frac{-1}{30}$$

$$\therefore u = -30\ \text{cm}$$

The object was placed at a distance of 30 cm from the lens.



21. Direct Methods:

(a) Collecting solar energy using solar heaters and cookers.

(b) Converting solar energy into electrical energy using photovoltaic cells.

Indirect Methods:

(a) Converting solar energy to chemical energy in the form of biomass in plants.

(b) By using wind and water energies, tidal energy and ocean thermal energy. (any three)

OR

Solar cells have gained importance because the solar cells:

(a) do not cause any pollution.

(b) can be easily used in remote and isolated areas.

(c) cheap sources of energy.

22. (a) – The spores are thick-walled and help the organism to tide over unfavourable conditions.

– They also help in dispersal to new areas.

(b) Contraceptive methods for females:

(i) Changing the hormonal balance of the body

– Certain drugs/hormones are taken in the form of pills; they prevent the release of eggs and thereby fertilisation.

- The hormonal imbalance can affect the metabolism and produce some side effects.
 - (ii) Contraceptive devices like loops and copper-T
 - They are placed in the uterus to prevent pregnancy.
 - They can cause side-effects due to irritation of uterine tissue.
 - (iii) Surgical method
 - The transport of ovum is prevented by creating a block in the fallopian tube and hence, fertilisation is prevented.
 - Surgery itself can cause infections and other problems if not performed properly.
- (any two)

23. (a) Differences:

Inherited characters	Acquired characters
<ul style="list-style-type: none"> – These characters are passed on from the parents to the offspring. – The DNA/gene for such traits are present in the germ cells also; hence, they can be transmitted to the next generation. 	<ul style="list-style-type: none"> – These characters are acquired by an individual after birth during the lifetime. – The DNA/gene is not influenced by these traits and hence, cannot be transmitted to the next generation.

- (b) (i) Errors in DNA copying.
 (ii) Recombination during sexual reproduction.

OR

- (a) Artificial selection is the process practised by man to select the characteristics in organisms, that are advantageous to him.
 e.g. Cauliflower, *Kohlrabi*, Kale, etc. have been developed by artificial selection from wild cabbage.
- (b) Genetic drift refers to random changes in the frequency of alleles of a population over successive generations.

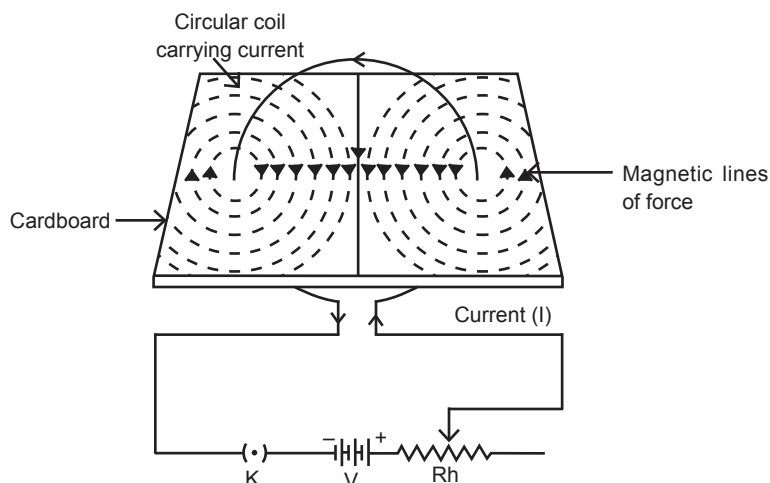
24. (a) Functions of cerebellum:

- (i) It controls the precision of voluntary movements.
- (ii) It is responsible for maintaining posture and balance of the body.

(b) **Differences:**

Involuntary actions	Reflex actions
<ul style="list-style-type: none"> – These are controlled by mid-brain and hind-brain. – These involve the involuntary muscles. – They occur in a rhythmic manner. 	<ul style="list-style-type: none"> – These are controlled by spinal cord. – These involve the voluntary muscles. – They are sudden/spontaneous responses to some stimuli.

25. (a) Diagram showing the magnetic field lines produced by the current-carrying circular coil.



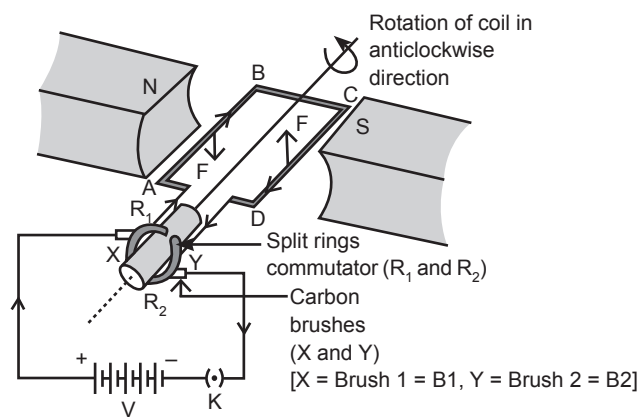
The magnetic field lines near each segment of the wire are circular and form concentric circles. The magnetic field lines near the centre of the coil are almost straight lines. At the centre of the coil, the magnetic field is uniform and perpendicular to the plane of the coil.

A current-carrying circular coil behaves like a disc magnet, whose one face is the N-pole and the other is the S-pole.

(b) Each turn of the coil acts a magnet. For a coil of n turns, a magnetic field of all the turns gets added up to become n times as large as that produced by a single turn.

OR

It works on the principle that when a coil rotates in a uniform magnetic field, the current is induced in the coil. The labelled diagram is—



Working: Let the coil 'ABCD' initially in horizontal position, is rotated anticlockwise, i.e., the arm 'AB' moves downwards and arm 'CD' upwards. Due to the motion of the coil in the magnetic field, induced current is produced in the coil from D to C.

According to Fleming's right hand rule—

After half rotation, the arms of the coil interchange their positions. Arm 'AB' comes to the right and arm 'CD' comes to the left. During the second half of the rotation, the current flows from B to A in the arm 'AB'.

The two rings (R_1 and R_2) rotate with the coil and touch the two carbon brushes (B_1 and B_2) one by one. As a result, each carbon brush continues to have the same polarity (+ or -). Brush B_2 always remains positive (+) and brush B_1 remains negative (-). This current so produced is called direct current (DC). One carbon brush touches the coil arm moving up in the magnetic field while the other carbon brush touches the coil arm moving down in the magnetic field. Therefore, the current always moves in one direction.

26. (a) When white light from sun falls on molecules/particles in the atmosphere, the scattered light consists mainly of blue colour. So, when we look upwards, the sky, far away from the sun, appears blue.
- (b) Due to wind and convection currents, density of the atmospheric layers keeps on changing. As a result, the position of a star keeps fluctuating from its mean position which makes them appear twinkling to the observer.
- (c) The upper layers of atmosphere are optically rarer than the lower layers. It is optically denser near Earth and rarer at higher altitudes. Rays of light from a star suffer refraction at each layer of atmosphere and bend slightly towards the normal. Ray follows curved path and appears to come from the star.
- (d) Small droplets of water remain suspended in the air. When sunlight falls on these drops, the white light splits into seven colours forming rainbow.
- (e) When we look into a pool of water, we do not see the actual bottom of the pool, we see virtual image of the bottom of the pool which is formed by the refraction of light coming from the pool water into the air.

27. (a) Formation of bubbles at both the electrodes.

(b) $H_2 : O_2 = 2 : 1$

(c) Oxygen is collected at anode and hydrogen at cathode.

(d) **Test for H_2 :** Bring a burning candle near the mouth of test tube. Candle gets extinguished with pop up sound.

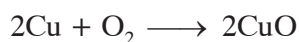
Test for O_2 : Bring a burning candle near the mouth of test tube. The flame of candle intensifies.

(e) $2H_2 + O_2 \longrightarrow 2H_2O$

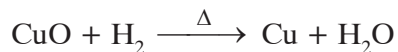
$H_2 + \frac{1}{2}O_2 \longrightarrow H_2O$

OR

(a) (i) This is due to oxidation of copper to become copper oxide which is deposited on the surface of copper.

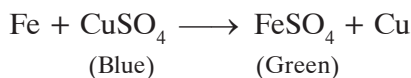


(ii) The black colour changes due to the reverse reaction taking place.



(Black
coating)

(iii) This is due to displacement reaction, ferrous sulphate will be formed which is green in colour.



(b) BHA — Butylated hydroxy anisole

BHT — Butylated hydroxy toluene

(c) Nitrogen gas because it prevents the oxidation of chips.

28. (a) (i) Na and K (ii) F and Cl

(b) Argon, Ar

(c) Newland's law of octaves

(d) 8, 0

(e) $\text{Na} \longrightarrow \text{Na}^+ + e^-$

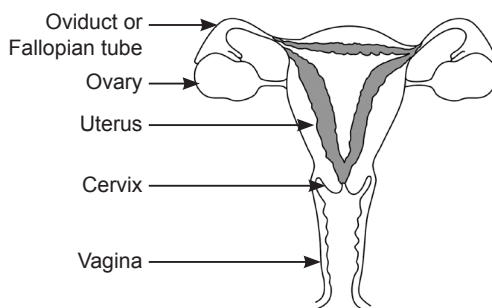
$\text{Cl} + e^- \longrightarrow \text{Cl}^-$

$\text{Na}^+ + \text{Cl}^- \longrightarrow \text{NaCl}$

29. (a) – *Spirogyra* reproduces asexually by fragmentation.

– Yeast reproduces asexually by budding.

(b)



(any four)

Human Female Reproductive System

(c) – In sexually reproducing organisms, there are special lineages of cells in specialised (reproductive) organs.

– Such cells undergo a special type of cell division, called meiosis and the germ cells or gametes have only half the number of chromosomes and half the amount of DNA as the parent cell.

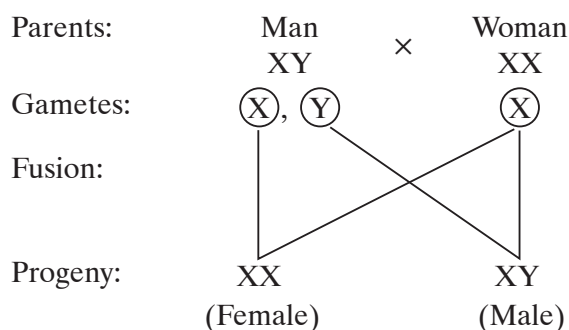
– When two such germ cells (gametes) fuse, the zygote/new individual is formed with the number of chromosomes and DNA content as in the parent organism.

– Thus, meiosis and fertilisation are responsible for keeping the amount of DNA constant through generations.

OR

(a) Sex-determination in Humans.

- In human beings, the sex of an individual is determined at the time of fertilisation, by the type of sperm fertilising the ovum.
- A human male has XY-sex chromosomes and produces two types of sperms, 50% of them with one X-chromosome and the other 50% of them with one Y-chromosome, along with 22 autosomes.
- A female has XX-chromosomes and produces only one type of ova, with one X-chromosome and 22 autosomes.
- If the ovum is fertilised by a sperm carrying X-chromosome, the zygote develops into a female individual.
- If the ovum is fertilised by a sperm carrying Y-chromosome, the zygote develops into a male individual.



(b) Differences:

Self-pollination	Cross-pollination
<ul style="list-style-type: none">- It is the transfer of pollen grains from the anthers to the stigma of the same flower.- It does not involve any pollinating agent.- It may not result in genetic variation.	<ul style="list-style-type: none">- It is the transfer of pollen grains from the anther to the stigma of another flower.- It involves a pollinating agent.- It results in genetic variation.

30. (a) Plants show autotrophic nutrition

- They carry out photosynthesis.

(b) The major events in photosynthesis

- (i) Absorption of light energy by chlorophyll.
- (ii) Conversion of light energy into chemical energy and splitting of water molecules into hydrogen and oxygen.
- (iii) Reduction of carbon dioxide into carbohydrates.

(c) Mushrooms, bread mould, Yeast.

(any two)