Tripura Board
Class X Science
Sample Paper 2 – Solution

Group A

Physics

1. On increasing the area of cross-section, resistance decreases. This is because resistance is inversely proportional to area

2. The glass plate cover produces a greenhouse effect which helps to increase the temperature inside the box of the cooker. This heat cooks the food material kept inside.

3. Kilowatt hour or kWh

4. Convex mirrors have a very wide field of view as they are curved outwards. So, the convex mirrors enable the driver to view a much larger area than a plane mirror. The images produced are erect and their size is much smaller than the object. Hence, it is used as a rear view mirror in automobiles to see objects at the backside of the vehicle.

5. Ciliary muscles can contract or relax. Owing to this, they can change the thickness of the eye lens, which also changes its focal length. With changes in the focal length, the eye lens can make images of nearby objects and also far away objects. So, power of accommodation of the eye is due to the function of the ciliary muscles.

6. Stars emit light on their own; when this light travels through the earth's atmosphere which has variable optical density, the continuously changing atmosphere refracts the light from the stars in different amounts from one moment to the next. The light seems to be bright and dim as it keeps changing due to continuous refraction through the different layers of the atmosphere of the Earth. Hence, we say light twinkles at night.

7.

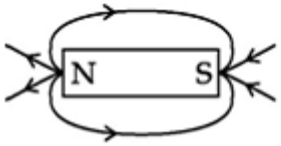


Fig. (1)

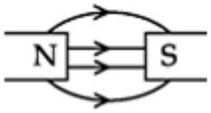


Fig. (2)

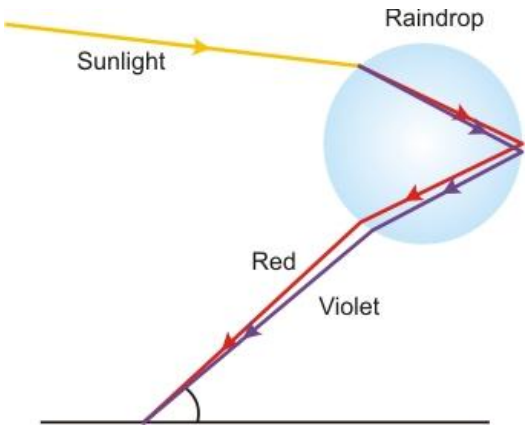
8. The force is perpendicular to the plane of the page. The direction of force can be determined by the Fleming's left-hand rule.

Fleming's left-hand rule is used to find the direction of this force. According to this rule, if we stretch the thumb, forefinger and middle finger of our left hand such that they are mutually perpendicular and if the first finger points in the direction of the magnetic field and the second finger in the direction of the current, then the thumb will point in the direction of the force acting on the conductor.

9. A current-carrying conductor produces a magnetic field around it which interacts with the magnetic field in which it is held. Thus, it experiences a force. Direction of this force depends on the direction of the current and the magnetic field.

Fleming's left-hand rule: If we stretch the thumb, forefinger and middle finger of our left hand such that they are mutually perpendicular, and if the first finger points in the direction of the magnetic field, the second finger in the direction of the current, then the thumb will point in the direction of the force acting on the conductor.

10. The rainbow is formed in the sky when the sun shines and it is raining at the same time. A rainbow is always formed in a direction opposite to that of the sun. A rainbow is produced by the dispersion of white sunlight by raindrops in the atmosphere. The raindrops in the atmosphere act like many small prisms. As white light enters and leaves these raindrops, the various colours present in white light are refracted by different amounts due to which an arch of seven colours called a rainbow is formed in the sky.



11.

(a) The image formed in front of the concave mirror is real; so, 'm' is negative,

Given:

m = -3,

Object distance, u = -10 cm

$$m = \frac{-v}{u}$$

$$-3 = \frac{-v}{-10}$$

$$v = -30 \text{ cm}$$

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} = \frac{1}{-30} + \frac{1}{-10}$$

$$\frac{1}{f} = \frac{-4}{30}$$

$$f = -7.5 \text{ cm}$$

Radius of curvature, R = 2f = 2 × (-7.5) = 15cm

(b) A lens is a piece of transparent glass bound by two spherical surfaces.

12.

(a)

(i) Right-hand thumb rule: If one holds a wire carrying current in the right hand in such a way that the thumb indicates the direction of current, then the folded fingers indicate the direction of the magnetic field surrounding the wire.

(ii) Fleming's left-hand rule: If we stretch the first three fingers of the left hand mutually perpendicular to each other such that the forefinger points along the direction of the magnetic field and the middle finger points along the direction of the current, then the thumb indicates the direction of the force experienced by the conductor.

(iii) Fleming's right-hand rule: If the forefinger, second (central) finger and thumb of the right hand are stretched at right angles to each other, with the forefinger in the direction of the field and the thumb in the direction of the motion of the wire, then the induced current in the wire is in the direction of the second or central finger.

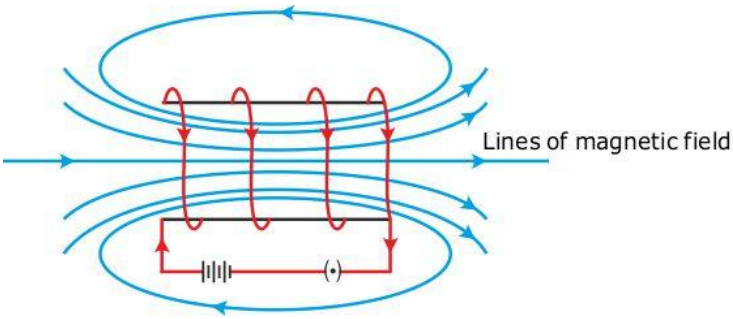
(b) The direction of AC changes after equal intervals of time. The direction of DC does not change.

Advantage of AC over DC: AC can be transmitted to long distances without much loss of energy.

Or

(a) A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is called a solenoid.

(b)



It is clear from the field pattern of the solenoid that this field is similar to that of a bar magnet.

(c) When current through a solenoid is reversed, the magnetic field also reverses its direction.

GROUP B
CHEMISTRY

13. The condition produced due to oxidation of fats and oils present in foods by virtue of which foods develop unpleasant smell and taste is called rancidity.

14. During a chemical combination, the product formed has its own set of properties and the reactants fail to retain their properties. So, water has different properties from its reactants and is hence used for extinguishing fires.

15. Due to small size and presence of four valence electrons, carbon forms strong bonds with other carbon atoms, hydrogen, oxygen, nitrogen or sulphur.

16. Ethanoic acid, CH_3COOH

17.

(a) Atomic size decreases along a period from left to right. It is due to increased nuclear charge because of which the force of attraction between the nucleus and the valence electrons increases and therefore, the atomic size decreases, so Na is bigger in size than Mg.

(b)

i. Most metallic element: Na
Metallic character decreases along a period due to decrease in tendency to lose electrons.

ii. Most non-metallic element: Cl
Non-metallic character increases along a period from left to right due to an increase in the tendency to gain electrons.

18. Mendeleev's Periodic Table was based on the law that the properties of elements are the periodic function of their atomic masses. So, cobalt with atomic mass 58.93 should be placed after nickel with atomic mass 58.71. However, to maintain similarity in properties, it had to be placed before nickel in Mendeleev's Periodic Table. Modern Periodic Table is based on the law that the properties of elements are the periodic functions of their atomic numbers. So, the problem was resolved because cobalt has a lower atomic number (27) than that of nickel (28).

19.

(a) Yes, the atoms of all the three elements lithium, sodium and potassium have one electron each in their outermost shells.

(b) Both helium (He) and neon (Ne) have filled outermost shells. Helium has a duplet in its K shell, while neon has an octet in its L shell.

20. In a physical change, there is only change of state of substance and no new substance is formed. Thus, melting of wax is a physical change because solid wax changes to liquid wax and no new substance is formed.

In a chemical change, a new substance is formed. Thus, the burning of wax is a chemical change because wax (made of hydrocarbons) burns to produce carbon dioxide and water vapour, i.e. new products are formed.

21. 'X' is more reactive than 'Y'; hence, 'X' is able to displace 'Y' from its salt, whereas 'Y' is not able to displace 'X' from its salt because it is less reactive than 'X'.

22. HCl gas is produced.

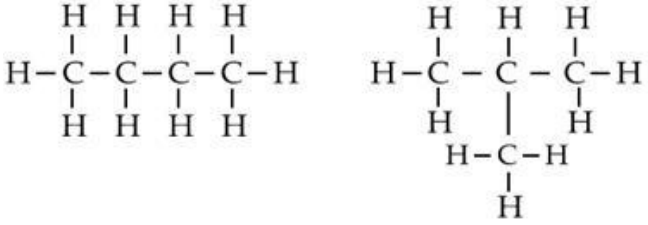
Chemical reaction: $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl \uparrow$

(i) The gas when passed through dry litmus paper will show no change in colour because it cannot show acidic properties as H^+ ions are not present.

(ii) The gas when passed through moist litmus paper will show colour change to red as it shows acidic properties because H^+ ions are produced when HCl dissolves in water.

23. Compounds having the same molecular formula but different structural formula are known as isomers and the phenomenon is called structural isomerism.

Eg: 4 carbon atoms in C_4H_{10} can be arranged in 2 different ways. C_4H_{10} has two isomers. These are n-butane and iso-butane



24.

(a)

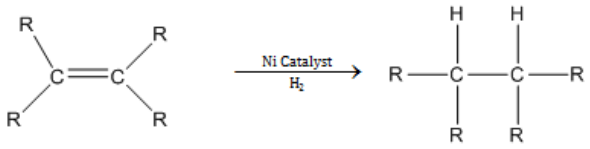
i. Ethanol

ii. 2-Bromopropane

(b) The formula of two successive members of a homologous series differs by -CH_2 unit.

(c) Unsaturated hydrocarbons will give a yellow flame with lots of black smoke.

(d) Hydrogenation of vegetable oils in the presence of nickel as a catalyst is an example of addition reaction.



Or

(a) Diamond and graphite are the two allotropes of carbon.

Diamond:

· Hardest substance

· Electrical insulator

Graphite:

· Comparatively soft; it is slippery over layers

· Good electrical conductor

(b) Aluminium articles have a longer life and attractive finish compared to many other metals because of the formation of a thin transparent protective film cover of aluminium oxide on the surface of aluminium formed due to its spontaneous reaction with oxygen.

(c)

(i) Ore: An ore is a type of rock which contains minerals with important elements including metals. The ores are extracted through mining; these are then refined to extract the valuable element(s).

(ii) Gangue: In mining, gangue is the commercially worthless material which surrounds, or is closely mixed with, a wanted mineral in an ore deposit.

(d) The electronic configuration of a metal atom is significant to know about the kind of bond which the metal will be forming. For example, in the formation of calcium chloride, chlorine only needs one electron to complete its octet, so two atoms of chlorine accept one electron each lost by the calcium ion.

Biology
Section A

1. When we keep plant cells in a hypotonic solution, they absorb water from the surroundings and become more turgid.

2. Organisms produced by asexual reproduction contain exactly the same number of chromosomes as the parent cells. So, they look alike and are considered as clones.

Section B

3. The importance of watershed management is:

i. It results in conservation of both water and soil.
ii. It is helpful in increasing the production of biomass.
iii. It controls excess of droughts and floods.
iv. It maintains ecological balance of water.

4.

Biodegradable waste	Non-biodegradable waste
The substances that are easily decomposed by microorganisms.	The substances that are not decomposed by microorganisms.
These substances easily mix with the soil after a short interval of time. E.g. paper	These substances are not able to mix with soil even after a long interval of time. E.g. plastic

5. Pesticides kill insects and pests; thereby, they protect the crops. However these pesticides remain on the crops which enter the food chain and get accumulated in the organisms at the topmost trophic level that causes diseases. When these are washed away by rain river water, it also causes pollution.

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7.

(i) The human kidney carries out the process of excretion by removing metabolic wastes from the blood.

(ii) It performs the function of osmoregulation by maintaining normal levels of water and mineral ions in body fluids.

8. The enzyme found in saliva is salivary amylase.

Role of saliva in digestion of food:

(i) Salivary amylase present in saliva converts starch into maltose and dextrose sugars.

(ii) Saliva moistens and lubricates the inner lining of the mouth cavity and the surface of the tongue and helps us in speaking.

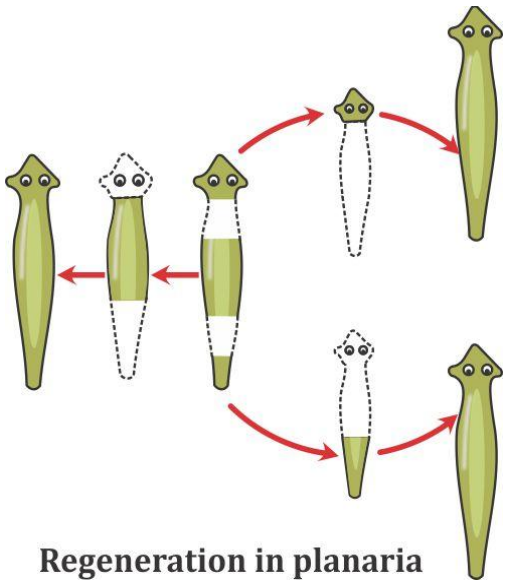
9. The hindbrain controls involuntary actions. It consists of pons, medulla and cerebellum.

Functions of medulla and cerebellum:

(i) The medulla helps in controlling involuntary actions such as blood pressure, salivation and vomiting.

(ii) The cerebellum is responsible for the precision of voluntary actions and maintaining the posture and balance of the body.

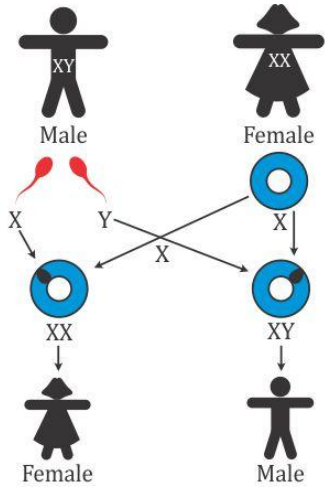
10. Regeneration is the ability of an organism to grow into a complete individual when its body is divided into any number of pieces. It can be seen in Hydra and Planaria.



Regeneration in planaria

Regeneration is carried out by specialized cells which proliferate and further make a large number of cells. From this mass of cells, different cells undergo changes to become various cell types and tissues. These changes take place in an organized sequence referred to as development.

11. The females carry two X-chromosomes. Females produce one type of gametes (eggs) with same type of chromosomes (22 + X). Males have one X and one Y chromosome. Among the male gametes, half of the sperms carry X-chromosome (22 + X) and half carry Y-chromosome (22 + Y). Thus, female is homogametic and male is heterogametic.



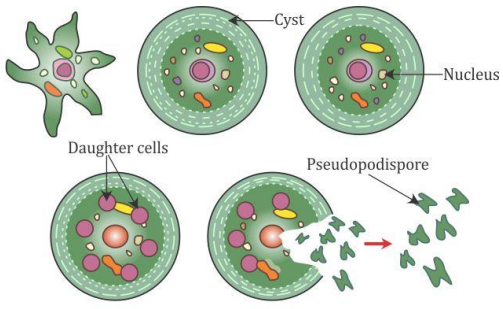
When a sperm carrying X chromosome fertilizes an egg, the zygote develops into a female (XX condition). When a sperm carrying Y chromosome fertilizes an egg, the zygote develops into a male (XY condition). Thus, sex is determined at the time of fertilization.

12.

(i) Multiple fission.

(ii) Binary fission.

This kind of division takes place during unfavorable conditions. The nucleus divides several times into many daughter nuclei. This process takes place inside a cyst which is a protective wall formed in single celled conditions. The daughter nuclei arrange along the periphery of the parent cell, and a bit of cytoplasm around each daughter nucleus develops another membrane. Finally, the multinucleated body divides into as many parts as the number of daughter nuclei and forms daughter individuals. This type of fission, where not one but several individuals arise, is called multiple fission. Example - Plasmodium.



Multiple fission

Or

(a) The steps which take place in chloroplasts during photosynthesis are

(i) Absorption of sunlight energy by chlorophyll.

(ii) Conversion of light energy into chemical energy and the splitting of water into hydrogen and oxygen by light energy.

(iii) Reduction of carbon dioxide by hydrogen to form carbohydrate (glucose) by utilising chemical energy.

(b) The opening and closing of stomata is controlled by guard cells. When water flows into the guard cells, they swell, become curved and cause the stomata to open. When the guard cells lose water, they shrink, become straight and close the stomata.

(c) Carbon dioxide is made available to plants when stomata are open