Eng. Medium 9th GSEB Batch :	**MAHESH TUTORIALS** **SUBJECT : Science & Technology** **Chemistry : 1, 2, Biology : 5, 6, Physics : 8, 9** **Model Answer Paper**	**Test -** Date: Time: 2 Hrs Marks : 50

SECTION - A
OBJECTIVE [10 MARKS]

1. 1. Endosmosis
2. Exosmosis

2. Momentum of a body depends on **mass** and **velocity.**

3. He.

4. **Speed** remains constant in uniform circular motion.

5. Meristematic tissue and permanent tissue.

6. Liquid, gaseous.

7. (d) **colloidal solution**

8. (c) $v = u + at$

9. Adenosine Triphosphate. It is produced in mitochondria.

10. True

SECTION - B

Answer the following questions : [2 Marks Each] **16**

11. Speed of an object is the distance travelled by it per unit time. ½
If a body travels a distance 's' in time 't' then its speed 'v' is given by ½

$$v = \frac{s}{t}$$ ½

The SI unit of distance is metre while the SI unit of time is second. So, the SI unit of speed is metre per second which is written as m/s or ms^{-1}. ½

12. When a liquid is heated up to its boiling point, the heat is absorbed by the molecules and stored in the form of potential energy . When potential energy of the molecule is increased, the intermolecular distance is increased. It means intermolecular force of attraction reduces to zero. The molecules start escaping in air causing the liquid to boil. **2**

OR

12. The molecules of solids vibrate about its mean position. When it is heated, its kinetic energy is increased and it starts vibrating vigorously. At the melting point the intermolecular force of attraction is reduced and particles cannot hold each other with strong force to hold them in their fixed position. The crystalline structure is destroyed and it starts melting. **2**

13. When a bus starts suddenly, the passengers fall backward. This is due to the fact that because of their inertia, the passengers tend to remain in their state of rest even when the bus has started moving. When a running bus stops suddenly, the passsengers are jerked forward because due to inertia the passengers tend to remain in their state of motion even though the bus has come to rest. **2**

14. Water from porous wall of earthen pot evaporates continuously, which lowers the temperature of water kept in the earthen pot. ½
In summer moisture level is very low in the atmosphere, which increases the rate of evaporation, as evaporation is inversely proportional to the moisture level in atmosphere. That is why in summer water kept in earthen pot becomes cool. **1 ½**

15.

	Prokaryotic cell		Eukaryotic cell	
1.	Generally small (1-10 μm).	1.	Generally large (5-100 μm).	½
2.	Nuclear region is poorly defined due to absence of nuclear envelope known as nucleoid.	2.	Nuclear region well defined and surrounded by a nuclear membrane.	½
3.	Chromosome single.	3.	More than one chromosome.	½
4.	Membrane bound cell organelles absent.	4.	Membrane bound cell organelles present.	½

OR

15.

	Plant cell		Animal cell	
i	Cell wall is present.	i	Cell wall is absent.	½
ii	Plastids are present.	ii	Plastids are absent.	½
iii	Vacuoles are larger in size.	iii	Vacuoles are smaller in size.	½
iv	Plant cells are larger in size.	iv	Comparatively smaller in size.	
v	Plant cells cannot change their shape.	v	Animal cells can change their shape.	½

16.

	Speed		Velocity	
1.	It is defined as the rate of change of distance.	1.	It is defined as the rate of change of displacement.	½
2.	It is a scalar quantity i.e., it has only magnitude.	2.	It is a vector quantity i.e., it has both magnitude and direction.	½
3.	It is always positive or zero.	3.	It can be negative, zero or positive.	
4.	Speed is velocity without direction.	4.	Velocity is directed speed.	
5.	Speed may or may not be equal to velocity.	5.	A body may possess different velocities but the same speed.	½
6.	For a moving body it is never zero.	6.	For a moving body it can be zero.	½

OR

16.

(a) Motion is uniform. ½
(b) Motion is non - uniform.
(c) Motion has a uniform acceleration. ½
(d) Motion has a non - uniform acceleration. ½
(e) Motion has zero acceleration. ½

17. **Fill in the blanks**

a. heterogeneous, centrifugation 1
b. scattering, Tyndall Effect, colloidal 1

18.

- Epidermis of a leaf is not continuous at some places due to the presence of small pores called stomata. ½
- Each stomata is bounded by a pair of specialised epidermal cells or two kidney-shaped cells called guard cells. ½
- Guard cells are epidermal cells containing chloroplasts. ½
- The stoma allows gaseous exchange during photosynthesis and respiration. ½

SECTION - C

Answer the following questions : [3 Marks Each] **12**

19. Here m = 10 g = 0.01 kg, u = 150 ms^{-1}, v = 0, t = 0.03 s

$$a = \frac{v - u}{t}$$ ½

$= \frac{0 - 150}{0.03} = -5{,}000\ ms^{-2}$ ½

The distance of penetration of the bullet into the block, ½

$s = ut + \frac{1}{2}at^2$ ½

$= 150 - 0.03 + \frac{1}{2} \times (-5000) \times (0.03)^2$ ½

$= 4.5 - 2.25 = 2.25$ m

The magnitude of the force exerted by the wooden block on the bullet

$F = ma$

$= 0.01 \times (-5{,}000) = -50$ N.

Thus retarding force = 50 N. ½

OR

19. Here $m_1 = 1$ kg, $u_1 = 10\ ms^{-1}$, $m_2 = 5$ kg, $u_2 = 0$ ½

Let v be the velocity of the combined object after the collision

Total momentum just before the impact = $m_1u_1 + m_2u_2$

= $1 \times 10 + 5 \times 0$ ½

= $10\ kg\ ms^{-1}$

Total momentum just after the impact = $(m_1 + m_2)\ v$

= $(1 + 5)v = 6v\ kg\ ms^{-1}$ ½

By conservation of momentum,

$6v = 10$ ½

or $v = \frac{10}{6} = \frac{5}{3}\ ms^{-1}$ ½

y Total momentum just after the impact = $6 \times \frac{5}{3} = 10\ ms^{-1}$ ½

20. (i) This is because, the water vapour present in air, on coming in contact with the cold glass due to lower atmospheric temperature outside the room because of rain, loses energy and gets converted to liquid state, which we see as water droplets. 1

(ii) Obedient, mature and responsible. 1

21.
- The cells are with thin cell walls.
- They are living cells. ½
- They are loosely packed.
- They have tough intercellular spaces. ½

Functions :
- It provides support to plants.
- It also stores food.
- It forms the packing tissue of all plant organs. ½
- In some parenchyma tissue cells contains chlorophyll. Then it is called chlorenchyma. It performs photosynthesis. ½
- In aquatic plants, parenchyma contains large air cavities. It gives buoyancy to the plants to help them float. Such parenchyma is known as aerenchyma. ½
- The parenchyma of stems and roots also stores nutrients and water. ½

22. **Rigidity:** The greatest force of attraction between particles and close packing of particles make solids rigid. Rigidity is one of the unique properties of solids. Because of rigidity, a solid can resist from getting distorted. Because of rigidity a solid has definite shape and volume. Rigidity is negligible in fluid and gas. ½

Compressibility: Compressibility is one of the most important characteristics of gas. Because of lot of space between particles, a gas can be compressed to a great extent. ½

Liquids and solids cannot be compressed because of the least space between their particles. ½

Fluidity: The ability to flow is called fluidity. The less force of attraction and more space between particles make liquids and gases to flow. That's why liquids and gases are called fluids.

Filling of a gas container: Liquids do not fill a gas container completely, while gases fill the gas container completely in which it is kept. This is because the particles of gas can move in all the directions. ½

Shape: Solids have fixed shape. Liquid and gas take the shape of the container in which they are kept. This happens because of less force of attraction and more kinetic energy between particles of liquids and negligible force of attraction and highest kinetic energy between particles of gas. ½

Kinetic energy: The kinetic energy of particles of solid is the minimum. They only vibrate at their fixed position. The kinetic energy of particles of liquid is more than that of solid. But they can slide above one another. The kinetic energy of particles of gas is the maximum.

Density: The mass per unit volume of a substance is called density. The density of solid is highest, of liquid is less than solid and of gas is minimum. ½

SECTION - D

Answer the following questions : [4 Marks Each] **12**

23.

(i) Consider the velocity-time graph of an object that moves under uniform acceleration as shown. From this graph, you can see that initial velocity of the object is u (at point A) and then it increases to v (at point B) in time t. The velocity changes at a uniform rate a. In Figure, the perpendicular lines BC and BE are drawn from point B on the time and the velocity axes respectively, so that the initial velocity is represented by OA, the final velocity is represented by BC and the time interval t is represented by OC. BD = BC – CD, represents the change in velocity in time interval t. ½

Let us draw AD parallel to OC. From the graph, we observe that

$BC = BD + DC$

$= BD + OA$

Substituting BC = v and OA = u

we get $v = BD + u$

or $BD = v - u$ ..... (1) ½

From the velocity-time graph (figure) the acceleration of the object is given by,

$$a = \frac{\text{Change in Velocity}}{\text{Time taken}}$$

$$= \frac{BD}{AD}$$

$$= \frac{BD}{OC}$$

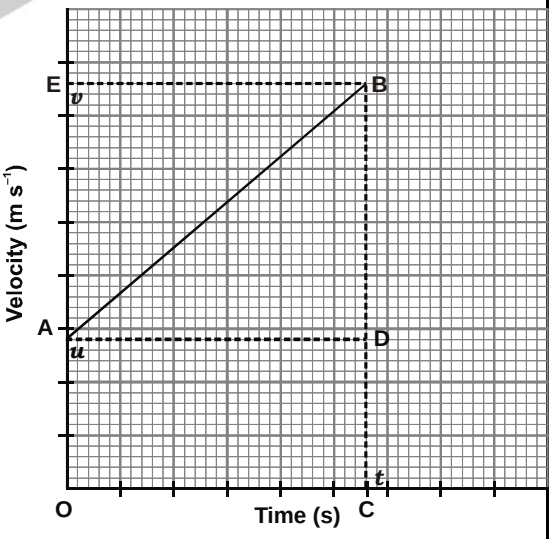
Substituting OC = t, we get

$$a = \frac{BD}{t}$$

or $BD = at$ ..... (2)

Using (1) and (2) we get ½

$v = u + at$



Velocity - time graph to obtain the equations of motion

(ii) Let us consider that the object has travelled a distance s in time t under uniform acceleration a. In the above graph the distance travelled by the object is obtained by the area enclosed within OABC under the velocity-time graph AB.

Thus, the distance *s* travelled by the object is given by

s = area OABC (which is a trapezium)

= area of the rectangle OADC + area of the triangle ABD ½

= OA × OC + $\frac{1}{2}$ (AD × BD)

Substituting OA = *u*, OC = AD = *t* and BD = *at*, we get

$s = u \times t + \frac{1}{2}(t \times at)$ ½

or $s = ut + \frac{1}{2}at^2$

(iii) From the velocity-time graph shown in above the distance s travelled by the object in time *t*, moving under uniform acceleration a is given by the area enclosed within the trapezium OABC under the graph. That is,

s = area of the trapezium OABC

$= \frac{(OA + BC) \times OC}{2}$ ½

Substituting OA = u, BC = v and OC = t,

we get $s = \frac{(u+v)t}{2}$ ..... (1)

From the velocity-time relation, we get,

$t = \frac{(v-u)}{a}$ ..... (2) ½

Using Eqs. (1) and (2) we have

$s = \frac{(v+u)\times(v-u)}{2a}$

or $2as = v^2 - u^2$ ½

i.e. $v^2 = u^2 + 2as$

OR

23. Initial velocity(u) = 0 m/s

Distance travelled (s) = 400m

Time taken (t) = 20s

Mass of truck (m) = 7 tonne ½

1 tonne = 1000 kg

y 7 tonne = 7000

To find : Acceleration (a) = ?

Force (F) = ?

Formula: $s = ut + \frac{1}{2}at^2$ ½

Solution : $s = ut + \frac{1}{2}at^2$

$400 = 0 \times 20 + \frac{1}{2} \times a \times 20 \times 20$ ½

$400 \times 2 = 400a$ ½

$\therefore a = \frac{400\times2}{400} = 2ms^{-2}$ ½

F = ma = 7000 × 2 ½

$\therefore$ F = 14000N ½

	The truck moves with an acceleration and $2ms^{-2}$. the force acting on it in 14000N.	½
24.	In a 20% solution containing 100 g water; the mass percentage of water = 100 - 20 = 80%	1
	∵ 80% of solution is 100 gram	
	∴ 1% of solution is $\frac{100}{80}$ gram	1
	∴ 20% of solution is $\frac{100}{80} \times 20 = 25$ gram	1
	Hence; to prepare 20% (w/w) solution in 100 gram of water 25 gram of sodium sulphate is needed.	1
25.	The given mixture can be separated using the following process.	
	Magnetic Separation: Using magnetic separation the iron fillings can be separated from the given mixture.	½
	In this a magnet is however just above the mixture, since iron is a magnetic substance it is attracted by magnet and will get stuck with it. By this first of all iron fillings are separated.	½
	Sublimation : After the separation of iron fillings, ammonium chloride is separated by the process of sublimation.	½
	Since, ammonium chloride is a sublimate and it turns into vapour directly without changing into liquid, thus when the mixture is sublimated, the ammonium chloride is deposited over the inner wall of funnel leaving the sodium chloride and sand in the watch glass. Ammonium chloride is separated by scratching from the inner wall of the funnel.	½
	Filtration : Now the left mixture of sand and sodium chloride is put in water, after stirring the sodium chloride is dissolved in water. The solution is separated by the process of filtration. The sand left over the filter paper is separated out.	½ ½
	Vaporisation : By the process vaporization, the liquid so obtained is vaporized and crystals of ammonium chloride can be obtained.	
	Hence, by using the methods of magnetic separation, sublimation, filtration and vaporisation and crystallization the component of given mixture of sand, iron fillings, ammonium chloride and sodium chloride can be separated.	½ ½
	★★★★ ***Best of Luck*** ★★★★	