# Kendriya Vidyalaya

# Chandigarh Region

# Support material for term -1

# Class IX

# Subject: Science

**Index**

## Chapter -2

## IS MATTER AROUND US PURE?

### ❖ Multiple choice questions ( Q. No. 1 to 20 )

1. If the components of a substance can be separated by a chemical change only then it is a /an
    a. Element
    b. Compound
    c. Mixture
    d. None of the above
2. The zigzag movement of dispersed phase particle in a colloidal system is known as
    a. Brownian motion
    b. Translational motion
    c. Circular motion
    d. Linear motion
3. The fine particles of an insoluble substance uniformly dispersed throughout a gas or liquid is called
    a. Suspension
    b. Precipitate
    c. Colloidal solution
    d. Impurity
4. What kind of solution is gel?
    a. Colloid
    b. Emulsion
    c. Suspension
    d. None of the above
5. In ' tincture of iodine ‘, the solute is _____ and the solvent is _____
    a. Alcohol, iodine
    b. Iodine, water
    c. Iodine, alcohol
    d. Tin, iodine
6. Iodized common salt is
    a. Homogeneous mixture
    b. Heterogeneous mixture
    c. Pure substance
    d. Oxidised substance
7. Which of the following upon shaking with water will not form a true solution?
    a. Alum
    b. Common salt
    c. Albumin
    d. Sucrose
8. Which of the following is a homogeneous mixture?

a. Solution of sugar in water
b. Chalk powder in water
c. Kerosene oil in water
d. None of the above

9. Solutions with low concentrations of solute are called
    a. Concentrated solution
    b. Solvent
    c. Dilute solution
    d. None of the above
10. Smoke is an example of
    a. Gas dispersed in liquid
    b. Gas dispersed in solid
    c. Solid dispersed in solid
    d. Solid dispersed in gas
11. Which of the following statement is not true about colloidal solutions?
    a. Colloids are homogeneous
    b. Colloids show tyndall effect
    c. Colloids show Brownian movement
    d. The size of colloidal particle ranges between 1 – 100 nm.
12. Iron rod turns red on heating. The change is a
    a. Physical change
    b. Permanent change
    c. Chemical change
    d. All of the above
13. Which of the following is not true for a compound?
    a. A compound is heterogeneous in nature
    b. A compound contains different elements in fixed ratio
    c. Properties of a compound are entirely different from those of the elements present in it.
    d. Constituents of a compound cannot be separated by simple physical methods.
14. Which of the following plants of colloids and their dispersed phase is correct?
    a. Smoke – gas
    b. Cheese – liquid
    c. Shaving cream – liquid
    d. Milk of magnesia – liquid
15. The following elements is not a metalloid
    a. Boron
    b. Silicon
    c. Germanium
    d. Tungsten
16. If we put camphor in an open container its amount keeps on decreasing due to
    a. Evaporation
    b. Precipitation
    c. Sublimation

d. Condensation

17. Which of the following non metal is a good conductor of electricity?
    a. Aluminium
    b. Silicon
    c. Graphite
    d. Gold
18. A mixture of Sulphur and carbon disulphide is
    a. Heterogeneous and show tyndall effect
    b. Homogeneous and show tyndall effect
    c. Heterogeneous and does not show tyndall effect
    d. Homogeneous and does not show tyndall effect
19. Blood and seawater are
    a. Both are mixtures
    b. Both are compounds
    c. Blood is a mixture where is sea water is a compound
    d. Blood is a compound and sea water is a mixture
20. Air is _____ mixture
    a. Homogeneous
    b. Heterogeneous
    c. Suspension
    d. All the above

**Assertion – Reason Type Questions ( Q.no. 21 to 40)**

General Instructions:

1. Both assertion and reason are true and reason is the correct explanation of assertion
2. Both assertion and reason are true but reason is not the correct explanation of assertion
3. Assertion is true but reason is false
4. Assertion is false but reason is true

21. **Assertion:** When a beam of light is passed through a colloidal solution placed in a dark place the path of the beam becomes visible.
    **Reason:** light gets scattered by the colloidal particles.

22. **Assertion:** A solution of table salt in a glass of water is homogeneous
    **Reason:** a solution having different composition throughout is homogeneous.
23. **Assertion:** a mixture of sugar and benzoic acid can be separated by shaking with ether.
    **Reason:** sugar is insoluble in water
24. **Assertion:** in sublimation a substance changes directly from solid to vapour without passing through liquid state and vice versa
    **Reason:** distillation involved to process that is vaporization and condensation.
25. **Assertion:** true solution exhibits tyndall effect

**Reason:** Particles are very large in size

26. **Assertion:** colloidal solutions are stable and the colloidal particles do not settle down
    **Reason:** Brownian movement counter the force of gravity acting on colloidal particles.
27. **Assertion:** tyndall effect is an optical property
    **Reason:** Electrophoresis is an electrical property.
28. **Assertion:** all homogeneous substances are pure.
    **Reason:** alloys are homogeneous mixture of solids
29. **Assertion:** the air is a compound containing oxygen nitrogen organ carbon dioxide and water vapours in a fixed proportion
    **Reason:** a compound is a substance whose composition is fixed.
30. **Assertion :** solution is a homogeneous mixture of two or more substances
    **Reason :** a solution has a solvent and a solute as its component
31. **Assertion :** in a colloid the size of solute particle is better than the particles of true solution but smaller than those of suspension
    **Reason :** sand dissolves in water to form colloidal solution
32. **Assertion :** rusting of iron is a chemical change
    **Reason :** rusting is a slow process in which the surface of iron is spoilt due to action of Oxygen and water on it.
33. **Assertion :** oxygen is an element
    **Reason:** it cannot be decomposed by a physical or a chemical process
34. **Assertion :** burning of coal is a physical change
    **Reason :** when coal is burnt carbon is changed to carbon dioxide.
35. **Assertion :** two elements are liquid at room temperature Mercury and bromine.
    **Reason :** metal conduct heat and electricity
36. **Assertion :** constituents of a compound can be separated by chemical method.
    **Reason:** pure substances contain same type of particles
37. **Assertion :** water is classified as a pure substance
    **Reason:** Water contains Hydrogen and Oxygen in fixed ratio.
38. **Assertion :** alloys are classified as homogeneous mixture
    **Reason :** They cannot be separated by physical methods.
39. **Assertion :** Milk is an emulsion
    **Reason :** Milk contain liquid dispersed phase in liquid dispersion medium.
40. **Assertion :** colloidal particles are big enough to scatter light
    **Reason :** composition of a compound is the same throughout.

## Case study based Questions

A . Read the given paragraph and answer the Q No 41 to 45

Suspension is the heterogeneous mixture of two or more substances. In suspension, particles are suspended throughout in bulk and can be seen by naked eyes. In suspensions, particles of solute do not dissolve rather are suspended. Particles of suspension are large enough to scatter rays of light and path of ray is visible through a suspension. The examples of suspension are mixture of chalk and water, muddy water, mixture of flour and water, milk of magnesia etc.

41. Which of the following statement is not true about suspensions?
    a. Suspensions are heterogeneous mixture
    b. Suspensions show tyndall effect
    c. Suspension is stable.
    d. The size of particles of suspension is greater than 1000 nm
42. Suspensions can be separated by
    a. Filtration
    b. Centrifugation
    c. Distillation
    d. All the above
43. Suspension is able to scatter the rays of light because
    a. Solute particles are large
    b. Solute particles are insoluble
    c. Solute particles settle at the bottom
    d. None of the above
44. Which of the following is not an example of suspension?
    a. Mixture of Sulphur and iron fillings
    b. Mixture of sand and water
    c. Mixture of dust particles and air
    d. Mixture of ink and water
45. The particles of suspension settle down due to
    a. Impurity
    b. Gravity
    c. Filtration
    d. All the above

**B . <u>Read the given paragraph and answer the Q No 46 to 50</u>**

When two or more elements chemically combined in a fixed ratio by mass, the obtained product is known as a compound. Compounds can be defined as a substance consisting of two or more different types of elements in a fixed ratio of its constituent atoms. When the elements combine, some individual property of the elements are lost and the newly formed compound has new properties. The compounds can be classified into two types molecular compounds and salts. In molecular compounds the atoms find each other through covalent bonds whereas insults atoms are held together with ionic bonds.

46. Which of the following is not a compound?
    a. Potassium per magnate
    b. Sand
    c. Water
    d. Air
47. Which of the following is not true about the compounds?
    a. Compounds are of two types
    b. Compounds have either covalent bonds or ionic bonds

c. Compounds have same properties as their constituent elements
d. The atoms are present in fixed ratio in a compound

48. Which of the following is not a pure substance?
    a. Elements
    b. Compounds
    c. Mixtures
    d. All the above substances are pure
49. Pick the odd one out
    a. Sodium
    b. Silver
    c. Silicon
    d. Sugar
50. The compounds can be made by ____ .
    a. Physical process only
    b. Chemical process only
    c. Both physical and chemical process
    d. Neither physical nor chemical process

**Answer key**

1. B
2. A
3. C
4. A
5. C
6. A
7. C
8. A
9. C
10. D
11. A
12. A
13. A
14. B
15. D
16. C
17. C
18. D
19. A
20. A
21. A
22. C
23. C.
24. B

25. D
26. A
27. B
28. D
29. D
30. B
31. C
32. A
33. A
34. D
35. B
36. B
37. A
38. B
39. A
40. B
41. C
42. A
43. A
44. D
45. B
46. D
47. C
48. C
49. D
50. B

# Chapter-5

# The Fundamental Unit of Life

**Multiple Choice Questions**

Q.1. _____ is called the energy currency of the cell
(a) Endoplasmic reticulum
(b) Oxygen
(c) ATP
(d) Mitochondria

Q.2. _____ coined the term "cell."
(a) Gorbachev
(b) Himmler
(c) Robert Hooke
(d) Anton Von Leeuwenhoek

Q.3. Which of the following statements are incorrect?
(a) Cytoplasm is also known as protoplasm
(b) Lysosomes are known as the suicide bags of the cell
(c) Mitochondria has its own DNA
(d) None of the above

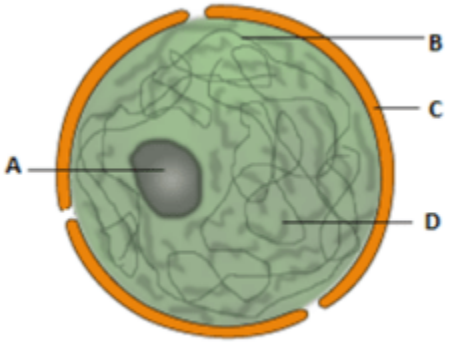
Q.4. A vacuole is a space or cavity within the cytoplasm of a cell, enclosed by a membrane and typically containing fluid. They are a kind of storage sacs that are very large sized in plant cell as compared to that in the animal cell.
Which among the following is not a function of the vacuole?
(a) They help to store the toxic metabolic by-products of the plant cell.
(b) They provide turgidity and rigidity to the plant cell.
(c) They help to maintain the osmotic pressure in the cell.
(d) They help the plant in its growth by the process of cell division.

Q.5. Which of the following is not a function of the vacuole in plants?
(a) They store toxic metabolic wastes
(b) They help with the process of cell division
(c) They help to maintain turgidity
(d) They provide structurally support

Q.6. Where are the essential proteins and lipids required for cell membrane, manufactured?
(a) Lysosome
(b) Chromosomes
(c) Endoplasmic reticulum
(d) Mitochondria

Q.7. The process by which water moves through a semi-permeable membrane from a region of high concentration to a region of lower concentration, thereby equalizing water concentration is called:
(a) Evaporation
(b) Diffusion
(c) Osmosis
(d) All of the above

Q.8. The nucleus controls all the activities of the cell and acts as a site of DNA material and protein synthesis. It is composed of some components which all together give the nucleus its functionality. Here is shown a figure of nucleus with some of its components labeled as A, B, C and D. can you name these components correctly?



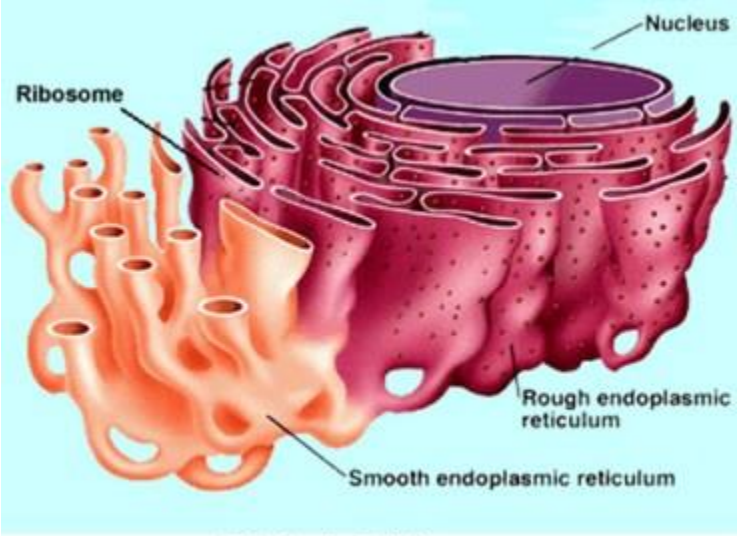
Structure of Nucleus

(a) A – Nucleons; B – Chromatin; C – Nuclear membrane; D – Nucleoplasm
(b) A – Nucleus; B – Chromatin; C – Nuclear membrane; D – Nucleoplasm
(c) A – Nucleolus; B – Chromatin; C – Nuclear membrane; D – Nucleoplasm
(d) A – Nucleolus; B – Chromatin; C – Nuclear membrane; D – Nuclear wall

Q.9. A cell will swell up if
(a) The concentration of water molecules in the cell is higher than the concentration of water molecules in the surrounding medium.
(b) The concentration of water molecules in the surrounding medium is higher than the concentration of water molecules in the cell.
(c) The concentration of water molecules is same in the cell and in the surrounding medium
(d) The concentration of water molecules does not matter.

Q.10. Which of the following statement marks as a difference between plant cell and animal cell?
(a) Plant cells have cell wall which animal cells do not.
(b) Plant cells do not have vacuole while animal cells do have.
(c) Plant cells have only cell membrane while animal cells have both cell wall as well as cell membrane.
(d) Plant cells have more plastids while animal cells have few plastids.

Q.11. Endoplasmic reticulum one of the cell organelles, exists as a membranous network that extends from outer membrane of nucleus to the plasma membrane making a connection between them.



Endoplasmic Reticulum

Which of the following statements is not related to the endoplasmic reticulum?
(a) It behaves as transport channel for proteins between nucleus and cytoplasm.
(b) It transports materials between various regions in cytoplasm.
(c) It can be the site of energy generation.
(d) It can be the site of some biochemical activities of the cell.

Q.12. The proteins and lipids, essential for building the cell membrane, are manufactured by:
(a) Endoplasmic reticulum
(b) Golgi apparatus
(c) Mitochondria
(d) Peroxisomes

Q.13. Osmosis is a process by which molecules of a solvent tend to pass through a semipermeable membrane from a less concentrated solution into a more concentrated one. Can you pick out the option among the following which does not belong to this process?
(a) The movement of water across a semipermeable membrane is affected by the amount of substances dissolved in it.
(b) Membranes are made of organic molecules such as proteins and lipids.
(c) Molecules soluble in organic solvents can easily pass through the membrane.
(d) Plasma membranes contain chitin sugar in plants.

Q.14. You must have observed that a fruit when unripe is green but it becomes beautifully coloured when ripe. According to you what is the reason behind this colour change.
(a) Chloroplasts change to chromosplasts
(b) Chromosplasts change to chromosomes
(c) Chloroplasts change to chromosomes
(d) Chromosplasts change to chloroplasts

Q.15. Rahul's mother was going to make pickle. For this she cut the vegetables into small pieces and put them in the sun for few hours. Rahul was observing all her activities very curiously and asked his mother if why she had put the salted vegetables in the sun. among the following what might be the most appropriate answer for his question?
(a) So that the pickle may get extra flavour.
(b) So that the cut vegetables may absorb the vitamin d as a nutrient from the sun rays.
(c) So that the vegetables may lose all the water by diffusion and evaporation and become dry.
(d) So that the salt may get evenly and properly absorbed by the vegetables.

Q.16. The process of plasmolysis in plant cell is defined as:
(a) Breakdown of plasma membrane in hypotonic solution.
(b) Shrinkage of cytoplasm in hypertonic medium.
(c) Shrinkage of Nucleoplasm.
(d) None of these.

Q.17. Among the following statements which one is incorrect?
(a) Golgi apparatus is involved with formation of lysosomes.
(b) Nucleus, mitochondria and plastid have DNA, hence they are able to make their own structural proteins.
(c) Lysosomes are called the suicide bags as they eat up their own cells.
(d) Cytoplasm is called known as protoplasm.

Q.18. Mitochondria are the sites of respiration in the cell. They oxidize carbohydrates and fats present in the cell to produce carbon dioxide, water and a lot of energy. The energy so released is stored in the form of ATP molecules. Since mitochondria in the cell are used to synthesize energy so, they are also called:
(a) Energy currency of the cell
(b) Energy generator of the cell
(c) Kitchen of the cell
(d) Power house of the cell

Q.19. Cell is the structural and functional unit of life. The word cell is derived from the Latin word 'cellula' which means "a little room". Can you name the scientist who coined the term cell?
(a) Robert Hooke
(b) Anton Von Leeuwenhoek
(c) Robert Brown
(d) Ernst Haeckel

Q.20. In a test, a teacher collected the answers written by four students as the definition of osmosis as given below. Read carefully and select the correct one.
(a) Movement of water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane.
(b) Movement of solvent molecules from its higher concentration to lower concentration.
(c) Movement of solvent molecules from higher concentration to lower of solution through a permeable membrane.
(d) Movement of solute molecules from lower concentration to higher concentration of solution through a semipermeable membrane.

Q.21. Anjali wanted to eat rice and kidney bean (rajmah). She requested her mother to cook the same on next day. At night her mother took a cup of kidney beans and put them in a container having some water and the kept the container covered overnight. Next day it was observed that the kidney beans got swollen and were ready to be cooked. What is this phenomenon due to which kidney beans got swollen is known as?
(i) Osmosis
(ii) Diffusion
(iii) Endosmosis
(iv) Exosmosis

Choose the correct option among the following:

(a) Only (iii)
(b) Both (i) and (iii)
(c) Both (i) and (iv)
(d) Only (i)

## Assertion Reasoning Type Questions

Directions: In the following questions, a statement of assertion is followed by a statement of reason.
Mark the correct choice as:
(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If both Assertion and Reason are false.

1. **Assertion**: Mitochondria and chloroplasts are semiautonomous organelles.
**Reason** : They are formed by division of pre-existing organelles and contain DNA but lack protein synthesizing machinery.

2. **Assertion** : Plasma membrane is selectively permeable.
**Reason** : Plasma membrane allows some molecules to pass through it more easily than others.

3. **Assertion** : Leucoplasts perform photosynthesis.
**Reason** : Chloroplasts store fats, starch and proteins.

4. **Assertion** : Cell wall is a non-living part of the cell.
**Reason** : It offers protection, definite shape and support.

5. **Assertion** : A cell membrane shows fluid behaviour.
**Reason** : A membrane is a mosaic of lipids and proteins.

6. **Assertion** : A plant cell bursts if placed in water.

**Reason** : High turgor pressure causes bursting of plant cells.

7. **Assertion** : Mitochondria are called 'powerhouses' of the cell.
**Reason** : Mitochondria produce cellular energy in the form of ATP.

8. **Assertion** : Plant cells have very large vacuoles.
**Reason** : In plant cells, vacuoles are full of cell sap.

9. **Assertion**: Organisms are made up of cells.
**Reason**: Cells are structural unit of living organisms. A cell keeps its chemical composition steady within its boundary.

10. **Assertion**: Specialization of cells is useful for organism.
**Reason**: It increases the operational efficiency of an organism.

11. **Assertion**: The number of cells in a multicellular organism is inversely proportional to size of body.
**Reason**: All cells of biological world are alive.

12. **Assertion** : Living organisms possess specific individuality with the definite shape and size.
**Reason** : Both living and non-living entities resemble each other at the lower level of organisation.

13. **Assertion**: Smaller cells are usually metabolically active cells.
**Reason**: Smaller cell nucleocytoplasmic ratio and surface volume ratio is higher.

14. **Assertion** : It is important that the organisms should have cell.
**Reason** : A cell keeps its chemical composition steady within its boundary.

15. **Assertion**: The number of cells in a multicellular organism is inversely proportional to the size of body.
**Reason**: All the cells in the biological world are of same size.

16. **Assertion**: Schleiden and Schwann were the first to observe the cells and to put forward cell theory.
**Reason**: The cells are always living unit.

17. **Assertion**: As per Schwann, cell wall is a unique character of the plant cell.
**Reason**: Body of plants and animals are composed of cells and products of cells.

18. **Assertion**: Eukaryotic cells have membrane bound organelles.
**Reason**: Prokaryotic cells lack membrane bound organelles.

19. **Assertion**: Ribosomes are non-membrane bound organelles found in the prokaryotic cells only.
**Reason**: These are present only in the cytoplasm.

20. **Assertion**: Eukaryotic cells have more DNA than prokaryotic cells.
**Reason**: Eukaryotes are genetically more complex than prokaryotes.

**Case study Based Questions**

**Paragraph-1**

Mitochondrial disease

The DNA within mitochondria is more susceptible to damage than the rest of the genome. This is because free radicals, which can cause damage to DNA, are produced during ATP synthesis. Also, mitochondria lack the same protective mechanisms found in the nucleus of the cell.

However, the majority of mitochondrial diseases are due to mutations in nuclear DNA that affect products that end up in the mitochondria.. As a general rule, cells that need the largest amounts of energy, such as heart muscle cells and nerves, are affected the most by faulty mitochondria.

Diseases that generate different symptoms but are due to the same mutation are referred to as genocopies. Conversely, diseases that have the same symptoms but are caused by mutations in different genes are called phenocopies. Leigh syndrome, which can be caused by several different mutations. Although symptoms of a mitochondrial disease vary greatly, they might include:

Over recent years, researchers have investigated a link between mitochondria dysfunction and aging. There are a number of theories surrounding aging, and the mitochondrial free radical theory of aging has become popular over the last decade or so.

The theory is that reactive oxygen species (ROS) are produced in mitochondria, as a by-product of energy production. These highly charged particles damage DNA, fats, and proteins.

Because of the damage caused by ROS, the functional parts of mitochondria are damaged. When the mitochondria can no longer function so well, more ROS are produced, worsening the damage further. Although correlations between mitochondrial activity and aging have been found, not all scientists have reached the same conclusions. Their exact role in the aging process is still unknown.

1. Which is the most common phenomenon of mitochondrial diseases?
A) Due to Damage of Mitochondrial membrane
B) Due to Mutation in Mitochondrial DNA
C) Due to Mutation in Nuclear DNA
D) Lack of Oxygen
2., How do free radicals affect mitochondria?
A) Make More Radicals
B) Causes damage to DNA
C) Dehydrate the cell
D) Does not harm at all
3. Name the cell(s) which uses maximum amount of energy?
A) Heart muscle Cells
B) Nerve cell
C) Epithelial cells
D) Both A and B

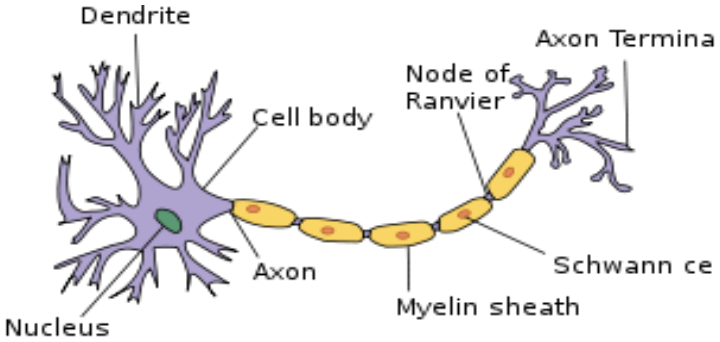
4.Leigh syndrome is an example of genocopy or phenocopy.
A) Phenocopy
B) Genocopy
C) Both A and B
D)Genotype

5. What is the difference between nuclear DNA and Mitochondrial DNA?
A) Mitochondrial DNA is Linear
B) Nuclear DNA is Circular
C) Mitochondrial DNA is Circular
D) No Difference

**Paragraph-2**

Neurons

Neuron is a nerve cell that is the basic building block of the nervous system. Neurons are similar to other cells in the human body in a number of ways, but there is one key difference between neurons and other cells. Neurons are specialized to transmit information throughout the body. These highly specialized nerve cells are responsible for communicating information in both chemical and electrical forms.



There are three basic parts of a neuron: the dendrites, the cell body, and the axon. However, all neurons vary somewhat in size, shape, and characteristics depending on the function and role of the neuron. Some neurons have few dendritic branches, while others are highly branched in order to receive a great deal of information. Some neurons have short axons, while others can be quite long. The longest axon in the human body extends from the bottom of the spine to the big toe and averages a length of approximately three feet!

Action Potentials

How do neurons transmit and receive information? In order for neurons to communicate, they need to transmit information both within the neuron and from one neuron to the next. This process utilizes both electrical signals as well as chemical messengers.

The dendrites of neurons receive information from sensory receptors or other neurons. This information is then passed down to the cell body and on to the axon. Once the information has arrived at the axon, it travels down the length of the axon in the form of an electrical signal known as an action potential.

1. In what ways other body cells are similar to neurons?
A) Both have dendrites
B) Both have nucleus
C) Both transmit Impulse
D) Both are Dead

2. Neuron transmit information in form of
A) Electrical Signals
B) Chemical signals
C) Both A and B
D) None of the Above

3. In which part of neuron information transmits in the form of electrical signals?
A) Dendrite
B) Cyton
C) Axon
D) Axon Terminal

4.Which part of a neuron receives messages from the cell?
(a)dendrites
(b)soma
(c) axon
(d) neuron cell

5. Longest Cell of Body is
A) Heart cell
B) Nerve Cell
C) White Blood Cell
D) Bone Cell

**Answers**

1. MCQ

| | | | |
|---|---|---|---|
| 1 | C | 11 | C |
| 2 | C | 12 | A |
| 3 | D | 13 | D |
| 4 | D | 14 | A |
| 5 | B | 15 | C |
| 6 | C | 16 | B |
| 7 | C | 17 | D |
| 8 | C | 18 | D |
| 9 | B | 19 | A |
| 10 | A | 20 | A |
| | | 21 | B |

**2. Assertion and reason type**

| | |
|---|---|
| 1 | (c) Assertion (A) is true but reason (R) is false. Both mitochondria and chloroplasts are double membrane bound, semi-autonomous cell organelles. Their structure and functions are partially controlled by nucleus of the cell and partially by themselves. Both possess their own DNA and arise from the pre-existing cells. 70S type of ribosome is present in both organelles which can help to translate the coded information contained in mRNA and protein synthesis. |
| 2 | (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). Each cell is bound by an extremely delicate, thin, elastic, selectively permeable, living membrane called plasma membrane. It is selectively permeable as it allows some molecules to pass through more easily than others. |
| 3 | (d) Assertion (A) is false but reason (R) is true. Chloroplasts perform photosynthesis while leucoplasts are storage plastids. |
| 4 | (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). Cell wall is a non-living part of the cell. It is an outer, rigid, protective, supportive and semi-transparent covering of plant cells only. The cell wall lies outside the plasma membrane. The cell wall is mainly composed of cellulose. It provides a definite shape to the cell. It protects plasma membrane and internal structures from the attack of pathogens and mechanical injury. |
| 5 | (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). A cell membrane shows fluid behavior. It was proved by fluid- mosaic model of a bio membrane by Singer and Nicolson in 1972. According to this model, the membrane does not have a uniform disposition of lipids and proteins but is a mosaic of the two. Further, the membrane is not solid but is quasi fluid. |
| 6 | (d) Assertion (A) is false but reason (R) is true. Plant cells have cell wall to counteract turgor pressure (T.P.) by exerting exactly equal and opposite wall pressure. Wall pressure stops entry of water into plant cells beyond a certain limit thus prevents their bursting. |
| 7 | (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). Mitochondria are cell organelles of aerobic eukaryotes. These are site of |

| | |
|---|---|
| | aerobic respiration, where Krebs cycle occurs in matrix, while ETS and oxidative phosphorylation enzymes are located in inner membrane. They are called powerhouses of cell because they produce energy in the form of ATP. They are the major centers of release of energy in the aerobic respiration. |
| 8 | (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). Plant cells possess large vacuoles to perform functions like: 1. Storage of water, mineral etc. 2. Provide turgidity and rigidity to the cell, as it is filled with cell sap. |
| 9 | (a) Cells are the basic structural and functional unit of organism. |
| 10 | (a) Specialization of the cell increases the efficiency of the cell for a particular function. |
| 11 | (d) The size and shape of the cell in multicellular organism depends upon the location and function performed by them. |
| 12 | (b) All living organisms have definite shape and size and all show specific individuality with an orderly mannered organization whereas at the lower level of organization, both the living and non-living are made up of atoms. |
| 13 | (a) Metabolically active cells are usually smaller due to higher nucleocytoplasmic ratio and higher surface volume ratio. The former will allow the nucleus to have better control of metabolic activities, while the latter will allow quicker exchange of materials between the cells and its outside environment. |
| 14 | (a) Metabolic reactions of a living organism can occur only in a delicately balanced environment in the non-living organisms. The cells are the life supporting chambers which have such a special environment. A living cell keeps its chemical composition steady within its boundary. |
| 15 | (d) Number of cells in a multicellular organism are directly proportional to the size of the body. On the other hand, it is a fact that cell vary greatly in their size. Mycoplasma cells are the smallest, ranging from 0.1 to 0.3μm, whereas human cells, generally range from 20 to 30μm. Nerve cells are the longest. |
| 16 | (d) They are credited with cell theory but the cells are not always the living unit. Cells die and still remain functional such as horny cells in animal and xylem vessels in plants. |
| 17 | (b) Based on his studies, Schwann proposed the hypothesis that the bodies of animal and plants are composed of cells and products of cells. Schleiden and Schwann together formulated the cell theory. Cell theory as understood is (i) All living organism are composed of cells and products of cells and (ii) all cells arise from pre-existing cells. |
| 18 | (b) Eukaryotic cells which have membrane bound distinct structures called organelles like nucleus, endoplasmic reticulum (ER), Golgi complex, lysosomes, mitochondria, micro bodies and vacuoles. These are found in all protists, plants, animals and fungi. Prokaryotic cells lack such membrane bound organelles. Prokaryotic cells occur in bacteria, archaea, blue-green algae, mycoplasma and PPLO. Genetic material in these cells lies naked in the cytoplasm. |
| 19 | (d) Ribosomes are non-membrane bound organelles found in eukaryotic as well as prokaryotic cells. Within the cell, ribosomes are found not only in the cytoplasm but also within the two organelles – chloroplasts (in plants) and mitochondria and on rough ER. |

| | |
|---|---|
| 20 | (a) Eukaryotic cells have more DNA than prokaryotic cells because in eukaryotic cells complex chromosomes are composed of DNA and histone proteins. But in prokaryotic cells, histone protein is absent. |

### 3. Paragraph Based Questions

3.1 Paragraph-1

| | |
|---|---|
| 1 | C |
| 2 | B |
| 3 | D |
| 4 | B |
| 5 | C |

3.2 Paragraph-2

| | |
|---|---|
| 1 | B |
| 2 | C |
| 3 | C |
| 4 | A |
| 5 | B |

## CHAPTER 6

## TISSUES

### MULTIPLE CHOICE QUESTIONS

**1.** Tiny pores are found on the surface of the leaves of plants. These pores are called stomata. These stomata surrounded by the kidney shaped guard cells provide many vital functions to the plants.
Which of the following functions is not served by the stomata for the plants?
(a) Exchange of gases, particularly $CO_2$ and $O_2$, with atmosphere
(b) Loss of water in the form of vapours during transpiration
(c) Helps to create pressure for the water to rise upward, by its process of transpiration
(d) Helps the leaves to carry out the process of photosynthesis

2. Epithelial tissue always has an exposed outer surface and an inner surface anchored to connective tissue by a thin, non- cellular structure called the
(a) Non stratified layer
(b) Stratified layer
(c) Basement membrane
(d) Fibroblast

3. Meristematic tissues are those which help in increasing the length and girth of the plan. Which of the following statements given below is correct about the meristematic tissue?
(a) It is made up of cells that are incapable of cell division
(b) It is made up of cells that are capable of cell division
(c) It is composed of single type of cells
(d) It is composed of more than one type of cells

4. Connective tissues are the tissues that help to bind or connect other tissues in the body. They have widely spaced cells embedded in a matrix having a variety of proteins, polysaccharides and mineral salts. Can you identify the connective tissues among the following?
i. Ligament
ii. Epithelium
iii. Tendon
iv. Blood
(a) Both (i) and (iii)
(b) (i), (ii) and (iii)
(c) (i), (iii) and (iv)
(d) All (i), (ii), (iii) and (iv)

5. If the tip of the sugarcane plant is removed from the field, even then it keeps on growing in length. It is due to the presence of:
(a) Cambium
(b) Apical meristem
(c) Lateral meristem

(d) Intercalary meristem

6. The cells of cork are dead and have a chemical in their walls that makes them impervious to gases and water. The chemical is
(a) lignin
(b) suberin
(c) cutin
(d) wax

7.The flexibility in plants is due to a tissue called
(a) chlorenchyma
(b) parenchyma
(c) sclerenchyma
(d) collenchyma

**8.** The tissue present in the lining of kidney tubules and ducts of salivary glands is
(a) squamous epithelium tissue
(b) glandular epithelium tissue
(c) cuboidal epithelium tissue
(d) columnar epithelium tissue

**9** The connective tissue that connects muscle to bone is called
(a) ligament
(b) tendon
(c) nervous tissue
(d) all of the above

**10** The tissue that helps in the movement of our body are
(a) muscular tissue
(b) skeletal tissue
(c) nervous tissue
(d) all of the above

**11** Sieve tubes and companion cells are present in
(a) xylem
(b) phloem
(c) cork
(d) cambium

**12** The size of the stem increases in the width due to
(a) apical meristem
(b) intercalary meristem
(c) primary meristem
(d) lateral meristem

**13** Cartilage and bone are types of
(a) muscular tissue
(b) connective tissue
(c) meristematic tissue
(d) epithelial tissue

**14** Xylem and phloem are examples of
(a) epidermal tissue
(b) simple tissue
(c) protective tissue
(d) complex tissue

**15** A tissue whose cells are capable of dividing and re-dividing is called
(a) complex tissue
(b) connective tissue
(c) permanent tissue
(d) meristematic

16.Which cell does not have perforated cell wall?
(a) Tracheids
(b) Companion cells
(c) Sieve tubes
(d) vessels

17. Tissue is a group of similar kind of cells specialized to perform a particular function in the body. Therefore presence of tissues in a multicellular organism ensures:
(a) Faster development
(b) Division of labour
(c) Higher reproductive potential
(d) Body strength

18. Lysosome is a cytoplasmic organelle containing enzymes that break down biological polymers. Lysosomes function as the digestive system of the cell. It is also called the suicide bag of the cell because
(a) It causes any cell to commit suicide
(b) Its enzymes digest the cell itself
(c) Its enzymes kill surrounding cells
(d) All of the above

19. While doing work and running, you move your organs like hands, legs, etc. Which among the following is correct?

(a) Smooth muscles contract and pull the ligament to move the bones
(b) Smooth muscles contract and pull the tendons to move the bones
(c) Skeletal muscles contract and pull the ligament to move the bones
(d) Skeletal muscles contract and pull the tendon to move the bones

20. Cardiac muscle is one of the three major types of muscles, the others being skeletal and smooth muscles. It is found in the walls and histological foundation of the heart. Which one of the following statements is not related to the cardiac muscles?
(a) They muscles show rhythmic contraction and relaxation throughout life.
(b) They do not work according to our will, so they are called involuntary muscles.
(c) They are non-striated, multinucleated and branched muscles.
(d) The contraction and relaxation of the heart muscles help to pump and distribute blood to different parts of the body

**ASSERTION REASONING TYPE QUESTIONS**

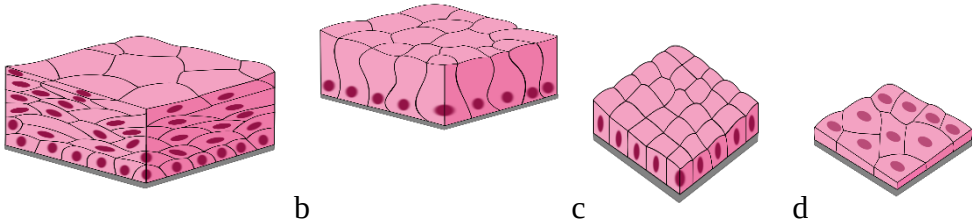
**DIRECTION:** In each of the following questions, a statement of Assertion is given and a corresponding statement of Reason is given just below it. Of the statements, given below, mark the correct answer as:
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both Assertion and Reason are false.

1. **Assertion :** Parenchyma cells help in storage of food.
**Reason :** Parenchyma cells are the main seats of photosynthesis.
2 . **Assertion :** Vascular or conductive tissue is a distinctive feature of complex plants.
**Reason :** Vascular tissue has made survival of complex plants possible in terrestrial environment.
3. **Assertion :** The inner lining of intestine has tall epithelial cells.
**Reason :** Columnar epithelium facilitates absorption and secretion.
4. **Assertion :** Permanent tissue is composed of mature cells.
**Reason :** Meristematic tissue is a group of actively dividing cells.
5. **Assertion :** Most of plant tissues are dead.
**Reason :** Due to sedentary existence of plants, dead cells provide mechanical strength more easily than live ones and need less maintenance.
6. **Assertion :** Ciliated epithelium helps in movement of particles.
**Reason :** Cilia help in movement.
7. **Assertion :** Meristematic tissues constitute the major portion of the plant body.
**Reason :** Meristematic tissues consist of differentiated cells.
8. **Assertion :** Surface of skin is impervious to water.

**Reason :** Surface of skin is covered by stratified cuboidal epithelium.
9. **Assertion :** Lateral meristems add thickness of plants.
**Reason :** Lateral meristems divide only in one plane.
10. **Assertion :** Vessel and sieve tube both are meant for transport purposes.
**Reason :** Vessels are lignified.
**11. Assertion** : Specialization of cells is advantageous for the organisms.
**Reason**: It increases operational efficiency of organism.
12. **Assertion**: skeletal muscles are also known as striated muscles
**Reason**: under microscope skeletal muscle show alternate light and dark bands
13. **Assertion**: The squamous epithelium is made of a single layer of flattened cells with irregular boundaries
**Reason**: They are found in walls of blood vessels.
14. **Assertion**: Urinary bladder can considerably expand to accommodate urine
**Reason**: It is lined by stretchable squamous epithelium
15. **Assertion**: columnar epithelium lining the intestinal mucosa appears to have a brush like appearance
**Reason**: A large number of microvilli are present on brush border columnar epithelium
16. **Assertion**: Surface of skin is impervious to water
**Reason**: Surface of skin is covered by stratified cuboidal epithelium
17. **Assertion**: Stomach and intestine of our body has columnar epithelium
**Reason**: Columnar epithelium helps in secretion and absorption
18. **Assertion**: Cell junction are present in epithelium and other tissues.
**Reason**: Among cell junction adhering junction help to stop substance from leakage.
**19. Assertion: Simple epithelium covers surface exposed to mechanical abersions**
**Reason**: Protection of underlying tissues is major function of simple epithelium
20. **Assertion**: Cells of connective tissue except blood secrete fibres
**Reason**: Fibres provide strength, elasticity and flexibility to tissues.

**CASE BASED QUESTIONS(1 AND 2)**

**Read the following and answer questions from 1.1 TO 1.5**
Epithelial cells are type of cells that lines the surface of your body. They are found on your skin, blood vessels, etc .They act as a protective barrier and stop viruses to enter the body. There are three main types of epithelial cell.
1.1 The epithelial tissue that lines the stomach and intestine is



a b c d
1.2 While doing work and running , you move your organs like hands, legs, etc

Which among the following is correct?
(a) smooth muscle contract and pull the ligament to move the bones
(b) smooth muscle contract and pull the tendon to move the bones
(c) skeletal muscle contract and pull the ligament to move the bones
(d) skeletal muscle contract and pull the tendon to move the bones

1.3 Read the given statements and select the incorrect ones
(a) The nature of matrix differs according to the functions of the tissues
(b) Fats are stored below the skin and in between the internal organs
(c ) Epithelial tissues have large intercellular spaces between them
(d) Cells of striated muscles are multinucleated and unbranched

1.4 Smooth muscle fibre are
(a) Spindle shaped, unbranched, non striated, multinucleated and involuntary
(b) Spindle shaped, unbranched, striated, multinucleated and involuntary
(c) Cylindrical, striated, unbranched, multinucleate and voluntary
(d) Cylindrical,non striated, unbranched, multinucleate and involuntary

1.5 Skeletal muscle fibre are
(a) Spindle shaped, unbranched, non striated, multinucleated and involuntary
(b) Spindle shaped, unbranched, striated, multinucleated and involuntary
(c) Cylindrical, striated, unbranched, multinucleate and voluntary
(d) Cylindrical,non striated, unbranched, multinucleate and involuntary

**Read the following and answer questions from 2.1 TO 2.5**

Connective tissue is specialised to connect various body with each other, for example it connects two or more bones to each other ,muscles to bones, bind different tissues together and also gives support to various parts of the body. The cells of connective tissue are loosely packed, living and embedded in an intercellular matrix that may either be jelly like fluid, dense or rigid in nature. The nature of matrix differs in concordance with the function of the particular connective tissue . The various types of the connective tissue are blood, bones, ligaments, tendons, cartilage, areolar tissue, adipose tissue

2.1 Connective tissue is
(a) Ectodermal in origin with intercellular spaces
(b) Ectodermal in origin without intercellular spaces
(c) Mesodermal in origin with intercellular spaces
(d) Ectodermal in origin with intercellular spaces

2.2 Which among the following is not correct?
(a) Blood has matrix containing proteins ,salts and hormones
(b) Two bones are connected with ligament
(c) Tendons are non fibrous tissue and fragile

(d) Cartilage is a form of connective tissue

2.3 Which of the following help in repair of tissue and fill up the space inside the organ?
(a) Tendon
(b) Adipose tissue
(c) Areolar tissue
(d) Cartilage tissue

2.4 Tip of nose and the external ears have
(a) areolar tissue
(b) ligament
(c) cartilage
(d) bone

2.5 Collagen is
(a) Carbohydrate
(b) lipid
(c) fibrous protein
(d) globular protein

Answer key

MCQ ASSERTION/REASON CASE

| | | | | |
|---|---|---|---|---|
| 1-d | 11-b | 1-b | 11-b | 1.1 -b |
| 2-c | 12-d | 2-b | 12-a | 1.2 -d |
| 3-b | 13-b | 3-a | 13-b | 1.3 -c |
| 4-c | 14-d | 4-b | 14-c | 1.4 -a |
| 5-d | 15-d | 5-a | 15-a | 1.5 -c |
| 6-b | 16-b | 6-a | 16-c | 2.1 -c |
| 7-d | 17-b | 7-d | 17-a | 2.2 -c |
| 8-c | 18-b | 8-c | 18-c | 2.3 -c |
| 9-b | 19-d | 9-a | 19-d | 2.4 -c |

# Chapter 8

## Motion

MCQ

Q.1 The displacement of the object in a unit time is called:
(a) speed (b) velocity

(c) acceleration (d) average speed

Q.2 The rate of change of velocity per second is known as:
(a) acceleration (b) speed
(c) average velocity (d) linear motion

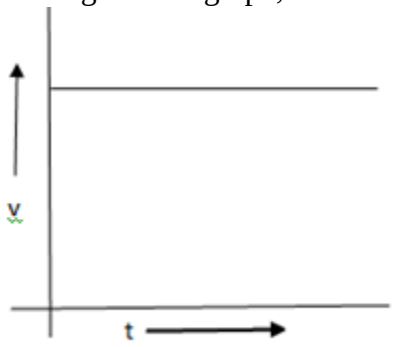
Q.3 What is the unit of acceleration?
(a) m/s (b) m/$s^2$ (c) ms (d) m/$s^3$

Q.4 A particle is moving in a circular path of radius r. The displacement after half a circle would be:
(a) zero (b) πr (c) 2r (d) 2πr

Q.5 A body is thrown vertically upward with velocity u, the greatest height h to which it will rise is:
(a) u/g
(b) u2/2g
(c) u2/g
(d) u/2g

Q.6 The slope of a velocity-time graph gives:
(a) the distance
(b) the displacement
(c) the acceleration
(d) the speed

Q.7 From the given v-t graph, it can be inferred that the object is




(a) At rest
(b) In uniform motion

(c) Moving with uniform acceleration
(d) In non-uniform motion

Q.8 Suppose a boy is enjoying a ride on a marry-go-round which is moving with a constant speed of 10 m/s. It implies that the boy is:
(a) At rest
(b) Moving with no acceleration
(c) In accelerated motion
(d) Moving with uniform velocity

Q.9 Which of the following can sometimes be 'zero' for a moving body?
i. Average velocity
ii. Distance travelled
iii. Average speed
iv. Displacement
(a) Only (i)
(b) (i) and (ii)
(c) (i) and (iv)
(d) Only (iv)

Q.10 Which of the following statement is correct regarding velocity and speed of a moving body?
(a) Velocity of a moving body is always higher than its speed
(b) Speed of a moving body is always higher than its velocity
(c) Speed of a moving body is its velocity in a given direction
(d) Velocity of a moving body is its speed in a given direction

Q.11 When a car driver travelling at a speed of 10 m/s applies brakes and brings the car to rest in 20 s, then the retardation will be:
(a) + 2 $m/s^2$
(b) − 2 $m/s^2$
(c) − 0.5 $m/s^2$
(d) + 0.5 $m/s^2$

Q.12 The numerical ratio of displacement to distance for a moving object is:
(a) Always less than 1
(b) Equal to 1 or less than 1
(c) Always more than 1
(d) Equal to 1 or more than one

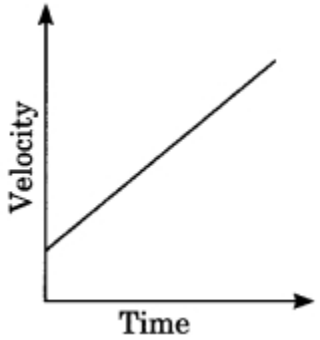
Q.13 Which of the following can sometimes be 'zero' for a moving body?
i. Average velocity
ii. Distance travelled
iii. Average speed
iv. Displacement
(a) Only (i)
(b) (i) and (ii)

(c) (i) and (iv)
(d) Only (iv)

Q.14 In a free fall the velocity of a stone is increasing equally ion equal intervals of time under the effect of gravitational force of the earth. Then what can you say about the motion of this stone? Whether the stone is having:
(a) Uniform acceleration
(b) Non-uniform acceleration
(c) Retardation
(d) Constant speed

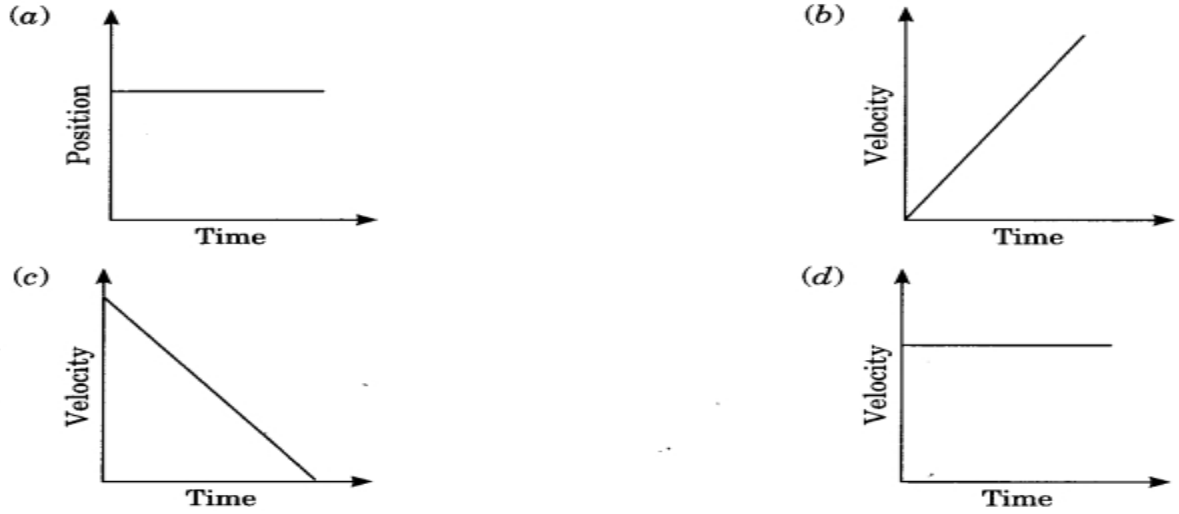
Q.15 A boy goes from A to B with a velocity of 20 m/min and comes back from B to A with a velocity of 30 m/min. The average velocity of the boy during the whole journey is
(a) 24 m/min
(b) 25 m/s
(c) Zero
(d) 20 m/min

Q.16 According to the given velocity-time graph, the object



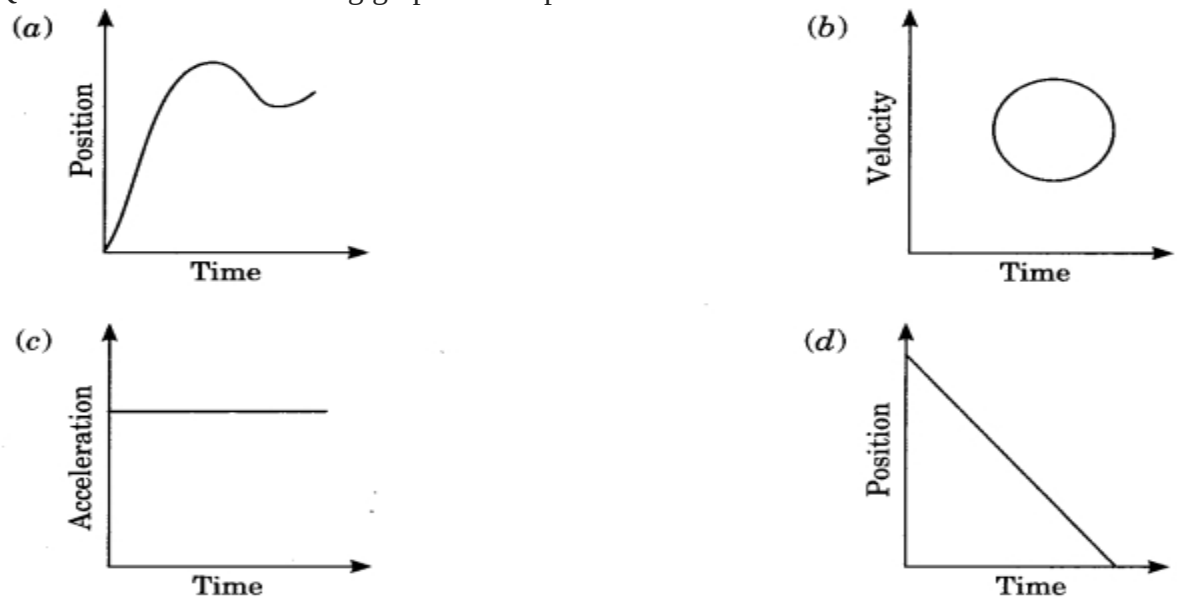

(a) is moving with uniform velocity
(b) has some initial velocity
(c) is moving uniformly with some initial velocity
(d) is at rest

Q.17 A car is moving along a straight road with uniform velocity. It is shown in the graph.

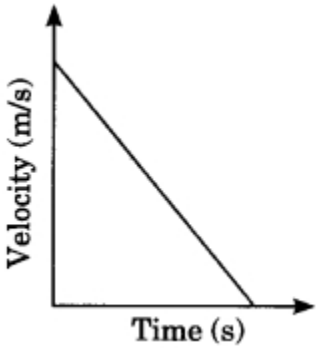


Q.18 Which of the following situations is possible?
(a) An object can have acceleration, but constant velocity.
(b) The velocity of an object may be zero but acceleration is not zero.
(c) Distance and the magnitude of displacement are equal in circular motion.
(d) Average speed and the magnitude of average velocity are always equal in circular motion.

Q.19 Which of the following graphs is not possible?




Q.20 Velocity-time graph of an object is given below. The object has




(a) Uniform velocity
(b) Uniform speed
(c) Uniform retardation
(d) Variable acceleration

**ASSERTION& REASON**
Read the Assertion and Reason carefully to mark the correct option out of the options given below :
*(a) If both Assertion and Reason are true and the reason is the correct explanation of the*

*Assertion.*
*(b) If both Assertion and Reason are true but Reason is not the correct explanation of the Assertion.*
*(c) If Assertion is true but reason is false.*
*(d) If the Assertion and Reason both are false.*
*(e) If Assertion is false but reason is true.*

1. **Assertion**: A body can have acceleration even if its velocity is zero at a given instant of time.
**Reason**: A body is momentarily at rest when it reverses its direction of motion.

2. **Assertion**: Two balls of different masses are thrown vertically upward with same speed. They will pass through their point of projection in the downward direction with the same speed.
**Reason**: The maximum height and downward velocity attained at the point of projection are independent of the mass of the ball.

3. **Assertion**: If the displacement of the body is zero, the distance covered by it may not be zero.
**Reason**: Displacement is a vector quantity and distance is a scalar quantity.

4. **Assertion**: The average velocity of the object over an interval of time is either smaller than or equal to the average speed of the object over the same interval.
**Reason**: Velocity is a vector quantity and speed is a scalar quantity.

5. **Assertion**: An object can have constant speed but variable velocity.
**Reason**: Speed is a scalar but velocity is a vector quantity.

6. **Assertion**: The speed of a body can be negative.
**Reason**: If the body is moving in the opposite direction of positive motion, then its speed is negative.

7. **Assertion**: The position-time graph of a uniform motion in one dimension of a body can have negative slope.
**Reason**: When the speed of body decreases with time, the position-time graph of the moving body has negative slope.

8. **Assertion**: A positive acceleration of a body can be associated with a '*slowing down*' of the body.
**Reason**: Acceleration is a vector quantity.

9. **Assertion**: A negative acceleration of a body can be associated with a '*speeding up*' of the body.
**Reason**: Increase in speed of a moving body is independent of its direction of motion.

10. **Assertion**: When a body is subjected to a uniform acceleration, it always move in a straight line.
**Reason**: Straight line motion is the natural tendency of the body.

11. **Assertion**: Rocket in flight is not an illustration of projectile.

**Reason**: Rocket takes flight due to combustion of fuel and does not move under the gravity effect alone.

12. **Assertion**: The average speed of a body over a given interval of time is equal to the average velocity of the body in the same interval of time if a body moves in a straight line in one direction.
**Reason**: Because in this case distance travelled by a body is equal to the displacement of the body.

13. **Assertion**: Position-time graph of a stationary object is a straight line parallel to time axis.
**Reason**: For a stationary object, position does not change with time.

14. **Assertion**: The slope of displacement-time graph of a body moving with high velocity is steeper than the slope of displacement-time graph of a body with low velocity.
**Reason**: Slope of displacement-time graph = Velocity of the body.

15. **Assertion**: Distance-time graph of the motion of a body having uniformly accelerated motion is a straight line inclined to the time axis.
**Reason**: Distance travelled by a body having uniformly accelerated motion is directly proportional to the square of the time taken.

16. **Assertion**: A body having non-zero acceleration can have a constant velocity.
**Reason**: Acceleration is the rate of change of velocity.

17. **Assertion**: A body, whatever its motion is always at rest in a frame of reference which is fixed to the body itself.
**Reason**: The relative velocity of a body with respect to itself is zero.

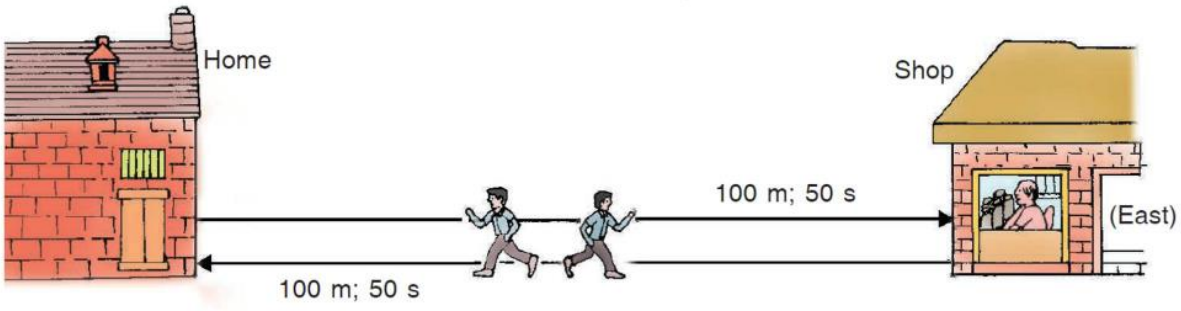
18. **Assertion**: Displacement of a body may be zero when distance travelled by it is not zero.
**Reason**: The displacement is the longest distance between initial and final position.

19. **Assertion**: The equation of motion can be applied only if acceleration is along the direction of velocity and is constant.
**Reason**: If the acceleration of a body is constant then its motion is known as uniform motion.

20. **Assertion**: A bus moving due north takes a turn and starts moving towards east with same speed. There will be no change in the velocity of bus.
**Reason**: Velocity is a vector-quantity.

## CASE STUDY QUESTION 01

**Read the following and answer any four questions from (i) to (v)**
Suppose the boy first runs a distance of 100 metres in 50 seconds in going from his home to the shop in the East direction, and then runs a distance of 100 metres again in 50 seconds in the reverse direction from the shop to reach back home from where he started (see Figure)




(i) Find the speed of the boy.
(a) 1 m/s (b) 2 m/s (c) 3 m/s (d) none of these

(ii) Find the Velocity of the boy.
(a) 1 m/s (b) 2 m/s (c) 3 m/s (d) 0 m/s

(iii) A boy is sitting on a merry-go-round which is moving with a constant speed of 10m/s. This means that the boy is :
(a) at rest (b) moving with no acceleration
(c) in accelerated motion (d) moving with uniform velocity

(iv) In which of the following cases of motion, the distance moved and the magnitude of displacement are equal ?
(a) if the car is moving on straight road
(b) if the car is moving on circular road
(c) if the pendulum is moving to and fro

(d) if a planet is moving around the sun

**CASE STUDY QUESTION 02**

Read the following and answer any four questions from (i) to (v)
One day Rahul decided to go his office by his car. He is enjoying the driving along with listening the old songs. His car is moving along a straight road at a steady speed. On a particular moment, he notices that the car travels 150 m in 5 seconds.

(i) What is its average speed ?
(a) 20 m/s (b) 30 m/s (c) 10 m/s (d) 40 m/s

(ii) How far does it travel in 1 second ?
(a) 20 m (b) 30 m (c) 10 m (d) 40 m

(iii) How far does it travel in 6 seconds ?
(a) 120 m (b) 130 m (c) 180 m (d) 140 m

(iv) How long does it take to travel 240 m ?
(a) 2s (b) 4s (c) 6s (d) 8s

(v) Which of the following statement is correct regarding velocity and speed of a Moving body ?
(a) Velocity of a moving body is always higher than its speed
(b) Speed of a moving body is always higher than its velocity
(c) Speed of a moving body is its velocity in a given direction
(d) Velocity of a moving body is its speed in a given direction

MCQ ANSWER
1 b
2 a
3 b
4 c
5 b
6 c
7 b
8 c
9 c
10 d
11 d
12 b
13 c
14 a
15 a

16 b
17 d
18 b
19 b
20 c

ASSERTION& REASON
ANSWER
1 a
2 a
3 a
4 a
5 a
6 d
7 c
8 b
9 b
10 e
11 a
12 a
13 a
14 a
15 e
16 e
17 a
18 c
19 d
20 e

Answer key  case study 1

(i) b

(ii) d

(iii) c

(iv) a

Answer key case study 2

(i) b

(ii) b

(iii) c

(iv) d

(v) d

# Chapter – 9

# Force and Laws of Motion

**MULTIPLE CHOICE QUESTIONS**

Question 1. Which of the following statements is not correct for an object moving along a straight path in an accelerated motion?

(a) Its speed keeps changing

(b) Its velocity always changes

(c) It always goes away from the Earth

(d) A force is always acting on it

Question 2. According to the third law of motion, action and reaction

(a) always act on the same body

(b) always act on different bodies in opposite directions

(c) have same magnitude and directions

(d) act on either body at normal to each other

Question 3. A goalkeeper in a game of football pulls his hands backwards after holding the ball shot at the goal. This enables the goalkeeper to

(a) exert larger force on the ball

(b) reduce the force exerted by the balls on the hands

(c) increase the rate of change of momentum

(d) decrease the rate of change of momentum

Question 4. The inertia of an object tends to cause the object

(a) to increase its speed

(b) to decrease its speed

(c) to resist any change in its state of motion

(d) to decelerate due to friction

Question 5 A passenger in a moving train tosses a coin which falls behind him. It means that motion of the train is

(a) accelerated

(b) uniform

(c) retarded

(d) along circular tracks

Question 6. An object of mass 2 kg is sliding with a constant velocity of 4 ms-1 on a frictionless horizontal table. The force required to keep the object moving with the same velocity is

(a) 32 N

(b) 0 N

(c) 2 N

(d) 8 N

Question 7. Rocket works on the principle of conservation of

(a) mass

(b) energy

(c) momentum

(d) velocity

Question 8. A water tanker filled up to 23 of its height is moving with a uniform speed. On a sudden application of brakes, the water in the tank would

(a) move backward

(b) move forward

(c) be unaffected

(d) rise upwards

Question 9 If the mass of a body is doubled and its velocity becomes half, then the linear momentum of the body will

(a) remain same

(b) become double

(c) become half

(d) become four times.

Question 10. When a number of forces acting simultaneously on a body bring about a change in its state of rest or of uniform motion in a straight line, then these forces acting on the body are said to be

(a) balanced forces

(b) equal forces

(c) unbalanced forces

(d) opposite forces

Question 11 When a car at high speed makes a sharp turn, the driver in a car tends to get thrown to the side opposite to the turn. This is due to the

(a) inertia of motion

(b) inertia of time

(c) inertia of rest

(d) inertia of direction

Question 12. A man is standing on a boat in still water. If he walks towards the shore, then the boat will

(a) move away from the shore
(b) move towards the shore
(c) remain stationary
(d) none of these

Question 13. Which of the following is an incorrect statement?

(a) Mass is measure of inertia of a body.

(b) Newton's first law of motion is the law of inertia.

(c) Unbalanced force produces constant velocity.

(d) Newton's third law talks about the direction of the force.

Question 14. A ball is thrown vertically upward in a train moving with uniform velocity. The ball will

(a) fall behind the thrower

(b) fall ahead of the thrower

(c) return back to the thrower

(d) fall on the left of the thrower

Question 15**.** Which of the following is not an application of conservation of linear momentum?

(a) While firing a bullet, the gun must be held tight to the shoulder

(b) When a man jumps from a boat to the shore

(c) A rocket explodes on midway from the ground

(d) A body suspended from the hook of a spring balanced in a lift which is accelerated downward

Question 16. When we stop pedalling, the bicycle begins to slow down. This is because of the

(a) Frictional force acting along the direction of motion of bicycle

(b) Air resistance which is in the direction of motion

(c) Frictional force acting opposite to the direction of motion of bicycle by the road

(d) Nature of the bicycle to stop after some time

Question 17. Inertia is the property of a body by virtue of which, it cannot change by itself

(a) its state of rest

(b) its steady state of uniform motion

(c) its direction of motion

(d) all of these.

Question 18. An athlete does not come to rest immediately after crossing the winning line due to the

(a) inertia of motion

(b) inertia of rest

(c) inertia of direction

(d) none of these

Question 19. A bullet of mass A and velocity B is fired into a wooden block of mass C. If the bullet gets embedded in the wooden block, then the magnitude of velocity of the system just after the collision will be

(a) $\frac{A+B}{AC}$
(b) $\frac{A+C}{B+C}$
(c) $\frac{AC}{B+C}$
(d) $\frac{AB}{A+C}$

Question 20. The masses of two bodies are in ratio 5 : 6 and their velocities are in ratio 1 : 2. Then their linear momentum will be in the ratio
(a) 5 : 6
(b) 1 : 2
(c) 12 : 5
(d) 5 : 12

## CASE BASED QUESTIONS-1

**Inertia and Mass**

All the examples and activities given so far illustrate that there is a resistance offered by an object to change its state of motion. If it is at rest it tends to remain at rest; if it is moving it tends to keep moving. This property of an object is called its inertia. Do all bodies have the same inertia? We know that it is easier to push an empty box than a box full of books. Similarly, if we kick a football it flies away. But if we kick a stone of the same size with equal force, it hardly moves. We may, in fact, get an injury in our foot while doing so! Similarly, instead of a five-rupees coin if we use a one-rupee coin, we find that a lesser force is required to perform the activity. A force that is just enough to cause a small cart to pick up a large velocity will produce a negligible change in the motion of a train. This is because, in comparison to the cart the train has a much lesser tendency to change its state of motion. Accordingly, we say that the train has more inertia than the cart. Clearly, heavier or more massive objects offer larger inertia. Quantitatively, the inertia of an object is measured by its mass. We may thus relate inertia and mass as follows: Inertia is the natural tendency of an object to resist a change in its state of motion or of rest. The mass of an object is a measure of its inertia.

Q1 Reluctance of object to change its state of rest or motion is termed as

A Mass

B Time

C weight

D Inertia

Q2 The inertia of an object with more mass is

A greater

B equal

C zero

D smaller

Q 3 How do we measure Inertia of an object?

A By its magnitude

B By its Displacement

C By its height

D By its mass

Q 4 A body having very high mass is bound to have high_____

1 Retardation

2 Inertia

3 Acceleration

4 Velocity

Q5 Which of the following shows correct relation between Mass and Inertia?

1 Inertia is directly proportional to mass

2 Inertia is inversely proportional to mass

3 No effect on each other

4 None of above

## CASE BASED QUESTIONS 2

Newton's Third law of Motion

A force is a push or a pull that acts upon an object as a results of its interaction with another object. Forces result from interactions! some forces result from *contact interactions* (normal, frictional, tensional, and applied forces are examples of contact forces) and other forces are the result of action-at-a-distance interactions (gravitational, electrical, and magnetic forces). According to Newton, whenever objects A and B interact with each other, they exert forces upon each other. When you sit in your chair, your body exerts a downward force on the chair and the chair exerts an upward force on your body. There are two forces resulting from this interaction - a force on the chair and a force on your body. These two forces are called *action* and *reaction* forces and are the subject of Newton's third law of motion. Formally stated, Newton's third law is:

**For every action, there is an equal and opposite reaction.**

The statement means that in every interaction, there is a pair of forces acting on the two interacting objects. The size of the forces on the first object equals the size of the force on the second object. The direction of the force on the first object is opposite to the direction of the force on the second object. Forces always come in pairs - equal and opposite action-reaction force pairs.


**Q1** According to the third law of motion, action and reaction

**A.** always act on the same body
**B.** always acts on different bodies in opposite directions
**C.** have same magnitude and directions
**D.** act on either body at normal to each other

Q2 The forward movement in swimming takes place because of

A. Third law of motion
B. Fourth law of motion
C. Second law of motion
D. First law of motion

Q3 A horse pulling A tonga moves forward due to_____

A. The horse on the ground with his feet
B. The horse on the tonga
C. The ground on the horse's feet
D. The tonga on the horse

Q4 When a force is exerted on the object,it can change its

A State

B Position

C shape

D all the above

Q 5 The action and reaction referred to in third law

A. Must act on different objects

B. must act on the same object

C. May act on different objects

D. Need not be equal in magnitude but act in the same direction

**ASSERTION REASONING QUESTIONS**

**DIRECTION** : In each of the following questions, a statement of Assertion is given and a corresponding statement of Reason is given just below it. Of the statements, given below, mark the correct answer as: (a) Both assertion and reason are true and reason is the correct explanation of assertion. (b) Both assertion and reason are true but reason is not the correct explanation of assertion. (c) Assertion is true but reason is false. (d) Both Assertion and Reason are false.

1 **Assertion** : If the net external force on the body is zero, then its acceleration is zero.

**Reason** : Acceleration does not depend on force.

2 **Assertion** : When a firefly hits a bus, each of them exerts the same force.

**Reason** : Firefly has more mass as compared to the windshield

3 **Assertion** : While walking on ice, one should take small steps to avoid slipping.

**Reason** : This is because smaller steps ensure smaller friction

4 **Assertion** : From Newton's second law of motion, impulse is equal to change in momentum.
**Reason** : Impulse and momentum have different SI units

5 **Assertion** : Newton's third law applies to all types of forces. e.g. gravitational, electric or magnetic forces etc.

**Reason** : Newton's third law of motion is applicable only when bodies are in motion.

6 **Assertion** : When we sit on a chair, our body exerts a force downward and that chair needs to exert an equal force upward or the chair will collapse.

**Reason** : The third law says that for every action there is an equal and opposite reaction.

7 **Assertion** : A table cloth cannot be pulled from a table without dislodging the dishes.

**Reason** : Newton's second law of motion gives definition of inertia.

8 **Assertion** : Force exerted by the ground on the man moves him forward.

**Reason** : It is a reactional force.

9 **Assertion** : Mass is a measure of inertia of the body in linear motion.

**Reason** : Greater the mass, greater is the force required to change its state of rest or motion.

10 **Assertion** : Change in momentum is impulse.

**Reason** :Impulse is the area between (F-t) graph and time axis.

11 **Assertion** : A boy facing forward in a moving bus throws a ball straight up. At the same instant the bus begins to accelerate. The ball goes up and falls in front of the boy.

**Reason** : As the ball rises, velocity remains constant

12 **Assertion** : A rocket works on the principle of conservation of linear momentum.

**Reason** : For two bodies system when there is a change in momentum of one body, the same change occurs in the momentum of the second body but in the opposite direction.

13 **Assertion**: Friction is a necessary evil

**Reason**: Though friction dissipates power, but without friction we cannot walk.

14 **Assertion** : Linear momentum is conserved in both elastic and inelastic collisions.

**Reason** : Total energy is conserved in all collisions.

15 **Assertion** : On a rainy day, it is difficult to drive a car or bus at high speed.

**Reason** : The value of coefficient of friction is lowered due to wetting of the surface.

16 **Assertion** (A) : Newton's laws can be applied to bigger bodies

**Reason** (R) : During any kind of collision the centre of mass of the system is not accelerated

17 **Assertion**: A rocket moves forward by pushing the surrounding air backwards.

**Reason** : It derives the necessary thrust to move forward according to Newtons third law of motion.

18 **Assertion**: A cannon after firing recoils due to

**Reason**: backward thrust of gases produced

19 **Assertion**: Two bodies of equal masses (m) moving with equal speed ( v) in opposite directions collide and stick to each other.

**Reason**: The resultant velocity of the combination is zero by applying principle of conservation of momentum.

20 Assertion: A football has lesser inertia than a stone of the same size.

**Reason**: Massive object has less inertia.

**ANSWERS(MULTIPLE CHOICE QUESTIONS)**

1(d) A force is always acting on it

2 (b) always act on different bodies in opposite directions

3 (d) decrease the rate of change of momentum

4 (c) to resist any change in its state of motion

5 (a) accelerated

6 (b) 0 N

7 (c) momentum

8 (b) move forward

9 (a) remain same

10 (d) opposite forces

11 (a) inertia of motion

12 (a) move away from the shore

13 (c) Unbalanced force produces constant velocity.

14 (c) return back to the thrower

15 (c) A rocket explodes on midway from the ground

16 (d) Nature of the bicycle to stop after some time

17 (d) all of these.

18 (a) inertia of motion

19

(d) $\frac{AB}{A+C}$

20 (d) 5 : 12

CASE BASED QUESTIONS-1

1 D

2 A

3 D

4 B

5 A

CASE BASED QUESTION-2

Q1 B

Q2 A

Q3 A

Q4 D

Q 5 C

ASSERTION REASONING ANSWERS

1 C

2 C

3 A

4 D

5 C

6 A

7 D

8 B

9 A

10 B

11 D

12 A

13 A

14 B

15 A

16 B

17 A

18 C

19 A

20 C