BOARD - QUE.PAPER **1** SOLUTION

SOLUTIONS

SCIENCE AND TECHNOLOGY

QUESTION PAPER-1 : JULY-2017

STANDARD-10 | JULY 2017 | 011(E)

• Part-A : Time : 1 Hour 15 minutes / Marks : 50 • Part-B : Time : 2 Hours / Marks : 50

PART-A

Time : 1 Hour 15 Minutes] 011(E) [Maximum Marks : 50

Instructions :
1. There are 50 Multiple Choice Questions (M.C.Q.) in Part - A and all questions are compulsory.
2. The questions are serially numbered from 1 to 50 and each carries 1 mark.
3. Read each question carefully, select proper alternative and answer in the O.M.R. sheet.
4. The OMR sheet is given for answering the questions. The answer of each question is represented by (A) ○, (B) ○, (C) ○, (D) ○. Darken the circle ● of the correct answer with ball-pen.
5. Set No. of Question Paper printed on the upper-most right side of the Question Paper is to be written in the column provided in the OMR sheet.
6. Rough work is to be done in the space provided for this purpose in the Test Booklet only.

1. The distilled water acts as _____ for the electricity.
(A) Conductor (B) Insulator (C) Semi-conductor (D) None of above

2. Which type of current is obtained from a battery?
(A) DC current (B) Current of AC & DC both
(C) AC current (D) Depends on type of battery

3. Which of the following statement is false ?
(A) The direction of magnetic field line is from N to S.
(B) Magnetic fields form close loops.
(C) The region where the magnetic field lines are at a close distance from each other will be strong magnetic field.
(D) Magnetic lines can cross each other.

4. Which of the following coloured wire is accepted traditionally as a neutral wire.
(A) Green (B) White (C) Black (D) Red

5. Which of the following can be measured as light year ?
(A) Age of sun (B) Speed of light
(C) Circumference of earth (D) Intensity of sunlight on surface of eanth

6. Poles of mars is covered by _____ .
(A) Dry ice (B) Ice (C) Nitrogen (D) Iron

7. In which of the following planet does the Sun "rise in West & sets in the East ?
(A) Mars (B) Saturn (C) Venus (D) Mercury

8. Matter in the core region of the sun is in _____ state.
(A) gaseous (B) solid (C) liquid (D) plasma

9. Which of the following statement is incorrect ?

(A) pH scale ranges between 0 to 14

(B) pH scale is applicable to only non-aqueous solutions

(C) pH scale is presented by S.P.L. Sorensen

(D) pH scale is applicable to only aqueous solutions

10. Which of the following is added by a farmer to make acidic soil neutral ?

(A) Gypsum (B) Lime (C) Urea (D) None of above

11. Which of the following substance is an antacid ?

(A) NaCl (B) HCl (C) $Mg(OH)_2$ (D) H_2SO_4

12. Which formula is correct ?

(A) Mole = Molecular mass / Weight (B) Mole = Weight / Litre

(C) Mole = Weight / Molecular mass (D) Mole = Molecular mass / Litre

13. Which alloy is used to Solder the electric wires ?

(A) Copper + Zinc (B) Lead + Tin (C) Aluminium (D) Copper + Tin

14. Section A contains name of metal & B contains its mineral, Match A & B to obtain correct pair:

Section-A	Section-B
(a) Iron	(i) Dolomite
(b) Aluminium	(ii) Siderite
(c) Copper	(iii) Bauxite
(d) Calcium	(iv) Malachite

(A) (a - i), (b - ii), (c - iii), (d - iv) (B) (a - iii), (b - iv), (c - i), (d - ii)

(C) (a - ii), (b - iii), (c - iv), (d - i) (D) (a - i), (b - iii), (c - iv), (d - ii)

15. Which of the formula is true for Aluminium ?

(A) Al_2O_3 (B) $Al_2O_3 \cdot H_2O$ (C) $Al_2O_3 \cdot 2H_2O$ (D) $NaAlO_2$

16. With which of the following element carbon does not give reaction ?

(A) Dichlorine gas (B) Di-hydrogen gas

(C) Dilute hydrochloric acid (D) Di-oxygen gas

17. Which of the following gases is used as a preservative in juice of fruits and Jams?

(A) NH_3 (B) SO_2 (C) H_2 (D) CO_2

18. Which of the following reaction is responsible to obtain vegetable ghee from vegetable oils in presence of a catalyst Nickel ?

(A) Hydrogenation (B) Chlorination (C) Both A & B (D) None of above

19. Which gas is filled at a high pressure in cylinders of house hold cooking gas ?

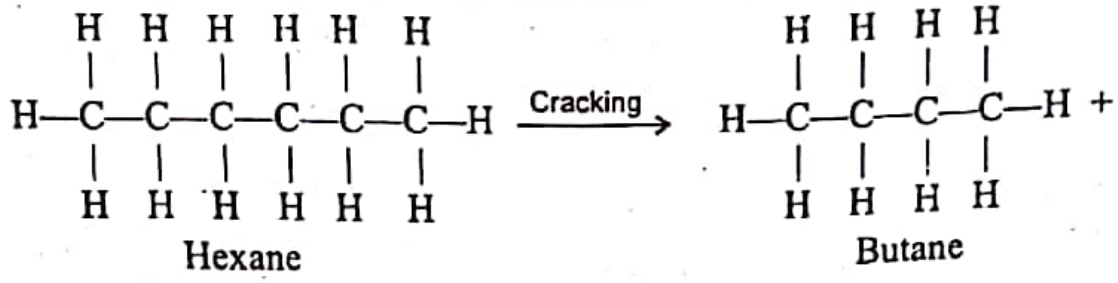
(A) Methane (B) Butane (C) Ethane (D) Propane

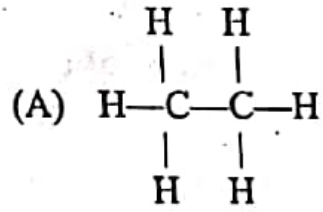
20. Which is the formula of Propane ?

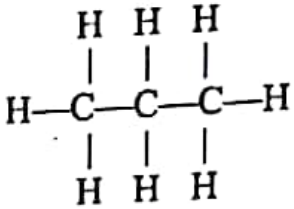
(A) CH_4 (B) C_3H_8 (C) C_2H_6 (D) C_4H_{10}

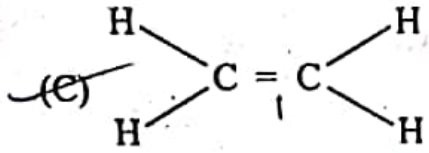
21. Which of the following shows the differential sequence of hydrogen and carbon in series ?

(A) CH (B) CH_3 (C) CH_2 (D) CH_4

22. 

(A) 

(B) 

(C) 

(D) None of A, B and C

23. What is called the solution of ethanol containing 5% water ?

(A) Beer (B) Rectified spirit (C) Varnish (D) Perfume

24. Which of the following is the use of acetic acid ?

(A) Preparation of vinegar (B) As a reagent

(C) White lead (D) All of the above given

25. Which of the following functional group is attached to the hydrocarbon in molecule of soap?

(A) $SO_3^-Na^+$ (B) $-COO^-Na^+$ (C) –COOH (D) None of A, B & C

26. Name the mode of nutrition absorbed by the organisms who depend on dead and decaying organic materials ?

(A) Parasitic nutrition (B) Commensalism

(C) Saprophytic nutrition (D) Both A and B

27. Which of the following structure is responsible for transportation of water and minerals ?

(A) Vessel (B) Sieve tube (C) Cells (D) Companion cells

28. Section A contains the name of organs and Section B contains its functions. Match the following.

Section - A	Section - B
(a) Heart	(i) Circulation of blood
(b) Root	(ii) Nephron
(c) Kidneys	(iii) Transportation of water.

(A) (a - i), (b - iii), (c - ii) (B) (a - iii), (b - ii), (c - i)

(C) (a - ii), (b - iii), (c - i) (D) (a - i), (b - ii), (c - iii)

29. What is the double walled cup shaped structure at the upper end of a Nephron called as ?

(A) Septa (B) Henlay's Septa

(C) Blood Vessels (D) Bowman's Capsule

30. Which of the following is responsible to allow the flow of blood due to contraction of right ventricle?

(A) Aorta (B) Lymph Vessels (C) Veins (D) Blood Vessels

31. Bending of the shoot of the plant in response to light is known as ?

(A) Geotropism (B) Thigmotropism (C) Thermonesty (D) Photonasty

32. Which of the following is a mis-matched pair

(A) Adrenaline : Pituitary gland (B) Estrogen : Ovary

(C) Pancreas : Insulin (D) Progesterone : Ovary

33. Asexual reproduction is

(A) A fusion of specialized cells

(B) A method producing genetically identical offsprings

(C) A method by which all types of organisms are produced

(D) A method in which more than one parent is involved

34. Which family planning surgery is generally adapted by ladies for birth control ?

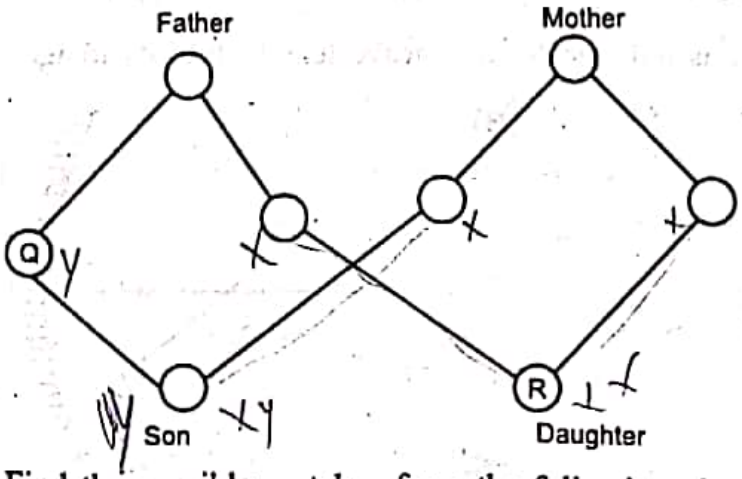
(A) Tubectomy (B) Diapharagm (C) Copper-T (D) Vasectomy

35. The organs which perform. different functions but have the same basic structure are known as ?

(A) Homologous organs (B) Homolytic organs

(C) Analogous organs (D) Analytic organs

36. The following chart shows F1 gametes of two parents.



Find the possible matches from the following alternatives.

	Q	R
(A)	X	XX
(B)	Y	XX
(C)	X	XY
(D)	Y	XY

37. The structural and functional unit of environment is known as ?

(A) Food chain (B) Food web (C) Ecosystem (D) None of above

38. Which of the following is not true to keep a control on the garbage formed in your city?

(A) To buy a battery which can be again recharged

(B) To donate your old clothes & shoes

(C) To reuse the paper on both sides (D) To buy disposable products

39. To reduce the use of LPG by making use of solar energy is an example of

(A) Recycle (B) Reuse (C) Reduce (D) None of above

40. Which award has been recently instituted by Government of India in remembrance of Amrita Devi Bishnoi for the conservation of wild life

(A) Amrita Devi Bishnoi State award (B) Amrita Devi Financial award

(C) Amrita Devi Bravery award (D) Amrita Devi Bishnoi National award

41. Which of the following techniques can be used as a top-down access in preparation.of scientific equipments and machinery parts.

(A) Carving (B) Cutting (C) Moulding. (D) All A, B and C

42. Which of the following material will you select to demolish a water tank in your village such that no other destruction is possible to near by residences.

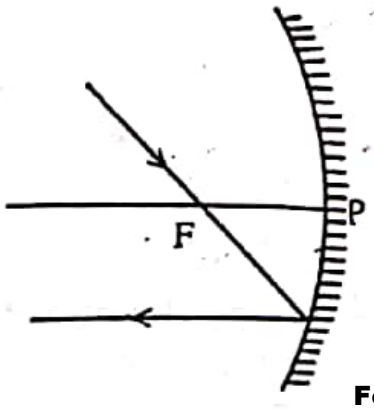
(A) Nenogolf (B) Nenoaluminum (C) Nenosilver (D) Nenocopper

43. Which of the following lens of focal length 10 cms, 20 cms, 25 cms & 50 cms has maximum power:

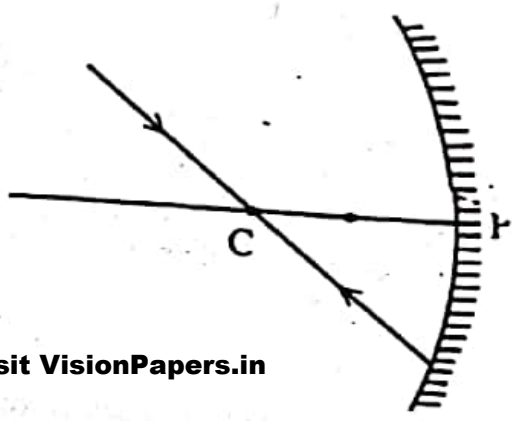
(A) 50 cms (B) 20 cms (C) 25 cms (D) 10 cms

44. Which of the following case is not true for a concave lens to find its image.

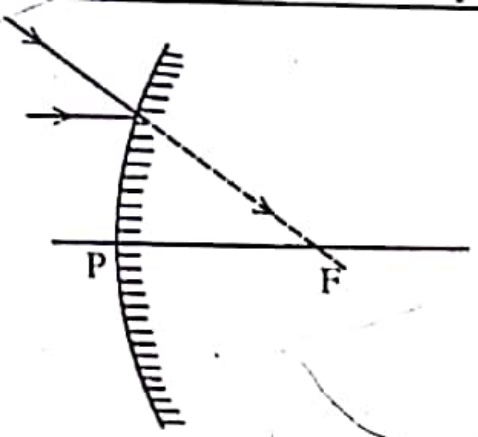
(A)



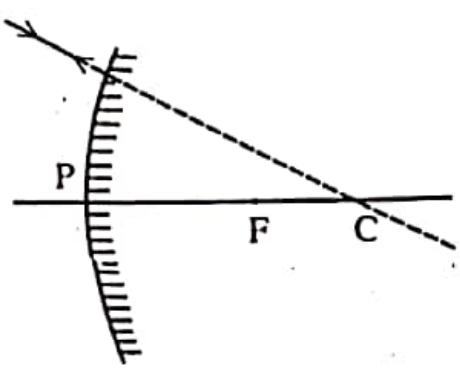
(B)



(C)



(D)



45. Which of the following phenomenon is responsible for the twinkling of a star ?

(A) Atmospheric reflection (B) Atmospheric refraction

(C) Reflection (D) Total internal reflection

46. Match the following :

Column-A	Column-B
(1) Hypermetropia	(a) bifocal lens
(2) Caterac	(b) concave lens.
(3) Presbyopia	(c) convex lens
(4) Myopia	(d) surgery

(A) (1 - a), (2 - b), (3 - c), (4 - d) (B) (1 - a), (2 - b), (3 - d), (4 - c)

(C) (1 - b), (2 - d), (3 - c), (4 - a) (D) (1 - c), (2 - d), (3 - a), (4 - b)

47. Due to which effect of light is tyndall effect resulted ?

(A) Reflection (B) Scattering (C) Refraction (D) Dispersion

48.. The amount of 2A electric current is passed for 1 'minute through a conducting wire. How much total electric charge will pass through this wire.

(A) 2 C (B) 60 C (C) 30 C (D) 120 C

49. Which of the following is true for Ohms law

(A) As current increases resistance increases

(B) As voltage increases resistance increases

(C) V → I is a linear graph

(D) As. resistance increases the current increases

50. What will be the direction of magnetic force by an electrified wire when placed ir magnetic field.

(A) Along magnetic field (B)-Perpendicular to magnetic -field

(C) along electric current (D) opposite to magnetic field

JULY - 2017

OMR SHEET - PART-A : SOLUTION

1.	A○	B●	C○	D○	26.	A○	B○	C●	D○
2.	A●	B○	C○	D○	27.	A○	B●	C○	D○
3.	A○	B○	C○	D●	28.	A●	B○	C○	D○
4.	A●	B○	C○	D○	29.	A○	B○	C○	D●
5.	A○	B○	C●	D○	30.	A●	B○	C○	D○
6.	A●	B○	C○	D○	31.	A○	B○	C○	D●
7.	A○	B○	C●	D○	32.	A●	B○	C○	D○
8.	A○	B○	C○	D●	33.	A○	B●	C○	D○
9.	A○	B●	C○	D○	34.	A●	B○	C○	D○
10.	A○	B●	C○	D○	35.	A●	B○	C○	D○
11.	A○	B○	C●	D○	36.	A○	B●	C○	D○
12.	A○	B○	C●	D○	37.	A○	B○	C●	D○
13.	A○	B●	C○	D○	38.	A○	B○	C○	D●
14.	A○	B○	C●	D○	39.	A○	B○	C●	D○
15.	A●	B○	C○	D○	40.	A○	B○	C○	D●
16.	A○	B○	C●	D○	41.	A○	B○	C○	D●
17.	A○	B●	C○	D○	42.	A○	B●	C○	D○
18.	A●	B○	C○	D○	43.	A○	B○	C○	D●
19.	A○	B●	C○	D○	44.	A○	B○	C●	D○
20.	A○	B○	C●	D○	45.	A○	B●	C○	D○
21.	A○	B○	C●	D○	46.	A○	B○	C○	D●
22.	A○	B○	C●	D○	47.	A○	B●	C○	D○
23.	A○	B●	C○	D○	48.	A○	B○	C○	D●
24.	A○	B○	C○	D●	49.	A○	B○	C●	D○
25.	A○	B●	C○	D○	50.	A○	B●	C○	D○

JULY-2017: PAPER SOLUTION

PART-B : JULY-2017

Time : 2 Hours] 011 (E) July-2017 [Maximum Marks : 50

1. Write in a clear hand writing.
2. There are four Sections in Part - B of the question paper and total 1 to 18 questions are there.
3. All the questions are compulsory. Internal options are given.
4. The numbers at right side represent the marks of the questions.
5. Start new Section on new page.
6. Maintain sequence.
7. Draw neat labelled diagram as per instructions.

SECTION-A

Answer the following in short using maximum 30 words. Each question carries 2 marks. 10

1. Name the four energy sectors where nanotechnology is useful ?

Ans. Nanotechnology useful energy sectors :

(1) **Biotechnology** : Anti-aging drugs, Genetic engineering, Gene-therapy, Regenerative medicine, Synthetic genomics, etc.

(2) **Energy** : Renewable energy like Biofuels, Concentrated Solar power, Fusion power, Grid energy storage, Nanowire battery, Wireless energy transfer, etc.

(3) **Information technology** : 3-dimensional (3D) printing, 3D optical data storage, Holographic data storage, Optical computing, Quantum computing, Quantum cryptography, Spintronics 3D - IC (Integrated circuit.)

(4) **Material science** : Super-conductivity at high temperature, Super-fluidity at high temperature, Multifunctional structures, Programmable materials, Quantum dots.

(5) **Robotics** : Nano-robotics, 'Self -reconfiguring modular robot, Swarm-robotics.

(6) **Others** : Projector phones, Automatic train operation, Driverless car, Supersonic transportation, Magnetic refrigeration.

OR

1. Explain how nanotechnology will be useful in Renewable energy sources.

Ans. Due to tunable electrical and optical properties, special type of nano materials can be designed which can interchange electricity and light with minimum energy loss.

→ These devices will be more efficient than any conventional devices.

→ Carbonic solar cells and hydrogen fuel cells developed with the help of nanotechnology will be soon out in the market.

→ Nanotechnology will lead to development of lighter, stronger and fuel efficient automobiles.

→ Another example is the invention of paper battery in which carbon nanotubes are infused in paper thin cellulose sheet. The paper battery can be twisted or rolled and still he used with same efficiency.

2. How much work is to be done to take 2 C electric charge from the potential to 6 V to the potential of 12 V ?

Ans. Electric potential difference

$$= V = 12 - 6V = 6V$$

Now, $\frac{W}{Q}$

work, $w = VQ$

$= 6 \times 2 = 12$ J $\quad \therefore$ Work : 12J

3. Write the common name of Ethyne and state its uses with its structural formula.

Ans. The common (industrial) name of ethyne is acetylene. Its structural formula is H – C ≡ C – H.

Uses :

→ Substances like ethanol, acrylic acid, vinyl - polymers, plastics and rubber are manufactured from ethyne.

→ Ethyne is used for oxy-acetylene flame used in welding of metals. (The temperature of oxy-acetylene flame is about 3573 K).

→ It is also used in filling up balloons used by children during Uttarayan festival.

OR

3. Write in detail the various types of mineral coal and explain any one of the following.

Ans. Mainly there are four types of mineral Coals : (1) Peat, (2) Lignite, (3) Bituminous coal and (4) Anthracite.

→ **Peat :** It contains about 28% carbon. The primary state of transformation of coal from wood is called peat. It is called rough coal.

→ Destructive distillation of peat gives liquid containing wax, acetone, acetic acid, methanol and cyclic carbon compounds.

4. Differentiate with at least 2 points of differences between Arteries and Veins.

Artery	Vein
(i) The blood vessel that carries blood from the heart to different organs is called an artery.	(i) The blood vessel that carries blood from any organ towards the heart is called a vein.
(ii) In artery, the blood flows under higher pressure.	(ii) In vein, the blood flows under somewhat low pressure.
(iii) The wall of the artery is relatively thick and elastic.	(iii) The wall of the vein is relatively thin and less elastic.
(iv) The artery divides into several arterioles and numerous fine blood capillaries in the organs and tissues.	(iv) In the organs and tissues, the veins are formed by the union of numerous blood capillaries and several venules.
(v) Arteries carry oxygenated blood (exception - Pulmonary artery).	(v) Veins carry deoxygenated blood (exception - Pulmonary vein).

5. Define food chain and food web.

Ans. Food chain : Living organisms of an ecosystem depend on each other for their food requirement and form a chain. This is termed as food chain.

Food web :

→ The trophic inter-relationship between animals in nature cannot be explained as simple food chains only.

→ Among the various ecosystem, each one is one having definite food chain. The individuals in one food chain are also involved in food chains of other ecosystem.

→ In this way, the animals are interdependent for food and they form a net which is termed as a food web.

SECTION-B

Answer in short using maximum 30 words. Each question carries 2 marks. 10

6. What are Jovian Planets? Write its characteristics ?

Ans. Planets of the solar system with their orbit outside the orbit of the Mars and composition similar to Jupiter planet are called Jovian Planets.

→ Jupiter, Saturn, Uranus, Neptune and Pluto are Jovian planets.

Characteristics :

→ These planets are bigger in size but have lower density.

→ These planets are mainly composed of gases of hydrogen, ammonia and helium.

→ These planets have rings around them.

→ Jovian planets have satellites (moons) of bigger size.

7. Explain the importance of pH in decay of teeth.

Ans. Importance of pH in stopping decay of teeth :

→ When the pH of the inner side of the mouth is less than 5.5, the decay of teeth takes place.

→ The outer layer of teeth is made up of hard substance like calcium phosphate ($Ca_3(PO_4)_2$). It does not dissolve in water, but gets decayed when pH of inner side of mouth becomes less than 5.5.

→ Acid is produced by decomposition of particles of food and saccharides by bacteria inside the mouth after taking meals. It decreases the pH inside the mouth. Hence, decay of teeth takes place.

→ To protect your teeth, good habit should be formed to clean the teeth after taking meals.

→ The tooth powder and toothpaste that are used for teeth cleaning possess basic nature. They neutralise the acid produced inside the mouth and protect teeth from decay.

8. Explain the functions of Nervous system.

Ans. Functions of nervous system are as follows :

→ It controls and coordinates the activities of each and every part of the body. Because of that all parts of the body can function in harmony with each other.

→ It controls and coordinates the muscular activity. So their different activities like walking, writing, dancing, etc. can take place.

→ It coordinates certain involuntary activities such as beating of heart, breathing, etc.

→ It collects all information from the surrounding environment, interprets them and react suitably.

→ It passes information for one system to the other in the form of impulses.

9. Explain Hereditary of characteristics.

Ans. Hereditary of characteristics

→ Those characteristics of the living organisms which come into existence as a result of changes occurring in the DNA of the parental sex cells, are called hereditary characteristics.

→ The genes in the parental sex cells undergo changes and through the process of sexual reproduction these altered genes are obtained by the off springs these particular characteristics become hereditary in the next generation.

→ **Examples of hereditary characteristics :** The skin colour of human being, the colour of the iris of eyes, form of hair, etc.

→ The height in the pea plant, colour and shape of the seeds, colour of flowers, location of flowers, etc. are also examples of hereditary characteristics.

→ In an example, a colony of red coloured beetles lives on the green coloured leaves of a plant.

→ The gene responsible for the red colour of the beetle mutates and this gene is transmitted through the sex cells in the course of sexual reproduction.

→ As a result, a green coloured beettle by heredity arises among the red coloured offsprings of the beettle.

→ This green colour of the beetle is a hereditary characteristic and it is transmitted in the subsequent generations.

→ Thus, the hereditary characteristics are the inevitable purposes of evolution.

OR

9. Write a short note on Heredity.

→ Heredity the common meaning of the word 'heredity' is the transmission of inheritable characters from one generation to the other. OR The continuity of characters seen from one generation to the other is called heredity.

→ **Examples of heredity :** (i) When a seed of pe germinates it develops into a pea plant. (ii) The mango seed germinates and gives rise to a mango plant. (iii) The egg of sparrow, when incubated, gives rise to a young sparrow bird. (iv) A bitch (a female dog) give birth to puppies. (v) A human female gives birth to a human baby boy or a baby girl only.

→ Thus, heredity can be defined as follows :

→ The transmission of characters from the parents to the offsprings or resemblance of the individual offsprings with its parents.

→ In the sexually reproducing organisms the 'hereditary information is located in the zygote, i.e., in the fertilized egg. The fertilized egg develops into a particular type of organism only.

→ The offsprings resembles its parents only, but it is never the exact replica of the parents'. The offspring differs from the parents in certain aspects.

→ The heredity and variations are the two important ortant aspects of biological science. These are studied under the title Genetics. Therefore Genetics is the sc science of heredity and variations.

10. Explain management of Water Reservoirs.

Ans. Management of Water Reservoirs : To provide an adequate supply of good quality of water for different purposes without causing any harm to the source of water is called water management.

Approaches to water management :

→ In hilly areas or flood prone areas, big water reservoir, ponds or dams should be constructed so that rain water and used water may be stored. This water percolates gradually and becomes ground water.

→ Canals should be constructed from the excess water to the desert areas.

→ Domestic used water or municipal water should be recycled and should be used for irrigation.

→ Excess use of water and wastage should be prevented as far as possible.

→ By distillation, salt contents of sea water should be removed so that it may become drinkable. This is being adopted in Bhavnagar.

SECTION-C

Answer questions from 11 to 15 in the limit of maximum 50 words. Each question carries 3 marks. **15**

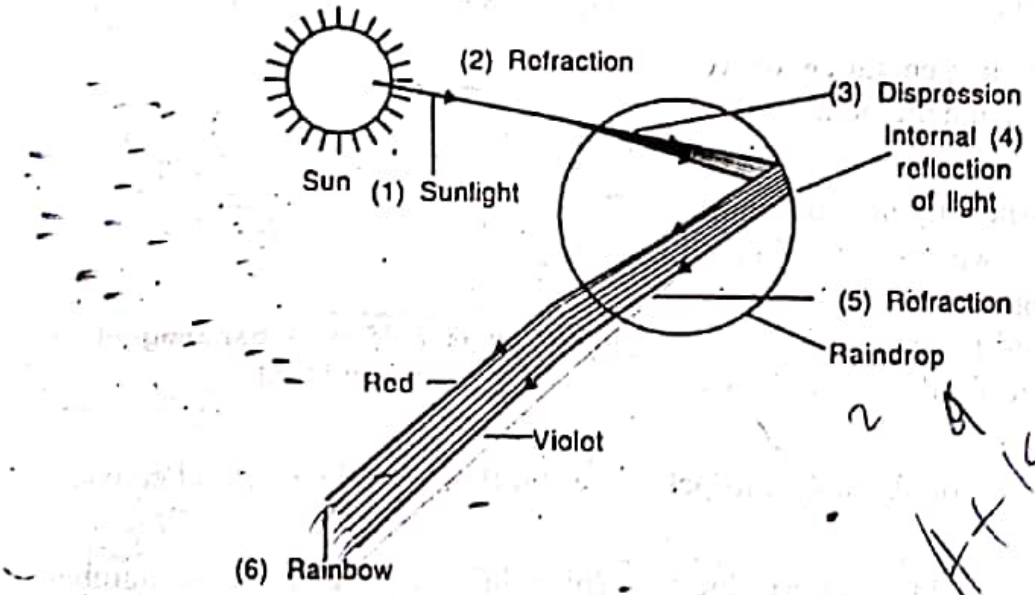
11. With the help of a neat diagram explain the construction of a Rainbow,

Ans. Rainbow :

→ A rainbow is a natural spectrum visible in the sky after rain shower.

→ Rainbow is formed when the water droplets present in the atmosphere disperse the sunlight falling on them.

→ Note that a rainbow is always formed in the direction opposite to that of the sun.



Formation :

→ When sunlight falls on the atmospheric water drops, they first disperse the incident light and then reflect it internally (not necessarily total internal reflection).

→ Finally the light gets refracted again while it is coming out of rain drops.

→ We see different colours in a rainbow because light enters into our eye through dispersion and internal reflection.

→ In a rainbow, water droplets act as small prisms.

→ The colour at the bottom of the rainbows is violet while the top most colour is red. Such a rainbow is called a primary rainbow.

→ Sometimes you may see two rainbows in the sky in which the order of colours in upper rainbow is reverse to the primary rainbow. Such a rainbow is called secondary rainbow.

12. What is a solenoid ? Explain its effect on magnetism?

→ A long metal wire turned several times to form the structure of a coiled cylinder is known as a solenoid.

→ As shown in the figure (ii), a solenoid is connected to a circuit.

→ Let us assume that this solenoid has 'N' number of loops (i.e. N turns of coil).

→ On passing electric current, a magnetic field is produced inside the solenoid.

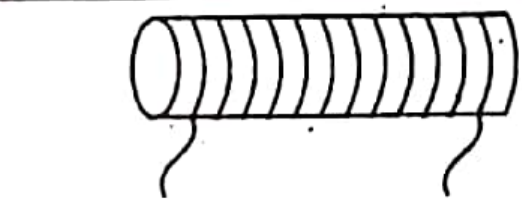
→ The magnetic field resulting due to N turns will be N times stronger than the magnetic field resulting by each circular coil.

→ This is because, in each turn, the direction of the current is same.

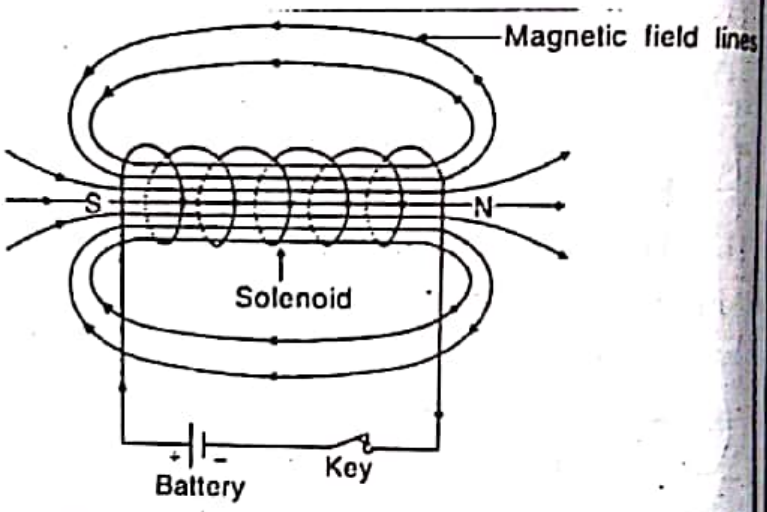
→ As a result, the magnetic field due to the current in each turn will be added.

→ This results in generation of a very strong magnetic field inside the solenoid.

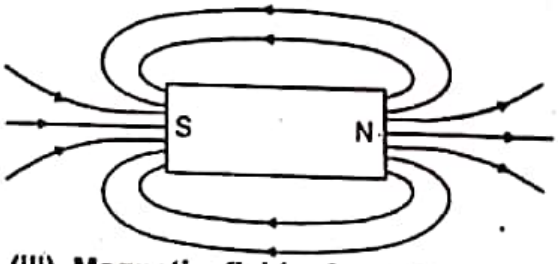
→ On comparing figure (ii) and figure (iii), we can conclude that the magnetic field produced by a solenoid is quite similar to the magnetic field produced by a bar magnet.



(i) Solenoid



(ii) Magnetic field of a solenoid



(iii) Magnetic field of a bar magnet (only for info.)

→ Here, one end of the solenoid acts as a North Pole while the other end acts as a South Pole.

→ The magnetic field produced due to a solenoid is dependent on the number of turns (n) and the current (I) flowing through it.

→ On placing an iron like metal (e.g. large iron nails) inside the solenoid, its magnetic field becomes stronger.

→ On passing electric current through a solenoid, it behaves as a temporary magnet.

→ Such magnets are called 'electromagnets'.

OR

12. **Differentiate between Electric motor & Electric generator.**

Electric motor	Electric generator
(i) It converts electrical energy into mechanical energy.	(i) It converts mechanical, mechanical energy into electrical energy.
(ii) Electric motor works on the principle that a current carrying loop kept in a magnetic field experiences force and hence gives mechanical energy.	(ii) Electric generator works on the principle of electromagnetic induction.
(iii) It is used in running fan, washing machine, mixers, etc.	(iii) It is used in diesel generators, wind mills.

13. **Explain the industrial preparation of Di-hydrogen gas with chemical equations.**

Ans. Hydrogen gas is industrially prepared from methane (CH_4) gas present in natural gas.

→ Methane gas is mixed with steam and passed over nickel catalyst at 1073 K and under 30 bar pressure to produce a mixture of carbon monoxide and hydrogen gas (water gas).

$$CH_{4(g)} + H_2O_{(g)} \xrightarrow[1073\ K,\ 30\ bar]{[Ni]} \underset{\text{water gas}}{CO_{(g)}} + 3H_{2(g)}$$

→ The mixture of CO and H_2 is called water gas.

→ By reaction of water gas again with vapour of water, more quantity of dihydrogen gas is produced and carbon monoxide is removed as $CO_{2(g)}$.

$$CO_{(g)} + H_{2(g)} + H_2O_{(g)} \longrightarrow CO_{2(g)} + 2H_{2(g)}$$

→ To separate dihydrogen gas from this mixture, it is passed through water at 30 bar pressure because carbon dioxide gas dissolves in water but dihydrogen gas is insoluble in water hence can be collected separately.

→ Moreover, by the electrolysis of pure water, dihydrogen gas can be prepared by the use of voltameter.

$$H_2O_{(l)} \xrightarrow{\text{electrolysis}} H_{2(g)} + \frac{1}{2}O_{2(g)}$$

14. **Explain the preparation of soap ?**

Ans. Soap is a sodium or potassium salt of fatty acid like stearic acid or palmitic acid.

→ Vegetable oil (mustard seed oil; groundnut oil) or animal fat (mutton tallow) is heated with the aqueous sodium hydroxide (NaOH) to form sodium salt of fatty acid (soap) and glycerol.

→ The reaction to prepare soap is known as saponification.

$$\text{Vegetable or Animal fat} + \text{Sodium hydroxide} \xrightarrow[\Delta]{\text{saponification}} \text{Glycerol} + \text{Sodium salt of fatty acid (soap)}$$

OR

14. **Justify the statement "Drinking of alcohol is injurious.to health".**

Ans. Ethanol is known as toxic amongst alcohols. Those who drink ethanol containing adulterant substances like methanol known as "lathha" lose thier eye sight and become blind. They lose sensitivity and lose the balance of the body. It affects the liver and

causes death due to a diseases called cirrohsis of liver. Hence, the drinking of alcohol is harmful for the health.

→ In drinks containing alcohol, ethanol is the main constituent and so it has got toxic effect on the body. If it is taken in small amount, it works as stimulant.

→ If drinks containing alcohol, are taken, then ethanol is absorbed through mucosa of stomach and ethanol mixes with the flow of blood through the layers of liver.

→ If an adult drinks alcohol, then the proportion of alcohol in blood becomes 0.3%. If more concentration of alcohol is there in the blood, it is harmful and in this condition, the person becomes unconscious and may also result in heart failure.

→ If alcohol is absorbed in the cells, then 90 of ethanol is slowly converted into acetaldehyde by oxidation. Acetic acid is formed by oxidation of acetaldehyde and finally carbon dioxide and water are formed by oxidation.

→ All the cells are able to carry out this oxidation, even then the oxidation reaction occurs mainly in the liver.

→ The toxic effect of alcohol is due to this acetaldehyde and so the person feels vomiting or loses balance or becomes unconscious.

→ In the liver of the alcohol drinker (alcohol addict) the amount of enzyme P-450 increases very high and so one who drinks alcohol gets tempted to drink more alcohol.

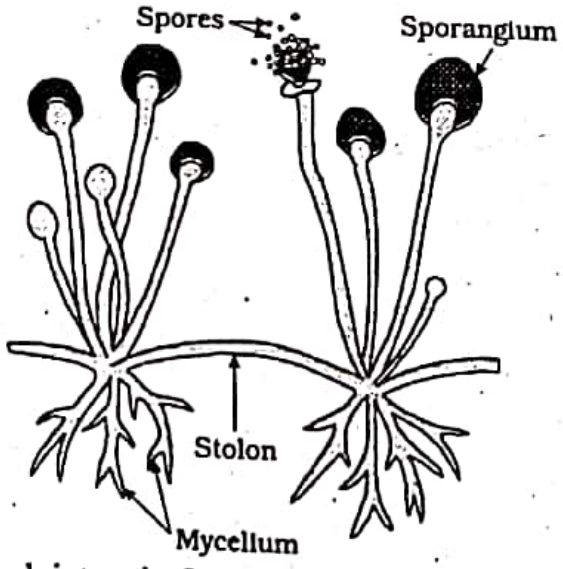
→ One who is habituated to drinking alcohol, is given medicine called disulfiram. By this medicine alcohol is oxidised only up to acetaldehyde and so by drinking acetaldehyde containing alcohol, one feels vomiting and nausia and as a result the alcohol drinker (alcohol addict) develops hatred towards alcohol.

15. Describe the various types of Asexual reproduction so as to explain in detail spore - formation.

Ans. Spore is the microscopic reproductive unit of plant which is covered by a protective coat.

Asexual reproduction through spore :

→ In mucor (Bread mould), the sporangium is developed in the hyphae made body. In the sporangium spores are produced. When sporangium becomes mature, spore coat bursts.



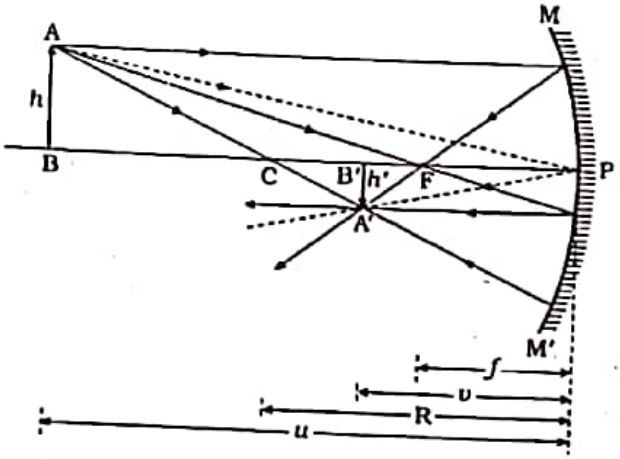
→ The spores are spread into air from the sporangium. These air-borne spores settle on food in the moist environment. In favorable condition, these spores germinate to produce new mycelium of fungi. This way asexual reproduction occur through spore. e.g., Mucor, Rhizopus.

SECTION-D

Answer questions 16 to 18 in detail, to the point, in at least 100 words. Each question carries 5 marks. **15**

16. 'For a curved mirror derive the relation $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$.

→ The formula, which gives relation between object distance (u), image distance (v) and focal length (f) of the mirror, is known as mirror formula.



Mirror formula

Explanation :

→ As shown in figure, an object AB of height h is placed beyond the radius of curvature R, in front of concave mirror MM' of small aperture.

→ Image formed by concave mirror is real, inverted and diminished of height h'.

→ According to the Cartesian sign convention,

Object distance PB = $-u$

Image distance PB' = $-v$

Focal length PF = $-f$

Radius of curvature PC = $-R$

→ From the figure it is clear that right-angled triangles, $\Delta A'B'P$ and ΔABP are similar.

$$\therefore \frac{A'B'}{AB} = \frac{PB'}{PB} = \frac{-v}{-u} = \frac{v}{u} \quad \text{....(1)}$$

→ In the similarly right-angled triangles, $\Delta A'B'C$ and ΔABC are similar

$$\therefore \frac{A'B'}{AB} = \frac{CB'}{CB} \quad \text{....(2)}$$

→ But, $CB' = PC - PB' = -R - (-v) = -R + v$ $CB = PB - PC = -u - (-R) = -u + R$

$$\therefore \frac{A'B'}{AB} = \frac{-R + v}{-u + R} \quad \text{....(3)}$$

→ Comparing equation (1) and (3),

$$\frac{v}{u} = \frac{-R + v}{-u + R}$$

$$\therefore -uv + vR = -uR + uv$$

$$\therefore vR + uR = 2uv \quad \ldots(4)$$

→ Dividing equation (4) by uvR,

$$\frac{1}{u} + \frac{1}{v} = \frac{2}{R} \quad \ldots(5)$$

(ii) Now, when the object is at infinite distance, the image is formed at the focus (F).

→ Therefore, substituting object distance $u = \infty$ and image distance $v = f$ in equation (5), we have

$$\frac{1}{\infty} + \frac{1}{f} = \frac{2}{R}$$

$$\therefore \boxed{f = \frac{R}{2}} \quad \left(\Theta \frac{1}{\infty} \approx 0\right) \quad \ldots(6)$$

(iii) Substituting the value of f from equation (6) in equation (5), we have

$$\boxed{\frac{1}{u} + \frac{1}{v} = \frac{1}{f}} \quad \ldots(7)$$

Equation (7) is known as mirror formula.

[Equation (7) is also valid for convex mirror.]

→ This mirror formula is true for both types of spherical mirrors for all the positions of object.

17. Explain the electrolysis of pure copper by method of Electrolysis?

Ans. Refining of metals :

→ The metal obtained by reduction method is not very pure. The method to obtain about hundred percent pure metal by removing impurities present in very small amounts in metal, is called refining. Refining of metals is mainly carried out by three methods :

(i) Electrolysis (ii) Liquefaction (iii) Zone refining

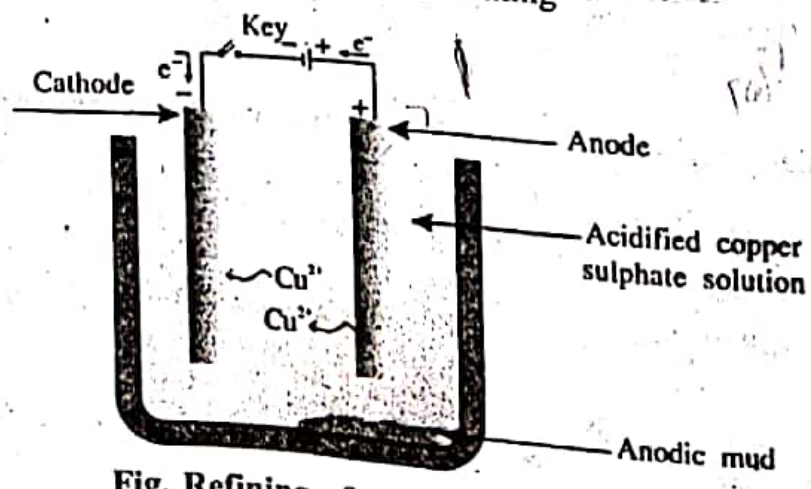


Fig. Refining of copper by electrolysis

Refining of copper by electrolysis :

→ Metals like copper, zinc, gold and silver are refined by this method.

→ In this method, the rod of impure metal is taken as anode and rod of pure metal is taken as cathode.

→ The aqueous solution of salt of metal, is used as electrolyte.

→ On passing electric current through electrolyte anode dissolves in the electrolyte.

→ The metal in the proportion of being obtained by dissolution of anode, is added to the electrolyte, the same proportion of metal is being deposited at the cathode. As there is no impurity in the metal deposited at the cathode, it is very pure.

→ Out of the impurities added to electrolyte by dissolution of anode, soluble impurities remain in the solution and insoluble impurities are collected at the bottom of the anode. It is called anodic mud.

→ If copper is refined by this method, then rod of impure copper is arranged as anode and the rod of pure copper as cathode as shown in figure.

→ The aqueous solution of copper sulphate is taken as the electrolyte.

→ A little dilute sulphuric acid is added to it.

→ When electric current is passed through the electrolyte the proportion in which copper from anode is dissolved in aqueous solution of copper sulphate, copper in the same proportion from copper sulphate solution is deposited at the cathode.

→ Thus, the copper deposited at the cathode in this way has almost 100 % purity.

→ **Anode (Positive pole)** : $Cu(s)\ (Impure) \rightarrow Cu^{2+}_{(aq)} + 2e^-$ (oxidation)

→ **Anode (Negative pole)** : $\mathbf{Cu^{2+}\ (aq) + 2e^- \rightarrow Cu(s)}$ **(reduction)**

→ **Net reaction** : $Cu(s)\ (Impure) \rightarrow Cu(s)\ (Pure)$

OR

17. Describe the methods to control corrosion.

Ans. Methods to control corrosions :

(1) One of the easy and cheap ways to prevent corrosion of iron is by applying paint on the iron.

→ The body of a car, windows or pillars of iron can be painted to prevent them from corroding.

→ If the paint applied to prevent corrosion comes out, the objects should be repainted to prevent corrosion in future.

(2) Sometimes corrosion can also be prevented by applying oil on the surface of iron objects.

→ Oil prevents the contact of moisture and iron objects.

→ This method is quite useful for small tools of iron like hammer, gardener's scissors, etc.

→ However, this method cannot be used for large objects because oil does not stay for a long time and repeated oiling becomes costly and impractical.

(3) Corrosion of iron can be prevented by applying a coat of very fine layer of zinc metal on it.

→ A major benefit of applying zinc is that even if zinc gets removed from iron surface, a more active layer of zinc metal replaces the surface. This prevents further corrosion.

→ The process of applying zinc is called galvanizing and the iron on which it is applied is then called galvanized iron.

→ For example, iron sheets used in the roofs of house are galvanized iron sheets.

(4) To prevent corrosion to the iron plates of the steamer, metals like magnesium or zinc is used. Zinc is more active than iron. So, when blocks of zinc are placed among plates of iron in the steamer, they save the iron from being corroded by sea water. The plate of iron acts as anode. The corrosion of this zinc block take place continuously in sea water and so they are to be replaced at fixed intervals. This is called sacrificial anode.

(5) Chemicals known as inhibitors can also be applied on the surface of the metals to prevent corrosion.

(6) Enamel paints can also be used to prevent corrosion.

(7) Another effective way to prevent corrosion is to change the properties of metals and non-metals.

→ This can be done by mixing different metals and non-metals.

→ For example, stainless steel is an alloy which consists of 70% iron, 20% chromium and 10% nickel.

→ This alloy does not get affected by air, water or alkali and it does not even get corroded.

→ Hence, utensils used in kitchen, instruments used in surgery, big vessels used in industries, etc. are prepared from stainless steel.

18. What is nutrition ? Describe in detail Autotropic mode of nutrition ?

Ans. Nutrition :

→ Phenomenon of ingesting the nutrients by the living organisms, digesting them to their simplest forms and transporting them to reach the living cells of different parts of the body and their utilization to obtain energy, for growth of the body and to carry on various vital activities in the body is called nutrition.

Autotrophic nutrition :

→ The word 'auto' means 'self' and 'trophe' means 'nutrients'. So the mode of formation of organic nutrients by oneself in ones own body cells, in order to obtain the required energy is called autotrophic nutrition.

→ The autotrophic organisms utilize the solar energy, carbon dioxide and water from the environment and with the help of chlorophyll contained in their cells, synthesize glucose (carbohydrate) themself. This process of synthesis of glucose is called photosynthesis.

→ Thus, all the photosynthetic organisms show autotrophic nutrition. e.g., All green plants, euglena, volvox, bacteria having chlorophyll, etc.

→ The glucose, so synthesized, is utilized for obtaining energy. The surplus glucose, not used, is converted to and stored as starch.

OR

18. **Explain 'human digestive system so as to explain the phenomenon of Absorption, Assimilation and Egestion.**

Ans. **Absorption of digested food in man (human) :** On completion of digestion of complex organic food substances their absorption occurs in small intestine. The inner lining of the wall of small intestine form millions of small finger-like thin processes called villa. These villi increase greatly, the absorptive surface area for absorption of digested food components and so the absorption becomes easy and rapid. The digested products absorbed mix with the blood stream.

Assimilation :

→ The nutrients, absorbed from the small intestine flow through blood and are transported to various parts of the body wherein different tissue cells obtain the nutrients and utilize them for obtaining energy, for growth and repair of worn out cells.

Egestion :

→ The undigested and unabsorbed remains of the food are passed on from small intestine to large intestine. In the latter, surplus water and useful mineral salts are absorbed through its mucosa.

→ The remaining contents are more or less solidified and that form faeces.

→ This useless undigested and unabsorbed Waste matter is passed out through the anus. This process in called egestion or defecation.

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