Very Short Answer Type Questions

[1 Marks]

Q. 1. Name the scientist who proved for the first time that objects move with constant speed when no force acts on them.

Ans. Galileo.

Q. 2. Why do bicycles begin to slow down when we stop pedaling?

Ans. This is because of the frictional forces acting opposite to the direction of motion

Q. 3. Which law of motion gives the measure of force?

Ans. Newton's second law of motion.

Q. 4. Write the C.G.S unit of force.
Ans. Dyne.

Q. 5. Can every force produce motion in every object?

Ans. No.

Q. 6. When a force is applied to a body, what are the two essential effect it can produce?

Ans. (a) It can bring about the change in the state of motion of a body or
(b) It can deform a body, *i.e.,* it can change its shape.

Q. 7. Define 1 newton force.

Ans. 1 newton is the magnitude of force which produces an acceleration of I m/s^2 in a body of mass 1 kg.

Q. 8. What do you mean by an impact force?

Ans. The force produced by the impact of a fast moving object on another is called impact force.

Q. 9. Define force of friction.

Ans. The force acting between any two surfaces in contact and tending to oppose motion is called force of friction.

Q. 10. Define electrostatic force.

Ans. The force exerted by an electrically charged body is called electrostatic force.

Q. 11. If the body is found to be accelerated, is the force acting on it balanced or unbalanced?

Ans. Unbalanced.

Q. 12. What do balanced forces usually do to a body?

Ans. Balanced forces usually produce a change in the shape of the body.

Q. 13. When a body moves on flat surface, will its speed change?

Ans. No.

Q. 14. What did Galileo conclude on the basis of his experiments on the motion of objects?

Ans. A body continues to move with the same velocity if no unbalanced force acts on it.

**Q. 15. What do you mean by a resultant force?**

Ans. When two or more forces act on a body simultaneously, then the single force which produces the same effect as produced by all the forces acting together is known as the resultant force.

Q. 16. Do action and reaction act on the same body?

Ans. No, action and reaction act on different bodies.

Q. 17. Plot a graph between force applied on a body and the acceleration produced in the given mass, assuming that the magnitude of force is constantly changing.

Ans.
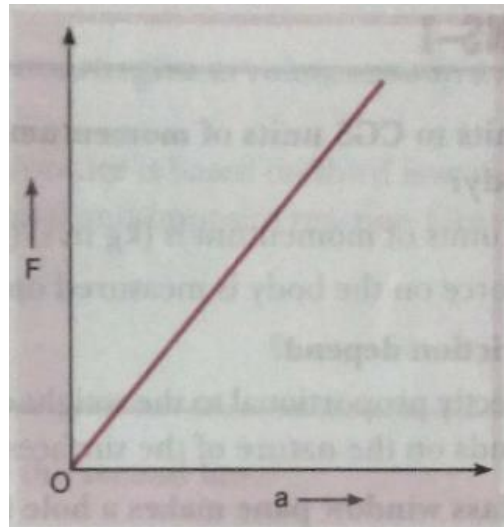
Q. 18. Write the SI unit of impulse.

Ans. Ns.

Q. 19. What is the total momentum of a bullet and a gun before firing?

Ans. Zero.

Q. 20. Name the principle on which a rocket works.

Ans. Newton's third law of motion

Q. 21. Body A is heavier than body Q. Which has more inertia?

Ans. A has more inertia.

Q. 22. A body is moving with uniform acceleration. Is its momentum constant?

Ans. No.

Q. 23. Name the physical quantity that corresponds to the rate of change of momentum.

Ans. Force

Q. 24. Which principle is involved in the working of a jet plane?

Ans. Newton's third law of motion.

Q. 25. Why mass is sometimes called coefficient of linear inertia?

Ans. It is easier to pull a lighter body than a heavier body. Therefore, more the mass more will be the inertia. That is why mass is sometimes termed as coefficient of linear inertia.

Q. 26. When a force acting on a body has equal and opposite reaction, then why should the body move at all?

Ans. The action and reaction act on different bodies. Therefore, the body moves under the action of the acting force.

Q. 27. Does Newton's third law apply to a system where bodies do not actually touch each other?

Ans. Yes, whenever the bodies are in actual contact or even if there is an interaction between the bodies (e.g., attraction or repulsion between two magnets charges, etc.), Newton's third law is applicable.

Q. 28. Suppose a ball of mass m is thrown vertically upwards with an initial speed *v*, its speed decreases continuously till it becomes zero. Therefore, the ball begins to fall downward and attain the speed *v* again before striking the ground. It implies that the magnitude of initial and final momenta of the ball are same. Yet, it is not an example of conservation of momentum. Explain why.

Ans. Law of conservation of momentum is applicable to isolated system (no external force is applied), In this case, the change in velocity is due to the gravitational force of earth.

Short Answer Type Questions – I

[2 marks]

Q. 1. What is the ratio of SI units to CGS units of momentum? How do you measure the effect of an impulsive force on the body?

Ans. A ratio of SI units to CGS units of momentum is (kg m/s)/(g cm/s) *i.e.,* 10^5. The effect of an impulse force on the body is measured only in terms of impulse.

Q. 2. On which factors does friction depend?

Ans. The force of friction is directly proportional to the weight of the body sliding over the surface. The force of friction also depends on the nature of the surfaces in contact.

Q. 3. A bullet fired against a glass window pane makes a hole in it, and the glass pane is not cracked. But on the other hand, when a stone strikes the same glass pane, it gets smashed. Why is it so?

Ans. When the bullet strikes the glass pane, the part of the glass pane which comes in contact with the bullet immediately shares the large velocity of bullet and makes a hole, while the remaining part of the glass remains at rest and is therefore not smashed due to inertia of rest.

But when a slow moving stone strikes the same glass pane, the various parts of the glass pane gets enough time to share the velocity of the stone, and the glass is smashed.

Q. 4. Why can a small mass such as a bullet kill a person when fired from a gun?

Ans. It is so because even if the mass of the bullet is small, it moves out of the gun with a very high velocity, due to which the momentum produced is high ($p = mu$). This high momentum of the bullet kills a person.

Q. 5. Why does a boat tend to leave the shore, when passengers are alighting from it?

Ans. When the passengers alight from the boat, they push the boat in backward direction. As a result, the tendency to slip back into water. This difficulty is usually overcome by the boatman by tying the boat to some rigid support.

Q. 6. Describe our walking in terms of Newton's third law of motion.

Ans. When we walk on the ground or road, our foot pushes the ground backward (action) and the ground pushes our foot forward (reaction). Thus, the forward reaction exerted by the ground on our foot makes us walk forward.

Q. 7. There are three solids made up of aluminium, steel and wood, of the same shape and same volume. Which of them would have highest inertia?

Ans. Steel has the highest inertia. As the mass is a measure of inertia, the ball of same shape and size, having more mass than other balls will have highest inertia. Since steel has greatest density and greatest mass, therefore, it has highest inertia.

Q. 8. Why does a cricket player moves his hand backward while catching the ball?

Ans. A fast moving cricket ball has a large momentum. In stopping or catching this ball, its momentum has reduced to be zero. Now, when a cricket player moves back his hands on catching the fast ball, then the time taken to reduce the momentum of ball to zero is increased. Due to more time taken to stop the ball, the rate of change of momentum of ball is decreased and hence a small force is exerted on the hands of player. So, the hands of player do not get hurt.

Q. 9. Two identical bullets are fired one by a light rifle and the other by a heavy rifle with the same force. Which rifle will hurt the shoulder more and why?

Ans. According to conservation of momentum, the rifle recoils with same momentum as that of bullet. As momentum = mass X velocity; so light rifle will recoil with larger velocity and hence, will hurt the shoulder more.

Q. 10. Water sprinkler used for grass lawns begins to rotate as soon as as the water is supplied. Explain the principle on which it works.

Ans. The working of the rotation of sprinkler is based on third law of motion. As the water comes out of the nozzle of the sprinkler, an equal and opposite reaction force comes into play. So the sprinkler starts rotating.

Short Answer Type Questions – II

[3 marks]

Q. 1. Deduce Newton's first law from the second law.

Ans. According to second law, $F = ma$

If $F = 0$, $a = 0$ since $m \neq 0$,

But $a = \frac{v-u}{t}$

or, $v - u = 0$ so, $v = u$ for whatever time t is taken.

This means that the object will continue moving with uniform velocity, u throughout the time, t. If u is zero then v will also be zero. That is, the object will remain at rest.

**Q. 2. When small boy is trying to push a heavy stone, mention various forces acting on the stone.**

Ans. The various forces acting on the stone are:
(a) The gravitational force exerted by the earth which pulls the stone downwards.
(b) The force of reaction exerted by the ground on the stone vertically upwards.
(c) The force of pushing exerted by the boy.
(d) The force of friction exerted by the stone.
When a small boy tries to push a heavy stone, then all these forces are balanced, and therefore the stone does not move.

Q. 3. Describe in brief an activity to illustrate the property of inertia of rest.

Ans.
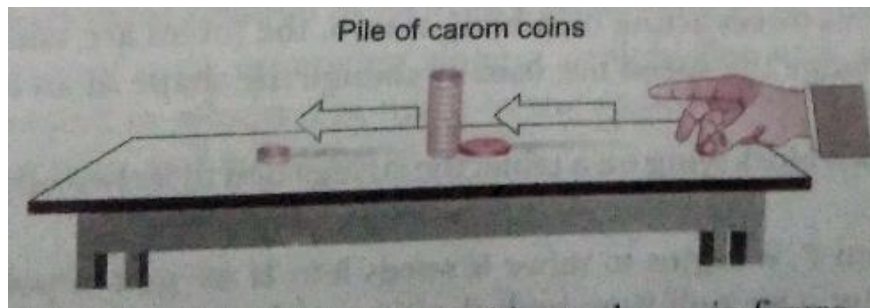
Pile of carom coins

**(a)** Make a pile of similar carom coins on a table, as shown in figure.
(b) Attempt a sharp horizontal hit at the bottom of the pile using another carom coin or the striker. If the hit is strong enough, the bottom coin moves out quickly. Once the lowest coin is removed, the inertia of the other coins makes them 'fall' vertically on the table.

(c) The inertia of coins tries to maintain its state of rest even when one of the coin moves out.

Q. 4. Give few examples of Newton's third law of motion.

Ans. (a) Jet aeroplanes and rockets work on the principle of third law of motion. In this case, the hot gases come out of a nozzle with great force, *i.e.*, action and the rocket moves with high speed upwards as a reaction.

(b) If we fill a balloon with air and hold it with its mouth downwards, then when release the balloon, the air rushes out vertically downwards (action). The balloon moves vertically upwards (reaction).
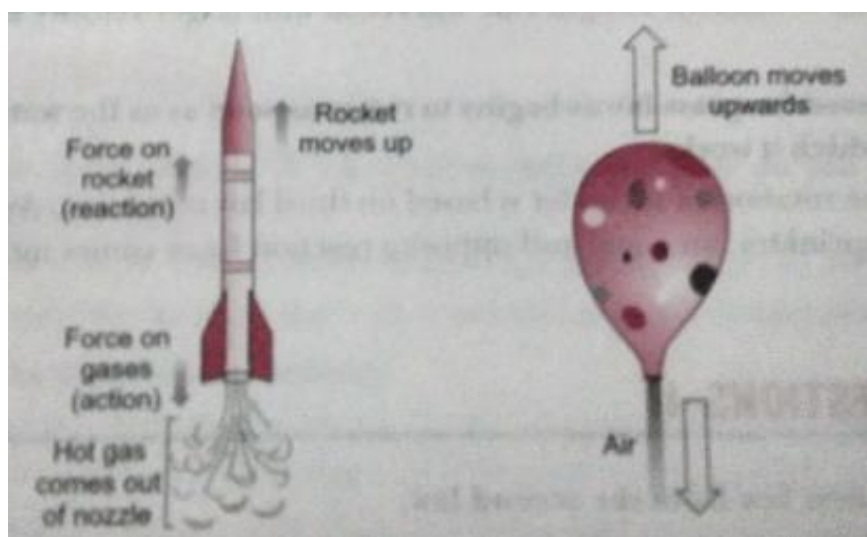
Q. 5. Two friends on roller-skates are standing 5 m apart facing each other. One of them throws a ball of 2 kg towards the other, who catches it. How will this activity affect the position of the two? Explain your answer.

Ans. Separation between them will increase. Initially the momentum of both of them are zero as they at rest. In order to conserve the momentum the one who throws the ball would move backward. The second will experience a net force after catching the ball and therefore will move backwards that is in the direction of the force.

Q. 6. Why does an athlete puts some sands or cushion on the ground while high jumping?

Ans. When a high jumper falls on a soft landing site(such as cushion or a heap of sand), then the jumper takes a longer time to come to stop. The rate of change of momentum of athlete is less due to which a smaller stopping force acts on the athlete. And the athlete does not get hurt. Thus, the cushion or sand, being soft, reduces the athlete's momentum more gently. If however, a high jumping athlete falls from a height on to hard ground, then his momentum will be reduced to zero in a very short time. The

rate of change of momentum will be large due to which a large opposing force will act on the athlete. This can cause serious injuries to the athlete.

Q. 7. Describe balanced forces with the help of two examples.

Ans. If the resultant of various forces acting on a body is zero, the forces are said to be 'balanced forces'. These forces do not change the speed but usually change the shape of an object.

Examples:
(a) Consider a wooden block lying on a table, the strings tied to its two opposite faces, as shown in the figure.

If we pull at point P, it begins to move towards left. If we pull at point Q, it begins to move towards right. But if we pull from both the sides with equal force, the block does not move. The two forces have now balanced each other.
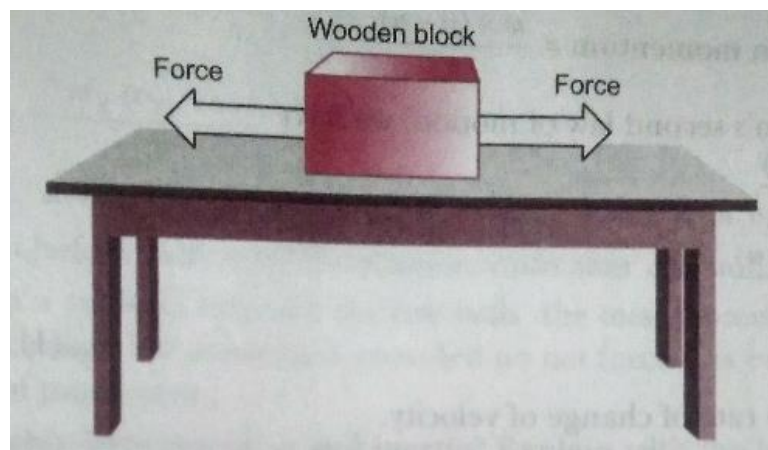
(b) In a tug-of-war, the two teams pull the rope with equal effort; the rope is not moved in any direction. This is clearly because the forces exerted by the two teams are equal and opposite and thus get balanced.

Q. 8. Why do the driver and the person seated in front seat need a seat belt?

Ans. In a car accident, a fast running car stops suddenly. Due to this the car's large momentum is reduced to zero in a very short time. The stretchable seat belts tightened by the passengers of the car increases time taken by the passengers to fall forward. Due to longer time, the rate change of momentum of passengers is reduced and hence less stopping force acts on them. So, the passengers may either not get injured at all or may get less injuries. It is obvious that seat belts reduce the passengers' momentum more gently and hence prevent injuries.

Long Answer Type Questions

[5 marks]

Q. 1. Describe Newton's first law of motion in detail, giving examples.

Ans. According to Newton's first law of motion, a body at rest or in uniform motion will remain at rest or in uniform motion unless an unbalanced force acts upon it. This law consists of three parts:

(i) The first part says that a body at rest continues in its state of rest. For instance, a boy standing in a train falls backward when the train suddenly starts moving forward. This is because when the bus moves, the lower part of his body begins to move along with the train while the upper part of his body continues to remain at rest due to inertia.

(ii) The second part says that a body in uniform motion continues to move in straight line path with a uniform speed, *e.g.*, when a moving train stops suddenly a person sitting in it falls forward. This is because as the train stops, the lower part of the person's body comes to rest along with the bus while upper part of his body continues to remain in motion due to inertia of motion and thus he falls forward.

(iii) Third part says that a body moving with a uniform speed in a straight line cannot change its direction of motion by itself. For example, when a bus takes a sharp turn, a person sitting in the bus gets force acting away from the centre of the curved path due to his tendency to move in the original direction.

Q. 2. Derive the mathematical relation of Newton's second law of motion.

Ans. Consider an object of mass m moving along a straight line with an initial velocity u (say). It is uniformly accelerated to velocity u in time t by the application of a constant force F in time t.
Then, initial momentum of the object = mu
$$P_1 = mu$$
Final momentum of the object = mv
$$P_2 = mv$$
∴ Change in momentum = $mv - mu = m(v - u)$

The rate of change in momentum = $\dfrac{m \times (v-u)}{t}$

According to Newton's second law of motion, we have

$$F \infty \frac{m(v-u)}{t}$$

$$F = km\frac{(v-u)}{t}$$

$$F = k\,m\,a \qquad\qquad\qquad … (1)$$

Here, a = $\frac{v-u}{t}$ = the rate of change of velocity.

= acceleration

k = a constant of proportionality

Putting m = 1 kg, a = 1 ms^{-2}

F becomes 1 N.

So,   1 N = k x 1 kg x 1 ms^{-2}

∴ $k = 1$

From equation (1), we have

$F = ma$

This represents the second law of motion.

Thus, the second law of motion gives a method to measure the force acting on an object as a product of its mass and acceleration.

Q. 3. Derive the mathematical formula of conservation of momentum.

Ans. To explain conservation of momentum, let us take the following example. Consider two balls A and B having masses m_1 and m_2, respectively. Let the initial velocity of ball A be u_1, and that of ball B be u_2 ($u_1 > u_2$). Their collision takes place for a very short interval of time t and after that A and B start moving with velocities v_1 and v_2 (now $v_1 < v_2$) respectively as shown in Figure.

Before collision ($u_1 > u_2$)   After collision ($v_1 < v_2$)

(a)   (b)
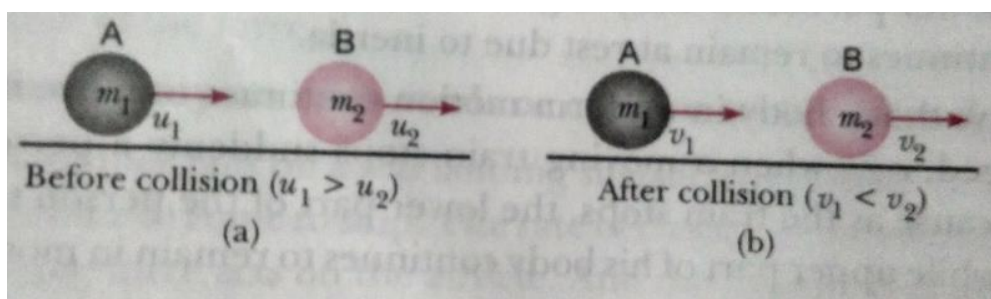
The momentum of ball A before and after the collision is m_1u_1 and m_1v_1 respectively. If there are no external forces acting on the body, then the rate of change of momentum of ball A, during the collision will be

$$= \frac{m_1(v_1 - u_1)}{t}$$

and, similarly the rate of change in momentum of ball B

$$= \frac{m_2(v_2 - u_2)}{t}$$

Let F_{12} be the force exerted by ball A on B and F_{21} be the force exerted by ball B on A. Then,

according to Newton's second law of motion

$$F_{12} = \frac{m_1(v_1 - u_1)}{t} \qquad \text{and} \qquad F_{21} = \frac{m_2(v_2 - u_2)}{t}$$

According to Newton's third law of motion, we have

$$F_{12} = - F_{21}$$

Or, $\qquad \dfrac{m_1(v_1 - u_1)}{t} = - \dfrac{m_2(v_2 - u_2)}{t}$

Or, $\qquad m_1 v_1 - m_1 u_1 = - m_2 v_2 + m_2 u_2$ or $m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$

i.e., Total momentum before collision = Total momentum after collision
Thus, we find that in a collision between the two balls the total momentum before and after the collision remains unchanged or conserved provided no net force acts on the system. This result is law of conservation of momentum.

Q. 4. What is the relationship between mass and inertia? Explain with the help of examples.

Ans. The mass of a body is a measure of its inertia. It means larger the mass of a body, larger will be the inertia offered by the body to change its state of motion. The following examples will clarify the concept:

(i) When we kick a football, it flies a long way but at the same time if we kick a stone of the same size, it hardly moves, as the stone resists a change in its motion better than the football because of its more mass.

(ii) We can increase the velocity of our bicycle by pedaling harder, *i.e.*, on applying more force.

But the same force will produce a negligible change in the motion of a bus, because in comparison to the bicycle, a bus has more tendency to oppose any change in its state of motion because of its larger mass i.e., the bus has more inertia than the bicycle. The SI unit of mass and inertia is kilogram (kg).

Q. 5. Describe Newton's third law of motion.

Ans. According to this law, to every action, there is an equal and opposite reaction. When an object, say A, exert a force (action) on another object, say B, then B also exerts a force (reaction) on the A. These two forces are always equal in magnitude but opposite in direction.
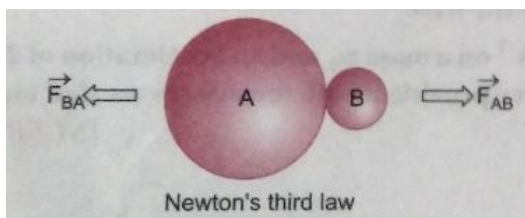
Newton's third law

As shown in the above figure, if $\vec{F}_{AB}$ be the force exerted by body A on B and $\vec{F}_{BA}$ is the force exerted by B on A, then according to Newton's third law,

$$\vec{F}_{BA} = - \vec{F}_{AB}$$

or   Force on A by B = - Force on B by A

or   Reaction = - Action

This law clarifies that a single force can never exist and that the forces always exist in pairs. The two opposing forces are known as action and reaction. The forces of action and reaction always act on two different bodies.

HOTS (Higher Order Thinking Skills)

Q. 1. Why does an athlete run a certain distance before taking a leap?

Ans. An athlete runs a certain distance before taking a leap so that the inertia of motion of his body at the time of leaping may help him in his muscular efforts.

Q. 2. Two balls of the same size of different materials, rubber and iron are kept on the smooth floor of a moving train. The brakes are applied suddenly to stop the train. Will the balls start rolling? If so, in which direction? Will they move with the same speed? Give reasons for your answer.

Ans. Yes, the balls will start rolling in the direction in which the train was moving. Due to the application of the brakes, the train comes to rest but due to inertia the balls try to remain in motion, therefore, they begin to roll. Since the masses of the balls are not the same, therefore, the inertial forces are not same on both the balls. Thus, the balls will move with different speeds.

Q. 3. The velocity-time graph of an object of mass m = 120 50 g is shown in figure. Observe the graph carefully and answer the following questions.
(a) Calculate the force on the object in time interval 0 to 3 s.
(b) Calculate the force on the object in the time interval 6 to 10 s.
(c) Is there any time interval in which no force acts on the object? Justify your answer.
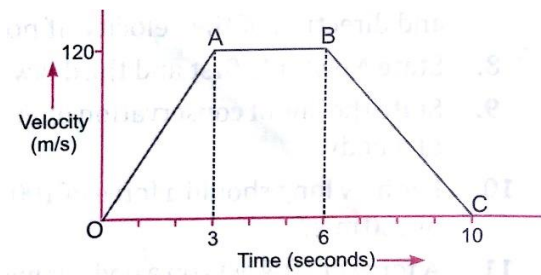
Ans. (a) Acceleration during interval 0 to 3s

$$a_1 = \frac{v-u}{t} = \frac{120-0}{3} = 40 m/s^2$$

Given mass, m = 50 g = $\frac{50}{1000}$ kg

∴ Force, F_1 = ma₁ = $(\frac{50}{1000})$ ×40 2N

(b) Acceleration during interval 6 to 10 s

$$a_2 = \frac{V_2 - V1}{t} = \frac{0-120}{(10-6)}$$

$$= -\frac{120}{4} = -30 \ m/s^2$$

Force, $F_2 = ma_2 = \frac{50}{1000} \times (-30) = -1.5$ N

(c) During time interval 3 to 6 s, the velocity of object is constant, so in this time interval, acceleration is zero and hence force, F (= ma) is zero.]

Q. 4. If an object is not moving, does it mean that no force is acting on it?

Ans. No, it implies that all the forces acting on the body are balanced.

Q. 5. A horse continues to apply a force in order to move a cart with a constant speed. Explain why?

Ans. A horse exerts a continuous force to move the cart with a constant velocity to overcome the force of friction between ground and cart.

Very Short Answer Type Questions

[1 marks]

Q. 1. Plasma membrane is made up of which two components?

Ans. Plasma membrane is made up of lipids and proteins.

Q. 2. What is hypotonic solution?

Ans. A solution having solute concentration lower than that of the cell sap is called hypotonic solution.

Q. 3. What is hypertonic solution?

Ans. A solution having solute concentration higher than that of the cell sap is called hypertonic solution.

Q. 4. What is isotonic solution?

Ans. A solution having solute concentration same as that of the cell sap is called isotonic solution.

Q. 5. Cell wall is made up of which component?

Ans. Cell wall is made up of cellulose.

Q. 6. Give an example of unicellular organism.

Ans. *Amoeba*, Bacteria, *Paramecium*.   (*Any one*)

Q. 7. Give an example of multicellular organism

Ans. Fungi, plants, animals. (*Any one*)

Q. 8. What is active transport?

Ans. The movement of molecules across a membrane in cells against a concentration gradient with the help of ATP units is called active transport.

Q. 9. What is the intracellular source of digestive enzyme?
Ans. Lysosome

Q. 10. What is endocytosis?

Ans. Endocytosis is the ingestion or engulfment of food and other material by folding of the plasma membrane it as seen in *Amoeba*.

Q. 11. Where are genes located?

Ans. Genes are located on chromosomes in the nucleus.

Q. 12. Name two structures found in plant cells but not in animal cells.

Ans. Cell wall and chloroplast

Q. 13. Name two structures found in animal cells but not in plant cells.

Ans. Lysosomes and centrioles

Q. 14. Which organelle is involved in the formation of lysosomes?

Ans. Golgi apparatus

Q. 15. what is the outermost layer found in animal cells?

Ans. Plasma membrane

Q. 16. What is the outermost layer found in the plant cell?

Ans. Cell wall

Q. 17. Which organelle is the storage sac of solid and liquid materials?

Ans. Vacuoles

Q. 18. Which organelle serves as a channel for transport of materials between cytoplasm and nucleus?

Ans. Endoplasmic reticulum

Q. 19. What is microscope?

Ans. Microscope is an optical instrument consisting of a lens or combination of lenses which renders minute objects distinctly visible.

Q. 20. Why is light microscope called a compound microscope?

Ans. Light microscope is called a compound microscope because it consists of two or more lens systems.

Q. 21. Which organelle is associated with ribosome formation?

Ans. Nucleolus

Q. 22. What are chromosomes made up of?

Ans. Chromosomes are made up of DNA and protein.

Q. 23. Define plasmolysis.

Ans. It is the shrinkage of cytoplasm due to loss of water when kept in a hypertonic medium.

Q. 24. What is a nucleoid?

Ans. the undefined nuclear region in the cytoplasm of prokaryotes is known as nucleoid.

Q. 25. Which organelles other than nucleus contain DNA?

Ans. Mitochondria and plasmids contain DNA.

Q. 26. Name the only cell organelle seen in prokaryotic cell.

Ans. Ribosomes

Q. 27. Which microorganisms can be made into crystal?

Ans. Viruses

Q. 28. Which organelle detoxify many poisons and drugs in a cell?

Ans. Peroxisome

Q. 29. Name a cell organelle which is non-membranous.

Ans. Ribosome.

Q. 30. Define diffusion.

Ans. Movement of molecules from a region of higher concentration to a region of lower concentration is called diffusion.

Q.31. Why is endocytosis found in animals only?

Ans. For endocytosis to occur, the outermost membrane should be flexible like the plasma membrane of animals. But in plant cells, cell wall is the outermost membrane which is very rigid. Hence, endocytosis occurs only in animals and not in plants.

Q.32. Which cell organelle controls most of the activities of the cell?

Ans. Nucleus, also known as the brain of the cell, controls most of the activities of the cell because it contains DNA (Deoxyribonucleic acid) which contains all the information of the cell.

Short Answer Type Questions – I

[2 marks]

Q. 1. Describe the microscopic structure of the cell.

Ans. The cork cells were the first cells to be observed. They were composed of box-like compartments, forming a honeycomb structure. Cell organelles are found embedded in the cytoplasm. These are smaller in size and bounded by plasma membrane.

Q. 2. How can you calculate the magnification of a microscope?

Ans. Magnification of a microscope is calculated by multiplying the powers of eyepiece and objective lenses.
Mathematically, $M = P_1 \times P_2$, where P_1 is the power of eyepiece and P_2 is the power of objective.

Q. 3. What is a cell wall and how is it formed?

Ans. Cell wall is non-living and freely permeable rigid structure bounding the plant cell. It is secreted by the cell itself for the protection of its plasma membrane and cytoplasm.

Q. 4. Why were the scientists not able to observe most of the cell organelles before 1940?

Ans. Before 1940, scientists could view the cell only under a light microscope. The invention of the electron microscope in 1940 enabled the scientists to observe the cell in greater detail.

Q. 5. There would be no plant life if chloroplasts did not exist. Justify.

Ans. Chloroplasts contain the pigment chlorophyll which is responsible for food preparation in plants by the process of photosynthesis. Hence, if there were no chloroplasts then there would not have been any plant life.

Q. 6. Why is the Golgi apparatus called the secretary organelle of the cell?

Ans. This is because it packages material synthesised in the ER and dispatches it to intracellular (plasma membrane and lysosomes) and extracellular (cell surface) targets.

Q. 7. what are the functional regions of a cell?

Ans. There are three major functional regions of cells: (i) cell membrane or plasma membrane, (ii) nucleus and (iii) cytoplasm.

Q. 8. What is cell sap? Give its composition.

Ans. Liquid content in the vacuoles of plant cell is called cell sap. The cell sap contains sugars, amino acid, proteins, minerals and metabolic wastes.

Q.9. What is cytosol and cytoskeleton?

Ans. Cytosol is the semifluid part of the cell cytoplasm which is embedded in between cell organelles. Cytoskeleton is a network of protein fibres present in the cell which provides a supporting framework for the organelles.

Q. 10. What are secretory proteins? Give an example of secretory protein.

Ans. Proteins which are synthesised by the cell and then released into outer medium of the cell are called secretory proteins. Examples of secretory proteins include mucus, digestive enzymes and hormones.

Q. 11. Why are peroxisomes mostly found in kidney and liver cells?

Ans. Peroxisomes contain various oxidative enzymes which detoxify the toxic material. Since the blood carries various toxic substances to kidney and liver, a large number of peroxisomes are present in them to oxidise the toxic material.

Q. 12. What do you mean by plasmodesmata?

Ans. Due to the presence of cell wall the exchange of materials between the plant cells is not possible. Therefore, protoplasts of plant cells are connected by cytoplasmic channels through their walls which are called as plasmodesmata. These channels are used for the exchange of the material between two cells.

Q. 13. Why do the animal cells not have cell wall?

Ans. Animals do not have rigid walls because cell walls are incompatible with the way in which an animal moves and grow. The flaccid cell membrane provides the animal cell freedom of mobility and formation of different tissues which is not present in plants.

Q.14. Why are the Golgi bodies found in large numbers in the cells which secrete digestive enzymes?

Ans. The main function of Golgi bodies is to release proteins or enzymes by vesicles. No other organelle has this property. Therefore, these are largely present in secreting cells.

Q. 15. What is the significance of pores present on the nuclear membrane?

Ans. The pores present on the nuclear membrane allow transport of water-soluble molecules across the nuclear envelope. RNA and ribosomes move out of the nucleus, whereas carbohydrates, lipids and proteins move into the nucleus.

Q. 16. What are asters and spindle fibres

Ans. Asters are two star-like structures radiating fibres from the centrosome. They help in locating spindle and trigger cleavage of cytoplasm.

Spindle fibres are formed from microtubules during cell division. They pull the chromosomes apart and bring them at the poles. These are broader in the middle and narrower at the poles.

Q. 17. Do you agree "A cell is a building unit of an organism". If yes, explain why.

Ans. An organism is made up of various organ systems like digestive system, nervous system, etc. These organ systems in turn are made up of various organs which are made up of tissues. Also tissues are a group of cells performing the same function. Hence, a cell is the building unit of an organism.

Cell → tissue → organ → organ system → organism

Q.18. If you are provided with some vegetables to cook, you generally add salt into the vegetables. After adding salt, vegetables release water. Why?

Ans. When salt is added, a hypotonic medium is created, *i.e.,* the concentration of salt molecules is more outside the vegetables than inside. Hence, due to osmosis water from the vegetables come out.

Q.19. How are chromatin, chromatid and chromosomes related to each other?

Ans. Chromatin is a thin thread-like structure which is composed of DNA (deoxy ribonucleic acid) and proteins to form a rod-like chromatid. Two similar chromatids attach to a centromere to form a chromosome.

Q.20. How is bacterial cell different from onion peel?

Ans.

Bacterial cell	Onion peel
1. Size is small (1-10 mm).	1. Size is larger (5-100 mm).
2. Nucleus is absent.	2. Nucleus is present.
3. It is a prokaryotic cell.	3. It is a eukaryotic cell.
4. Cell division takes place by fission or budding.	4. Cell division takes place by mitosis.

Short Answer Type Questions – II

[3 marks]

Q. 1. Differentiate between diffusion and osmosis.
Ans.

Diffusion	Osmosis
1. It occurs in any medium.	1. It occurs in liquid medium only.
2. Diffusing molecules may be solid, liquid or gaseous solutes.	2. It involves movement of solvent molecules only.
3. Semipermeable membrane is not required.	3. Semipermeable membrane is required.

Q. 2. Differentiate between rough and smooth endoplasmic reticulum. How is endoplasmic reticulum important for membrane biogenesis?

Ans.

Rough endoplasmic reticulum	Smooth endoplasmic reticulum
1. They have ribosomes attached on their surfaces.	1. They do not have ribosomes attached on their surfaces.
2. RER manufactures proteins and transports them to various places.	2. SER helps in manufacturing lipids and transports them to various places.

Endoplasmic reticulum act as main site for synthesis of protein and lipids which are needed for the biogenesis of plasma membrane.

Q. 3. What is membrane biogenesis? How is plasma membrane formed during this process?

Ans. The process of plasma membrane formation is called membrane biogenesis. Following organelles are involved in this process:
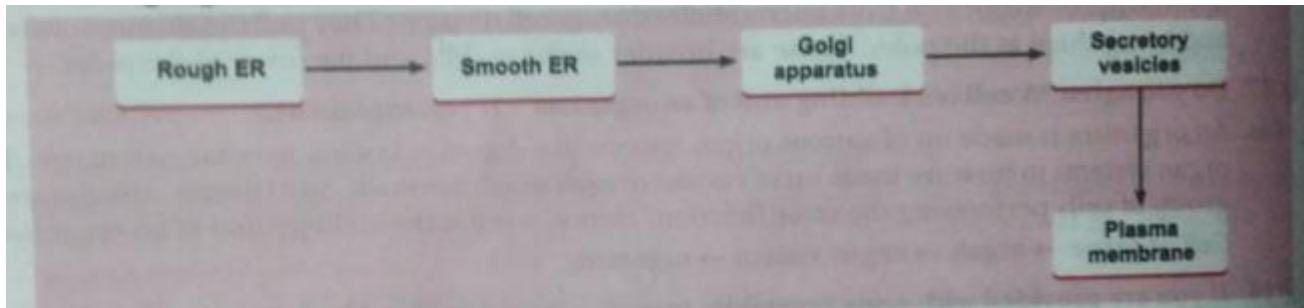
The proteins and lipids are first synthesised in rough endoplasmic reticulum and the smooth endoplasmic reticulum, respectively. These are then transported to the Golgi complex for their modification. After modification, these are transported to the cell surface through vesicles which bud off from Golgi complex to fuse with cell membrane and form a part of the membrane.

Q 4. Write the name of different plant parts in which chromoplast, chloroplast and leucoplast are present.

Ans. Chromoplasts are present in flowers, fruits or any other coloured part of the plant (other than green part).
Chloroplasts are present in leaves and stem of plant (green part).
Leucoplasts are present anywhere in plant as they are colourless and store food.

Q. 5. What is cell division? Give the types of cell division.

Ans. Cell division is a process of formation of two or more daughter cells of its own type from the mother cell. These are similar in structure and function.
Cell division occurs in three ways:
1. Amitosis   2. Mitosis   3. Meiosis
In each case, division of nucleus (Karyokinesis) occurs before the division of cytoplasm (Cytokinesis).

Q. 6. What are the functional differences between a plasma membrane and cell wall?

Ans.

Plasma membrane	Cell wall
1. It holds cellular contents and controls passage of materials in and out of cell.	1. It gives protection, strength and rigidity to the cell.
2. It is semipermeable in nature and allows entry of selected molecules into the cell.	2. It is completely permeable in nature.
3. It is not elastic.	3. It is elastic and controls the cell's turgidity preventing its bursting.

Q. 7. What are the functions of nuclear membrane?

Ans. 1. A nuclear envelope separates the environment of nucleus from that of rest of the cell.

2. It protects the genetic material from damage.

3. It facilitates and regulates exchange of materials in and out of the nucleus.

Q. 8. Write a note on Golgi apparatus and the functions it performs.

Ans. Golgi apparatus or Golgi bodies or Golgi complex is composed of membrane-bound fluid-filled vesicles, vacuoles and cisternae. In animal cells they are larger and only one or two in number, while in plants they are smaller and more in number. Also, in plant cells, they are distributed throughout the cytoplasm and are called dictyosomes.

Functions:
1. It is involved in the transport and modification of protein, lipids as well as carbohydrates.
2. It helps in the formation of cell plate during cell division.
3. It is also involved in the formation of cell wall, plasma membrane lysosomes and peroxisomes.
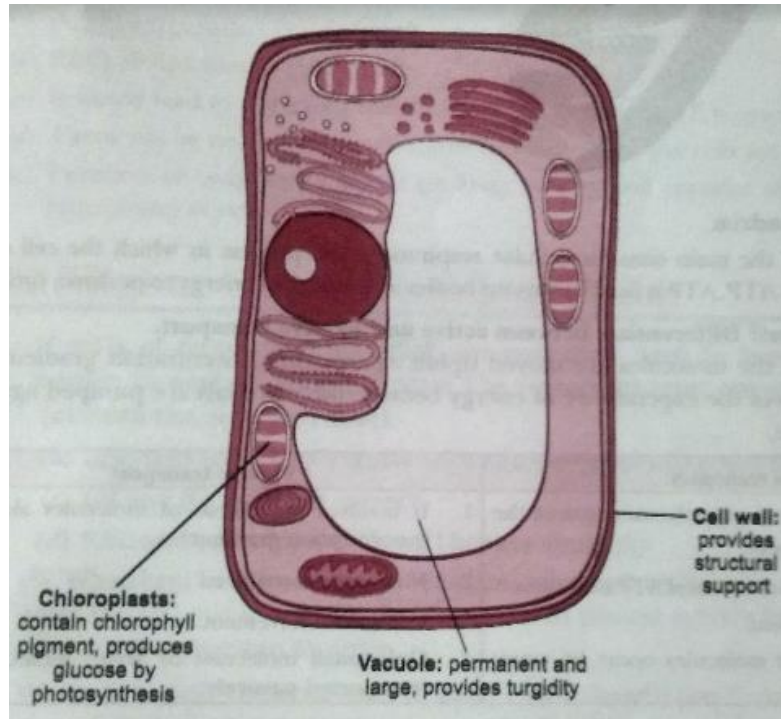4. The material synthesised near endoplasmic reticulum is packaged and dispatched to various targets and outside the cell through the Golgi apparatus.

Q. 9. How will absence of any one of the cell organelle affect the cell's working?

Ans. Functions of all the organelles are inter-linked to each other and ultimately to the working of the cell. So, if even a single link is missing, the cell ultimately suffers and die. For example, DNA from the nucleus passes the information for protein formation to the ribosomes which send the proteins to Golgi complex and ER for modification and transport.
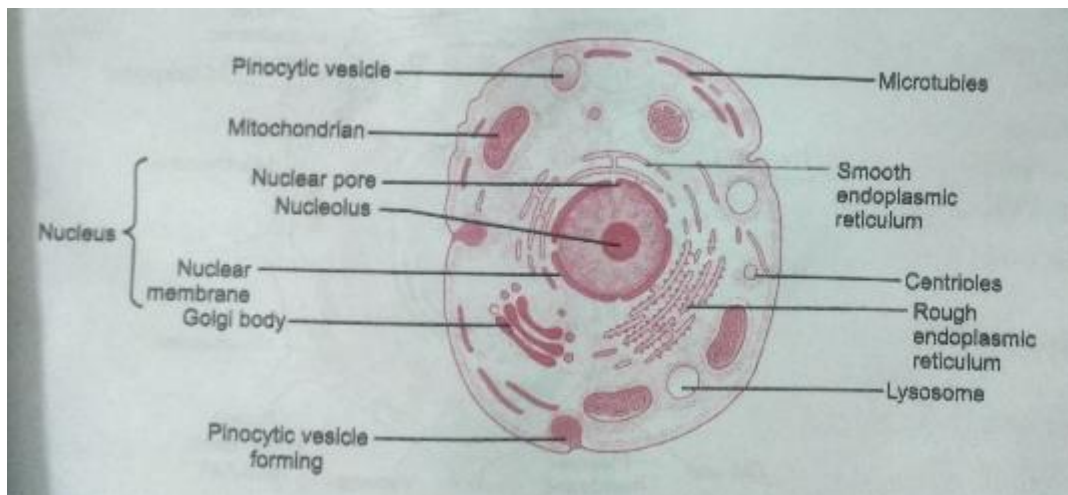
Q. 10. Draw a neat diagram of plant cell and label any three parts which differentiate it from animal cell.

Ans.

Chloroplasts: contain chlorophyll pigment, produces glucose by photosynthesis

Vacuole: permanent and large, provides turgidity

Cell wall: provides structural support

Q. 11. Draw a neat labelled diagram of an animal cell.
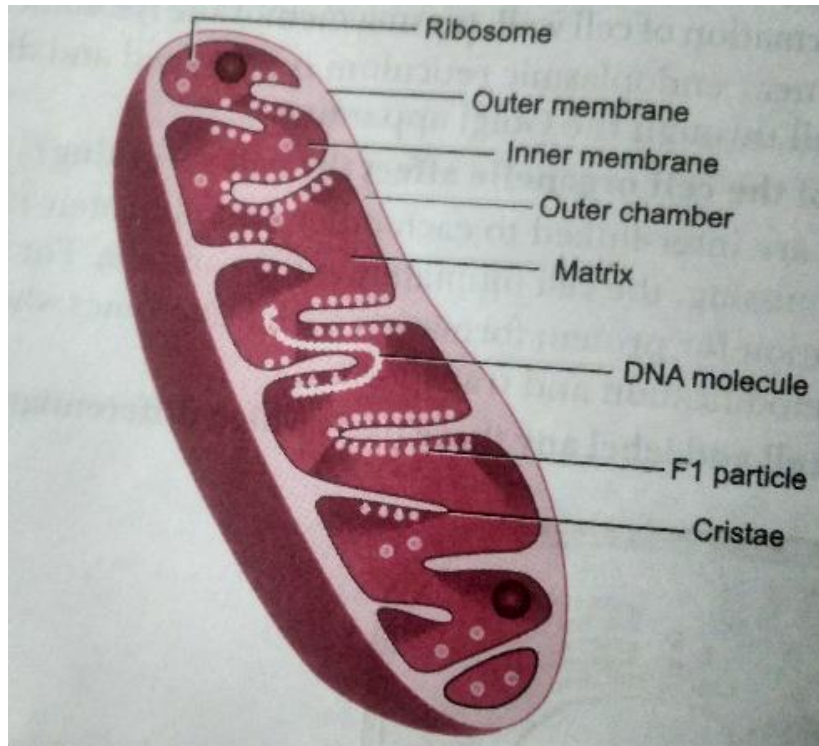
Ans.

Long Answer Type Questions

[5 mark]

Q. 1. Draw a labelled diagram of mitochondria. Write the functions of mitochondria.

Ans.

Functions of mitochondria:
The mitochondria are the main sites for cellular respiration, the process in which the cell converts sugars and oxygen into ATP. ATP is used by various bodies as a source of energy to perform functions.

Q. 2. What is active transport? Differentiate between active and passive transport.

Ans. The process in which the molecules are moved uphill against the concentration gradient. Active transport always involves the expenditure of energy because the materials are pumped against the concentration gradient.

Active transport	Passive transport
1. It involves movement of molecules against the concentration gradient.	1. It involves movement of molecules along the concentration gradient.
2. It requires energy in the form of ATP molecules.	2. No energy is required.
3. It is a rapid movement.	3. It is a slow movement.
4. Movement of large molecules occur by active transport.	4. Only small molecules or water molecules are transported passively.

Q. 3. Illustrate only a plant cell as seen under electron microscope. How is it different from animal cell?

Ans.
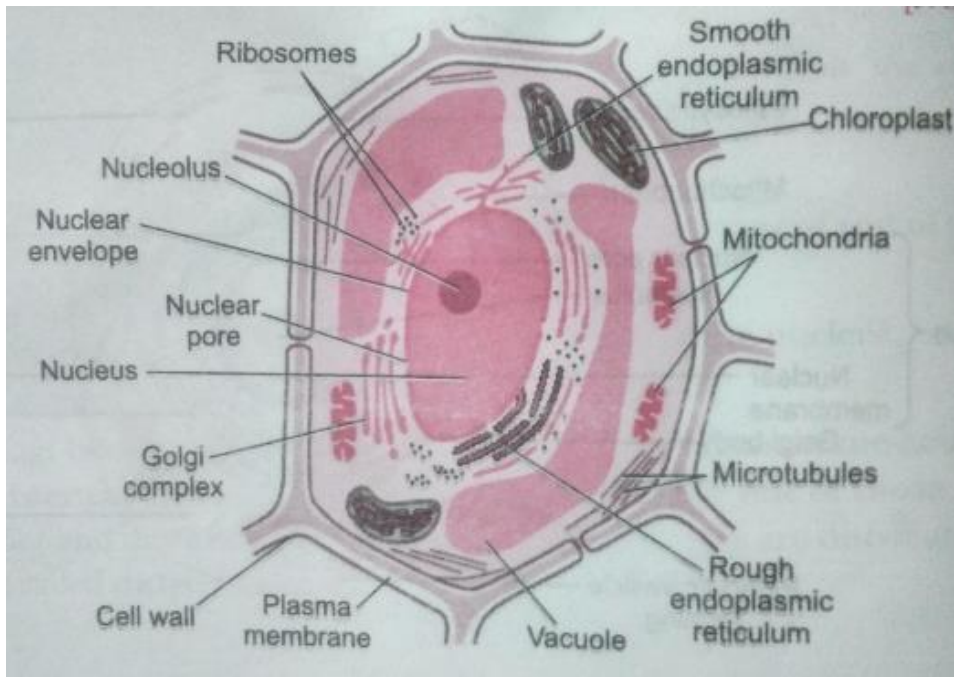
Major   diferences
are:
(a) Plant cells have chloroplasts
(b) Plant cells have large vacuoles.
(c) Plant cells have cell walls.

Q. 4. In brief state what happens when:
(a) dry apricots are left for sometime in pure water and later transferred to sugar solution?
(b) a red blood cell is kept in concentrated saline solution?
(c) the plasma membrane of a cell breaks down?

(d) rheo leaves are boiled in water first and then a drop of sugar syrup is put on it?
(e) golgi apparatus is removed from the cell?

Ans. (a) The apricots swell due to osmosis initially and when transferred to sugar solution shrink again due to exosmosis.
(b) RBCs shrink due to exosmosis.
(c) It would lead to scattering of cell organelles and there will be no functioning of the organs.
(d) There will be no change in cell shape or size because the cells are dead due to boiling.
(e) Function of Golgi apparatus is packing, storing and transfer of protein. It would affect the functioning of cell.

HOTS (Higher Order Thinking Skills)

Q. 1. If cells of onion peel and RBC are separately kept in hypotonic solution, what will happen to each of them? Explain the reason for your answer.

(a) Both the cells will swell.

(b) RBC will burst easily while cells of onion peel will resist the bursting to some extent.

(c) (a) and (b) both are correct.

(d) RBC and onion peel cells will behave similarly.

Ans. (b). When kept in a hypotonic solution, the onion cells will become turgid because the water will enter the cell due to osmosis. But the cell wall present outside the cell provides it rigidity and does not let any harm to occur.

Whereas, in RBC the movement of water inside the cell due to osmosis will lead to bursting of the cell because it does not have a rigid cell wall.

Q. 2. A person takes concentrated solution of salt, after sometime, he starts vomiting. What is the phenomenon responsible for such situation? Explain.

Ans. Concentrated salt solution is a hypertonic solution. This causes exosmosis in the cells of the alimentary tract. This further result into dehydration and irritation thus resulting in vomiting.

Q. 3 Where will you find more number of ribosomes-in cancer cells or in fat cells?

Ans. Ribosomes are found in greater number in actively dividing cell which are the cancer cell they need more amount of proteins for the formation of new cells.

Q. 4. A solution of 3% glucose and a solution of 8% glucose are kept in a trough separated by a semipermeable membrane. What will you observe after 1 hour?

Ans. After 1 hour the solution on both the sides of the semipermeable membrane will because isotonic because of the process of osmosis.

Q. 5. What are the colours absorbed by plants? The green light of the sunlight is blocked. How will the photosynthesis be affected?

Ans. Plants absorb all the colours in the spectrum. The plants reflect back the green light because which they appear green in color. Therefore, photosynthesis will not be affected if green light is blocked.

Q. 6. Why does the skin of your finger shrink when you wash clothes for a long time?

Ans. Soap solution is a hypertonic solution. When our finger are in contact with it for a long time, water from epidermal cells of finger diffuse out though the process of osmics and the skin shrinks.

Value Based Questions

1. Consider the following statements:
(a) Ribosomes are the protein factories of the cell.
(b) The proteins formed are transported by the Golgi complex to different parts according to their requirements.
(c) Mitochondria provide energy for the wörking of the cell.
(d) Lysosomes are the suicidal bags where dead and damaged organelles are destroyed.
Answer the following questions based on the above information:
(i) What would happen if any one of the above mentioned organelles are absent in the cell?
(ii) What values shown by the cell organelles can be related to humans?
(iii) Give one situation in your everyday life where such values are exhibited.

Ans. (i) If any one of the organelles is absent, the working of the entire cell is disturbed because functions of all the organelles are interlinked. For example, if mitochondria are absent, the other organelles would not get any energy for their working.
(ii) Unity and division of labour.
(iii) A village community has a farmer, barber, shopkeeper, carpenter, etc. All these have different professions but are interdependent. For example, a farmer provides food for everyone and in turn gets different services from other people.

Value Based Questions

1. Two friends were going for a short tour and on the way the car suddenly stopped. Both of them managed to push the car of mass 1100 kg at a uniform velocity along a level road. In the meantime a villager came to help them and the same car was now pushed by three persons at an acceleration of 0.2 m/s².

After reading the passage carefully answer the following questions:
(*i*) With what force does each person push the car?
(*ii*) Which value is promoted here?
(Consider that each person pushes the car with the same efficiency.)

Ans. (*i*) Mass of the car, m = 1100 kg

Let F be the muscular force applied by each person.

∴ Force required for moving the car at uniform speed = 2 x F = $2F$

Total force applied by three persons = 3 F

∴ Force needed to produce acceleration in the car = 3F - 2F = F

Now acceleration produced in the car, a = 0.2 m/s

∴ From the definition,

$$Force = Mass \times Acceleration$$
$$F = 1100 \text{ kg} \times 0.2 \text{ m/s}^2$$
$$F = 220 \text{ N}$$

(*ii*) Value of helping attitude towards those persons who are really in trouble is shown here.