Karnataka Board Class 10 Science 2017

1. This Question Paper consists of 42 objective and subjective types of questions.
2. This question paper has been sealed by reverse jacket.

You have to cut on the right side to open the paper at the time of commencement of the examination. Check whether all the pages of the question paper are intact.

3. Follow the instructions given against both the objective and subjective types of questions.
4. Figures in the right hand margin indicate maximum marks for the questions.
5. The maximum time to answer the paper is given at the top of the question paper. It includes 15 minutes for reading the question paper.

Four alternatives are given for each of the following questions/incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet.

$10 \times 1 = 10$

Q1. According to Graham's law of diffusion, at the given temperature and pressure the rate of diffusion of a gas is

(A) Directly proportional to the square root of its density.

(B) Directly proportional to its mass.

(C) Inversely proportional to the square root of its density.

(D) Inversely proportional to the square of its mass.

Solution:

(C) inversely proportional to the square root of its density

Q2. When the source of the sound is moving away from the observer, the observer feels the sound to be of lower frequency because,

(A) The waves behind the source of sound are compressed.

(B) The wavelength of the source of sound decreases.

(C) The waves behind the source of sound are farther apart.

(D) The observer receives more number of waves.

Solution:

(B) the wavelength of the source of sound decreases.

Q3. The distribution of taste buds in the human tongue is shown in this figure. The part labelled as '1', senses this taste

(A) Sweet

(B) Bitter

(C) Salt

(D) Sour.

Solution: (D) Sour.

Q4. 'Norit' is used in the manufacture of sugar because

(A) The impurities in the sugarcane juice get precipitated

(B) The crystallisation of sugar becomes fast

(C) Sugar gets decolourised

Solution: (C) sugar gets decolourised

Q5. When Mendel crossed pure varieties of a tall plant with red flowers and a dwarf plant with white flowers, the number of dwarf plants with white flowers obtained in F1 generation is

(A) 0

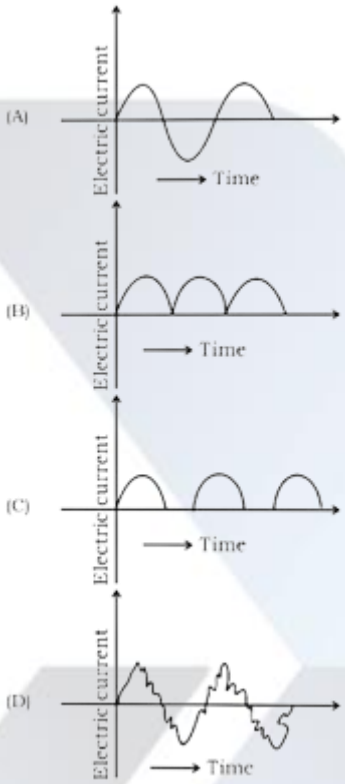
(B) 9

(C) 3

(D)1

Solution: (A) 0

Q6. Identify the graph of alternating current in the following.



Solution: (A)

Q7. If the number of blood cells present in 1 mm^3 blood of a healthy person is written in the increasing order, then the correct order obtained is

(A) Platelets, red blood cells, white blood cells

(B) white blood cells, red blood cells, platelets

(C) Red blood cells, platelets, white blood cells

(D) white blood cells, platelets, red blood cells.

Solution: D) white blood cells, platelets, red blood cells

Q8. The main feature of the red giant stage of a star is

(A) The star has hydrogen core.

(B) The radiation pressure acting outwards is equal to the inward gravitational pull of the star.

(C) The temperature of the star increases and emits radiation of high frequency.

(D) The star swells, loss of radiation takes place, the temperature decreases.

Solution: (a) the star has hydrogen core

Q9. The disease Syphilis is caused by the bacterium

(A) Neisseria gonorrhoeae

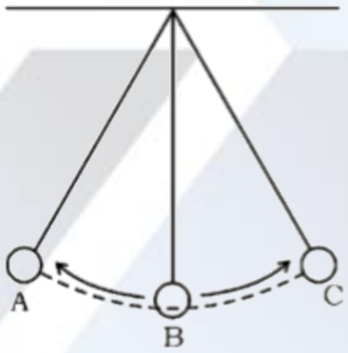
(B) Vibreocholerae

(C) Treponemapallidum

(D) Salmonella typhae.

Solution: (C) Treponemapallidum

Q10. The motion of a simple pendulum is shown in the figure. Identify the correct statement related to this figure.



(A) The pendulum has maximum potential energy at the point B.

(B) The pendulum has maximum kinetic energy at the point A.

(C) The pendulum has maximum potential energy at the points A and C.

(D) The pendulum has maximum kinetic energy at the points A and C.

Solution:

(C) The pendulum has maximum potential energy at the points A and C.

Q11. A few terms used in metallurgy are given in Column-A and their meanings are given in Column-B. Match them and write the answers along with its letter:

$4 \times 1 = 4$

Column - A	Column - B
(A) Concentration of the ore	(i) The substance added to the ore before heating.
(B) Calcination	(ii) Heating the ore just below its melting point in the presence of air.
(C) Flux	(iii) Impurities present in the ore.
(D) Roasting	(iv) Subjecting the ore to the method of electrolysis.
	(v) Increasing the percentage of desired component of the ore.
	(vi) Heating the ore just below its melting point in the absence of air.
	(vii) Crystallising the ore.

Solution:

Column - A	Column - B
(A) Concentration of the ore	The substance added to the ore before heating
(B) Calcination	Heating the ore just below its melting point in the absence of air
(C) Flux	Subjecting the ore to the method of electrolysis
(D) Roasting	Heating the ore just below its melting point in the presence of air.

Answer the following questions: $7 \times 1 = 7$

Q12. Effluents coming from furnaces of the industries must be cooled to atmospheric temperature before releasing into water bodies. Why?

Solution:

Effluents coming from furnaces of the industries must be cooled to atmospheric temperature before releasing into water bodies to prevent the death of aquatic life due to the thermal shock.

Q13. What are mechanical waves?

Solution:

A mechanical wave is a wave that is an oscillation of matter and is responsible for the transfer of energy through a medium.

Q14. Define Charles law.

Solution:

Charle's Law states that the volume of an ideal gas at constant pressure is directly proportional to the absolute temperature.

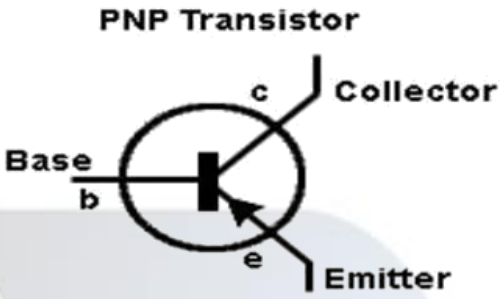
Q15. Moss plants do not grow to greater heights. Why?

Solution:

Due to the absence of vascular tissues or due to the absence of xylem and phloem tissues. Moss plants do not grow to greater heights.

Q16. Draw the circuit symbol of p-n-p transistor.

Solution:



Q17. If an A.C. source of 220 volts has to be stepped down to 10 volts, then calculate the turns ratio of the primary coil and secondary coil.

Solution:

$$\text{Ratio} = \frac{N_{sec}}{N_{pri}}$$

$$= \frac{220}{10}$$

$$= 22:1$$

Q18. The electrochemical equivalents of copper and gold are 0.0003 gm/coulomb and 0.000681 gm/coulomb respectively. If the equal amount of current is passed for the equal time interval in copper and gold voltameters, then in which voltameter the deposition of the metal at the cathode is more? Why?

Solution:

In gold metal, the deposition of the metal at the cathode is more because, the mass of the substance deposited is directly proportional to its chemical equivalence.

Answer the following questions: $26 \times 2 = 52$

Q19. Explain the structure of male and female cones of gymnosperms.

Solution:

Male Cones - the male strobili or male cones have microsporophylls, which have the microsporangia that produce the haploid microspores. Some of these

microspores develop into male gametes called the pollen grains, while the rest degenerate.

Female Cones - the megasporophylls form a cluster and are called as the female strobili or cones. They bear the ovules having the megasporangium. Thus produces the haploid megaspores and a megaspore mother cell.

Q20. List any four characteristic features of fishes.

Solution:

Four characteristic features of fishes.

- The streamlined body has an exoskeleton composed of dermal scales.
- Locomotory structures are in the form of paired and unpaired fins.
- Gills are the respiratory organs.
- Heart is two chambered with one auricle and one ventricle.

OR

List any four characteristic features of reptiles.

Solution:

characteristic features of reptiles are followings:

- The exoskeleton is in the form of epidermal scales, forming distinct plates.
- Locomotor structures are in the form of a pair of forelimbs and a pair of hindlimbs, containing five digits each.
- Respiratory organs are a pair of lungs.
- The heart is three chambered.

Q21. Explain the method of manufacturing 95% pure ethyl alcohol from molasses.

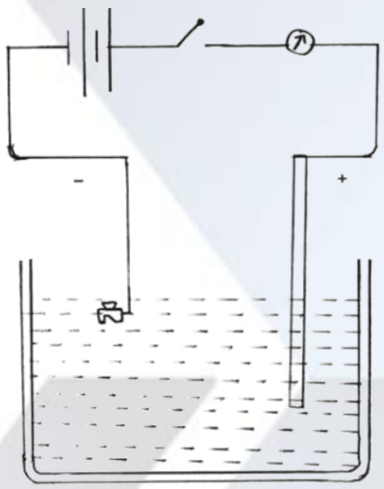
Solution:

Molasses is waste product of sugar industry and represents a promising raw material for ethanol production. On industrial scale, ethanol can be prepared by the fermentation of molasses. Molasses is diluted with water and acidified by adding dilute sulphuric acid. Yeast is added and the temperature is maintained at

308 K. Fermented matter is called Wort. Wort is fractionally distilled to get 95% pure alcohol.

Q22. Draw the diagram of the apparatus used in electroplating.

Solution:



Apparatus used in electroplating

Q23. "In agriculture, growing genetically modified plants can reduce the water pollution caused by agricultural wastes." Justify this statement.

Solution:

To prevent crop from pests, weeds etc., pesticides, herbicides are used. This will lead to soil and water pollution as excess pesticides and herbicides seeps down the soil to nearby water sources or underground aquifer rendering the water source unusable. Genetically modified crops which are more resistance to pest, weeds can be used to reduce the number of pesticides, herbicides used.

Q24. Mention the differences between n-type and p-type semiconductors.

Solution:

A p-type semiconductor material is formed by the addition of group III elements or trivalent impurity to a pure (intrinsic) semiconductor. On the contrary, the n-type semiconductor material is formed by the addition of group V elements i.e., a pentavalent impurity to a pure or intrinsic semiconductor.

OR

Mention the differences between intrinsic semiconductors and extrinsic semiconductors.

Solution:

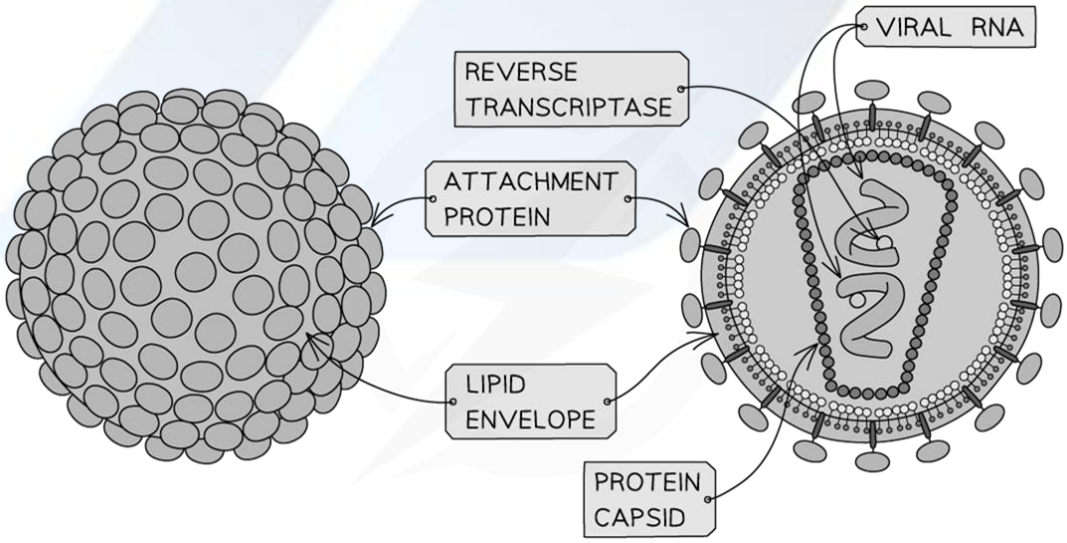
Semiconductors which are not doped are known as intrinsic semiconductors, while a semiconductor material doped with impurities is known as an extrinsic semiconductor.

Number of positive charge carriers (holes) and the negative charge carriers are equal in intrinsic semiconductors, while by adding impurities the number of charge carriers are changed, hence unequal in extrinsic semiconductors.

Intrinsic semiconductors have relatively lower conductivity than the extrinsic semiconductors.

Q25. Draw the diagram showing the structure of HIV.

Solution:



HIV

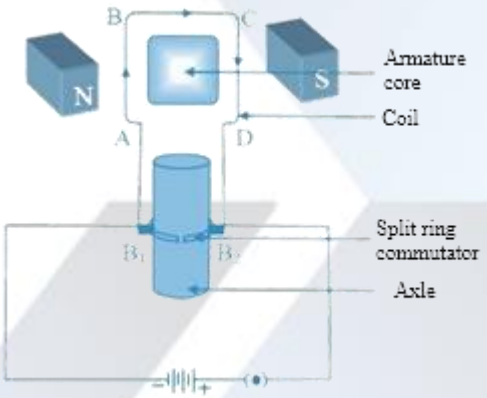
Q26. "Limited use of fossil fuels helps to reduce acid rain." Give scientific reasons for this statement.

Solution:

Oxides of sulphur and nitrogen are released by the combustion of fossil fuels. These cause acid rain. Limited use of fossil fuels reduces the release of these oxides thus reducing gases which cause acid rain.

Q27. Draw the diagram of a D.C. motor.

Solution:



DC Motor

Q28. Explain the working of SONAR.

Solution:

SONAR stands for Sound Navigation and Ranging.

Principle and working: It is based on the principle of the reflection of sound wave (i.e., echo). It can be used to find the depth of the ocean accurately. Powerful pulses of ultrasound are sent out at regular intervals from a transmitter mounted on the ship. When these pulses are intercepted by a distant object or even the sea bottom, they get reflected. The reflected sound or echo is detected by an underwater receiver which is also mounted on the ship. The time interval between transmission and reception of the ultrasonic signal is recorded.

If v is the speed of ultrasound in seawater and t is the elapsed time between the transmission and reception of the ultrasound signal from an unseen object underwater at a point, then the distance of the object from the point of transmission is given by h

$$h = v \times \frac{t}{2}$$

OR

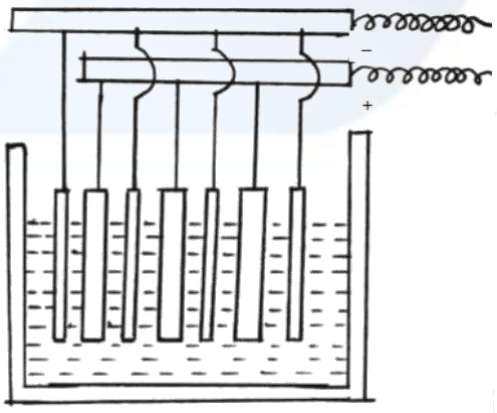
Explain the working of an ultrasound scanner.

Solution:

An ultrasound scanner works by sending high frequency sound pulses into a patient's body. The sound waves travel through the patient's body, passing through different types of tissue. The amount of sound reflected back from an acoustic interface depends on a property of the materials on either side of the interface called acoustic impedance. The acoustic impedance of a material is simply its density multiplied by the speed at which sound travels through it. The scanner calculates the distance from the probe to the acoustic interfaces based on the time taken for echoes to bounce back to the probe. The distances and intensities are then displayed on a screen to form a two-dimensional (2D) image.

Q29. Draw the diagram of the apparatus used in the electrolytic refining of copper.

Solution:



Electrorefining Setup

Q30. List the physical features of Neanderthal man.

Solution:

Neanderthal man existed in late Pleistocene period.

They walked upright with bipedal movement.

The face was slightly prognathous and hard Low Brows, receding Jaws and high domed head The jaw was deep with no chin and skull bones were thick.

OR

List the physical features of Australopithecus.

Solution:

Physical features of Australopithecus are following:

- Its height was 1.5 CM and had both human and Apes characters.
- It was fully a bipedal hominid.
- It was off erect posture and had an omnivorous diet.
- Brow ridges projected over eyes and black chin.

Q31. Name the reaction that causes enormous amounts of energy in the sun. Mention the two uses of solar cells.

Solution:

Nuclear fusion is the reaction that causes an enormous amount of energy in the sun.

Uses of solar cells:

- They provide electric power to satellites and space probes.
- They provide electric power to offshore drilling platforms and light houses.
- TV relay stations for wireless transmission system located in remote areas use solar panels to get electric power

Q32. Name the type of glass used in the following situations:

(a) Manufacture of laboratory equipment.

Solution: Borosilicate glass.

(b) Manufacture of lens.

Solution: Lead glass

(c) Manufacture of window glass

Solution: Soda glass

(d) Used as wind shield in aeroplane industries.

Solution: Safety glass

OR

Name the type of paper used in the following situations:

(a) To wipe the face

Solution: Tissue paper

(b) Manufacture of post card.

Solution: Cardboard paper

(c) To separate fine solids from liquids.

Solution: Filter paper

(d) To wrap the cookies.

Solution: Wax paper

Q33. Explain the method of extraction of crystalline silicon with chemical equation.

Solution:

Crystalline silicon is obtained when an excess of silica is heated with coke in the electric furnace in the absence of air.

$$SiO_2 + 2C + Heat \rightarrow Si + 2CO$$

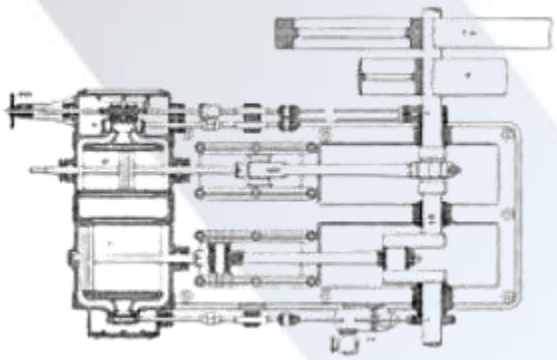
Q34. In a specific group of unsaturated hydrocarbons, though the ratio of carbon and hydrogen atoms is 1: 2, CH2 is not the first member of those hydrocarbons. What is the reason for this? Write the structural formula of the first member of that hydrocarbon group.

Solution:

The tetravalent property of carbon is not satisfied OR carbon cannot form a double bond with hydrogen atom.

Q35. Draw the diagram showing the expansion stroke of a steam engine.

Solution:



The expansion stroke

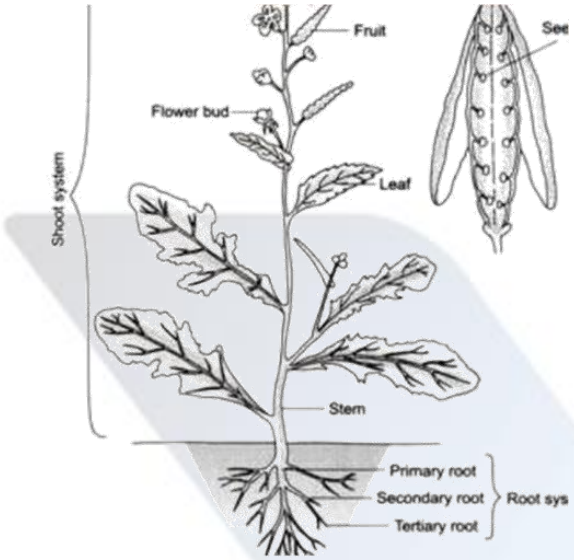
Q36. What is allotropy? Mention the two crystalline allotropes of carbon.

Solution:

The phenomenon in which an element occurs in different forms, differ in their physical properties but identical in their chemical properties is called allotropy. Graphite, diamond, are allotropy of carbon.

Q37. Draw the diagram showing the structure of a dicot plant.

Solution:



DICOT PANT

Q38. Write the balanced chemical equation for the following chemical reactions:

(a) Sodium reacts with water

Solution:

$2Na + 2H_2O \rightarrow 2NaOH + H_2$

(b) Zinc reacts with dilute sulphuric acid.

Solution:

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

Q39. Explain the supernova stage of a star.

Solution:

Stars are hot bodies of glowing gas that starts their life in Nebulae. They vary in size, mass and temperature, diameter. The energy produced by stars is by nuclear fusion in the star core. The core collapses in less than a second, causing an explosion called supernova, in which a shock wave blows of the outer layers of the star.

Q40. Name the components of Xylem tissue.

Solution:

The different components of Xylem include tracheids, vessels, xylem parenchyma and xylem fibres.

Q41. List any four uses of ceramics.

Solution:

Four uses of ceramics are followings:

- It is used in Electronic gadgetry.
- It is used in Ball bearings.
- It is used in Spare parts of engines
- It is used in Synthetic teeth

Q42. Why adrenaline is called the emergency hormone?

Solution:

Adrenaline is called an emergency hormone because during emergencies and when a person feels excited. It is secreted and therefore adrenaline rush happens, which refers to an activity of the adrenal gland in a fight-or-flight response, when it is releasing adrenaline.

Q43. List the advantages of hydroponics.

Solution:

The advantages of hydroponics are followings:

- Control over nutrient uptake (can adjust in water supply)
- Grow plants indoors without the use of natural light
- No hassle with soil setup and testing
- Generally, weed free environment (if done indoors)
- More plants can fit into a smaller space

Q44. Which is the heavily doped segment of a transistor? Mention its function.

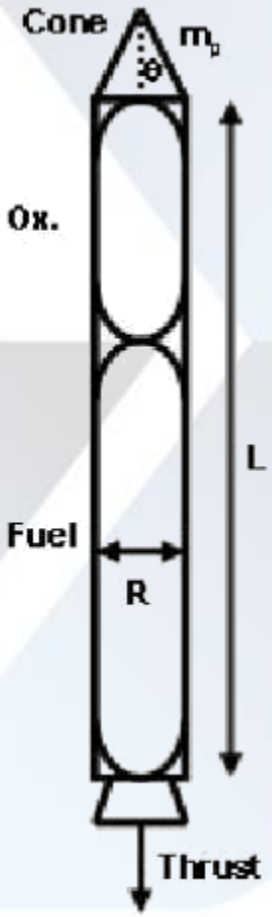
Solution:

Emitter: It is heavily doped and of moderate size. It supplies the large number of majority charge carriers for the flow of current through the transistor.

Answer the following questions: $5 \times 3 = 15$

Q45. Draw the diagram of a single stage rocket and label the parts.

Solution:



SINGLE Stage Rocket

Q46. Mention the similarities and differences found in the striated muscle fibres and the cardiac muscle fibres based on their structure.

Solution:

Similarities found in the striated muscle fibres and the cardiac muscle fibres are followings:

(i) The muscle fibres are elongated and cylindrical.

(ii) Cross bands are found.

Difference found in the striated muscle fibres and the cardiac muscle fibres are followings:

Striated muscle fibres are unbranched. Cardiac muscle fibres are branched. The branches are connected with one another.

Q47. (a) The element uranium which is used in the nuclear power reactor is enriched. Why?

Solution:

Uranium-235 is a nuclear fuel. Uranium is refined to obtain "nuclear grade" uranium. During the nuclear fission a huge energy is released which is easily transformed in heat and electricity. The energy released from uranium compared to the energy of fossil fuels is immense.

(b) Explain the function of control rods and moderator in a nuclear power reactor.

Solution:

The speed of the chain reaction must be controlled because the ever-increasing numbers of splitting nuclei will very quickly release a large amount of heat energy and this would cause the

nuclear reactor to explode. The moderator and control rods together control the rate of reaction in the core of the nuclear reactor.

OR

(a) ${}_{92}\mathrm{U}^{235} + {}_{0}n^{1} \rightarrow {}_{56}\mathrm{Ba}^{142} + {}_{36}\mathrm{Kr}^{91} + 3\,{}_{0}n^{1} + \text{Energy}.$

This reaction is called nuclear fission reaction. What is the reason?

Solution:

The fission of an atom of Uranium producers 10 million times the energy produced by the combustion of an atom of carbon from coal so it is called a nuclear fusion reaction.

(b) List the effects of harmful radiations arising from the nuclear power reactor. Explain the measure to get protection from these radiations.

Solution:

The effects of harmful radiations arising from the nuclear power
Reactors are followings.

- Storage and disposal of spent or used fuel and the uranium continuously decaying into harmful sub atomic particle is a big problem.
- Improper nuclear waste storage and disposal may lead to environmental contamination.
- There is also a risk of nuclear accidents causing due to the leakage of nuclear radiation

Q48. Explain the process of replication of DNA.

Solution:

The process of replication begins with the breaking of hydrogen bonds between the nitrogenous bases of complementary nucleotide strands. The two strands of DNA helix get unwound to form a forklike structure. The two open strands serve as templates for the assembly of nucleotides to form the daughter strands. The assembly of nucleotides on the parent DNA template is brought about by some enzyme. The assembly of new bases against the exposed bases of parent DNA strands takes place in a complementary mode. This process continues till the two daughter DNA strands are formed.

OR

Explain the double helix structure of DNA molecule.

Solution:

The structure of DNA molecule resembles a spirally twisted ladder. The molecule of DNA has a pair of polynucleotide chains running antiparallel to each other. They are intertwined and helically coiled around the other. Each nucleotide unit consists of deoxyribose sugar, phosphate and nitrogenous base. Each strand of the ladder is made up of pentose sugar and phosphate arranged alternatively.
The nitrogen bases connect the two opposite strands like the rungs of a ladder. There are two types of purine bases namely adenine and guanine and two types of pyrimidine bases namely cytosine and thymine. Adenine pairs with thymine and guanine pairs with cytosine.

Q49. The electronic configuration of four elements is given in the following table:

Element	Electronic Configuration
A	$1s^2 2s^2 2p^6 3s^1$
B	$1s^2 2s^2 2p^4$
C	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
D	$1s^2 2s^2 2p^6 3s^2$

(a) Which element has greatest atomic size in these elements? Why?

Solution:

Element ' C ' element has greatest atomic size in these elements because it has more number (4) of shells

(b) Among these elements, the element having least atomic size, belongs to which period? Why

Solution: It belongs to 2nd period.

The element 'B' has least atomic radius as the number of shells is less because, the electronic configuration of the element 'B' is ended in 2nd shell.

Answer the following questions: $3 \times 4 = 12$

Q50. (a) Explain the expansion stroke and exhaust stroke of a petrol engine.

Solution:

During expansion stroke, both the inlet and exhaust valves remain closed. The high pressure of the products of combustion pushes piston from Top Dead Centre (TDC) to Bottom Dead Centre (BDC). It is also called as working stroke as the linear movement of the piston is converted into the rotational movement by the cranks shaft.

At the end of the expansion stroke, the exhaust valves are open to exhaust the burnt gases out of the cylinder. During the exhaust stroke, the inlet valves will remain closed. In this stroke, the piston starts moving from the Bottom Dead Centre (TDC) to the Top Dead Centre (TDC) and sweeps all the burnt gases from the cylinder into the atmosphere. With this, the exhaust process will be completed.

(b) Name the stroke of a diesel engine in which diesel in the form of micelles is injected into the cylinder.

Solution: Compression Stroke

Q51. (a) What are functional groups? Write the structural formula of the compound obtained when one atom of hydrogen in 'Ethane' is replaced by -CHO group.

Solution:

The specific groups of atoms or bonds within molecules that are responsible for the characteristic chemical reactions of those molecules are called functional group. For example Halo group (-Cl, -Br, -F) , Alcohol group(-OH), Aldehyde group(-CHO).

(b) Write the balanced chemical equations for the four chemical reactions occurring when the mixture of methane and chlorine is exposed to ultraviolet light, till the production of tetrachloromethane.

Solution:

$$CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$$

$$CH_3Cl + Cl_2 \rightarrow CH_2Cl_2 + +HCl$$

$$CHCl_3 + Cl_2 \rightarrow CCl_4 + HCl$$

OR

(a) Explain the preparation of methane with chemical equation. Name the products formed when methane completely burns in oxygen.

Solution:

When a mixture of sodium acetate and soda lime is heated in a hard glass test tube, methane gas is formed.

$CH_3COONa + NaOHCaO \longrightarrow Na_2CO_3 + CH_4 \uparrow$

When methane completely burns in oxygen, it produces carbon dioxide (CO_2) and water (H_2O).

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$

(b)Oils have very little shelf life. What is the reason?

Solution:

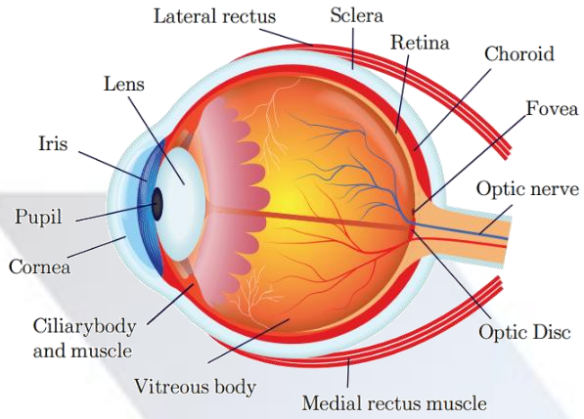
They are unsaturated and chemically reactive. They oxidise in air.

Q52. Draw the diagram showing the vertical section of the human eye and label the following parts:

(a) Lens

(b) Optic nerve.

Solution:



The Human Eye