

## Half Yearly Examination Answer Key - 2019

## 10<sup>th</sup> SCIENCE – ANSWER KEY

### HALF YEARLY EXAMINATION - 2019

#### PART – I (Marks - 12)

1. d)  $8.31 \text{ J mol}^{-1} \text{ K}^{-1}$
2. c) Electrical Energy
3. a) Vibrate along the direction of the wave motion
4. c) Iron – 59
5. a) 17<sup>th</sup>
6. c) 1-(ii), 2-(iv), 3-(i), 4-(iii)
7. a) large surface area
8. b) mitochondrial matrix
9. c) Durameter
10. a) retina of eye
11. d) Large feathery stigma
12. b) metacentric

#### PART – II (Marks - 14)

13. 1942 at Chicago, U.S.A
14. Copper does not react with dilute sulphuric acid as its reduction potential is higher than that of hydrogen. Copper does not displace hydrogen from non-oxidising acids like HCl or dilute  $\text{H}_2\text{SO}_4$ .
15. Atomic masses of Ca = 40, P = 30, O = 16.  
Gram molar mass of  $\text{Ca}_3(\text{PO}_4)_2$   

$$= (40 \times 3) + [30 + (16 \times 4)] \times 2$$

$$= 120 + (94 \times 2)$$

$$= 120 + 188$$
 Gram molar mass of  $\text{Ca}_3(\text{PO}_4)_2 = 308 \text{ g}$
16. It helps the digestion of food without harming the stomach. During indigestion the stomach produces too much acid and it causes pain and irritation. pH of the stomach fluid is approximately 2.0.
  - it can neutralize the excess acid and prevent tooth decay.
  - In agriculture, the pH of the soil is very important.
17. i) Autonomic Nervous System (ANS)  
ii) ANS comprises sympathetic and parasympathetic nerves.
18. (i) **Alloying** : The metals can be alloyed to prevent the process of corrosion. **Eg**: Stainless steel.  
**Galvanization**  
It is the process of coating zinc on iron sheets by using electric current.

#### Electroplating :

It is a method of coating one metal over another metal by passing electric current.

19. Fossils throw light on phylogeny and evolution of plants.
  - Fossil plants give a historical approach to plant kingdom.
  - Fossils are useful in classification of plants
  - Fossils show that life on earth was once different from life found on earth today.
20. Genetic engineering is the manipulation and transfer of genes from one organism to another organism to create a new DNA called as recombinant DNA (rDNA).
21. **Script area**: Where you build scripts.
  - **Block menu**: Where you choose the category of blocks (programming statements) to use.
  - **Block palette**: Where you choose the block to use.
22. Current  $I = 2 \text{ A}$  potential difference  $V = 30 \text{ V}$ .

$$\text{From ohm's law, } R = \frac{V}{I} R = \frac{30}{2} = 15 \Omega$$

#### PART – III (Marks - 21)

23. i) When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure.

$$P \propto \frac{1}{V} \quad (\text{i.e.}) \quad PV = \text{constant.}$$

ii)

Ideal gas	Real gas
1. If the atoms or molecules of a gas do not interact with each other, then the gas is said to be an ideal gas or a perfect gas.	1. If the molecule or atom of a gas interact with each other with a definite amount of intermolecular or interatomic force of attraction, then the gases are said to be real gases.
2. A real gas at low or high temperature can be termed as a perfect gas.	2. At very high temperature or low pressure, a real gas behaves as an ideal gas.

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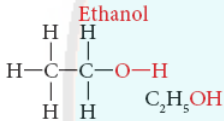
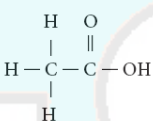
24. i) The earth wire provides a low resistance path to the electric current.

- The earth wire sends the current from the body of the appliance to the earth, whenever a live wire accidentally touches the body of metallic electric appliance.
- Thus, the earth wire serves as a protective conductor, which saves us from electric shocks.

ii) Merits of LED bulb.

- As there is no filament, there is no loss of energy in the form of heat. It is cooler than the incandescent bulb.
- Led bulbs have significantly low power requirement.
- It is not harmful to the environment.

25. a)

Ethanol(CH <sub>3</sub> CH <sub>2</sub> OH)	Ethanoic acid(CH <sub>3</sub> COOH)
 <p style="text-align: center;">Ethanol C<sub>2</sub>H<sub>5</sub>OH</p>	

b) Volume of aqueous solution = 200 ml

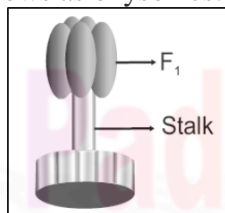
Volume percentage = 20%

$$\text{Volume percentage} = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100$$

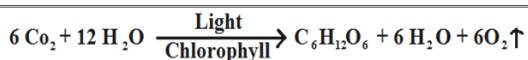
$$20 = \frac{\text{volume of ethanol}}{200} \times 100$$

$$\text{Volume of ethanol} = \frac{20 \times 200}{100} = 40 \text{ ml}$$

26. i) The inner mitochondrial membrane bears minute regularly spaced tennis racket shaped particles known as oxysomes.



ii) Photosynthesis is a process by which autotrophic organisms like green plants, algae and chlorophyll containing bacteria utilize the energy from sunlight to synthesize their own food.



27) i) Locomotion in leech takes place by

- Looping (or) crawling movement.
- Swimming movement.

**Looping or crawling movement:**

- This type of movement is brought about by the contraction and relaxation of muscles.
- The two suckers serve for attachment during movement on a substratum.

**Swimming movement:**

Leech swim very actively and perform undulating movements in water.

ii) Leeches are effective in increasing blood circulation and breaking up blood clots. It is surprising that they can be used to treat cardiovascular diseases. Biochemical substances derived from leech saliva are used for preparation of pharmaceutical drugs that can treat hypertension.

28. Simple or basic reflexes:

These reflexes are inbuilt and unlearned responses. Many of the actions we perform in our day to day life are simple reflexes. e.g., winking of eyes when any dust particles enter, sneezing, coughing, yawning, etc. We perform these actions without thinking.

(ii) **Acquired or conditioned reflexes:**

These reflexes are the result of practice and learning. Playing harmonium by striking a particular key on seeing a music note is an example of conditioned reflexes which required conscious training effort.

29. F<sub>1</sub> plants are Hybrid tall (Tt)

- ❖ In the F<sub>2</sub> generation 3 different types were obtained.
  - Tall Homozygous - TT - pure - 1
  - Tall Heterozygous - Tt - 2
  - Dwarf Homozygous - tt - 1
- ❖ So the genotype ratio = 1:2:1

30. Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

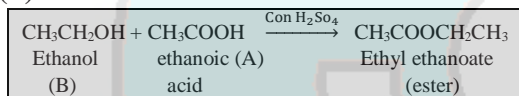
**Importance of Ethnobotany:**

- It proves traditional uses of plant.
- It gives information about certain unknown and known useful plants.

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- The ethno medicinal data will serve as a useful source of information for the chemists
  - Pharmacologists and practitioners of herbal medicine.
  - Tribal communities utilize ethno medicinal plant parts for the treatment of diseases.
31. The two important properties of stem cells that differentiate them from other cells are,
- Its ability to divide and give rise to more stem cells by self renewal.
  - Its ability to give rise to specialised cells with specific functions by the process of differentiation.
  - In treating **neurodegenerative, disorders** like Parkinson's disease and Alzheimer's disease **neuronal stem cells** can be used to replace the damaged or lost neurons.
32. (i) A- Ethanoic acid B - Ethyl ethanoate

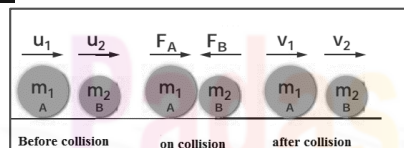
(ii)



- (iii) The reaction of an alcohol with a carboxylic acid gives a compound having fruity odour. This compound is called an ester. This process is known as esterification.

**PART - IV (Marks - 28)****33. a) i) Law of Conservation of momentum:****Statement:**

There is no change in the linear momentum of a system of bodies as long as no net external force acts on them.

**Proof:**

- Let two bodies A and B having masses  $m_1$  and  $m_2$  move in a straight line.
- Let initial velocities of A and B be  $u_1$  and  $u_2$  respectively such that  $u_1 > u_2$ .
- During an interval of time 't second', they tend to have a collision.
- After the impact, both of them move along the same straight line with a velocity  $v_1$  and  $v_2$  respectively.

Force on body B due to A,

$$F_B = \frac{m_2(v_2 - u_2)}{t} \text{ ----- (1)}$$

Force on body A due to B

$$F_A = \frac{m_1(v_1 - u_1)}{t} \text{ ----- (2)}$$

By Newton's third law, Action Force = Reaction force :

$$F_A = -F_B$$

$$\frac{m_1(v_1 - u_1)}{t} = - \frac{m_2(v_2 - u_2)}{t}$$

$$m_1(v_1 - u_1) = -m_2(v_2 - u_2)$$

$$m_1v_1 - m_1u_1 = -m_2v_2 + m_2u_2$$

$$m_1v_1 + m_2v_2 = m_1u_1 + m_2u_2$$

In the absence of an external force, the algebraic sum of the momentum after collision is numerically equal to the algebraic sum of the momentum before collision.

**ii) Linear momentum = mass (m) × velocity (v)**

Velocity = Linear Momentum / mass

$$V = 2.5/5 = 0.5 \text{ kgms}^{-1}$$

**b) i)**

Myopia	Hypermetropia
1. Myopia is also known short sightedness	Hypermetropia is also known a long sightedness.
2. It occurs due to the lengthening of eye ball	It occurs due to the shortening of eye ball.
3. Nearby objects can be seen clearly but distant objects cannot be seen clearly.	Distant objects can be seen clearly but nearby objects cannot be seen clearly.
4. The image of distant objects are formed before retina.	The image of nearby objects are formed behind retina.
5. This defect can be corrected using concave lens.	This defect can be corrected using convex lens.
6. The focal length of required concave lens is $f = \frac{xy}{x-y}$ Where, x - distance that the person can see y - distance that the person want to see	6. The focal length of required convex lens. $f = \frac{dD}{d-D}$

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ii)

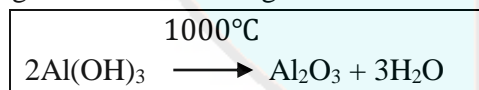
Convex lens	Concave lens
1. Thicker in the middle than at edge	Thinner in the middle than at edge.
2. Converging lens	Diverging lens
3. It is used to correct Hypermetropia	It is used to correct myopia
4. Produces mostly real images	Produces virtual images

34. a) i)

Ores of Aluminium	Formula
Bauxite	$\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$
Cryolite	$\text{Na}_3\text{AlF}_6$
Corundum	$\text{Al}_2\text{O}_3$

ii) Baeyer's Process

- Bauxite ore is finely ground and heated under pressure with a solution of concentrated caustic soda solution at  $150^\circ\text{C}$  to obtain sodium meta aluminate.
- On diluting sodium meta aluminate with water, a precipitate of aluminium hydroxide is formed.
- The precipitate is filtered, washed, dried and ignited at  $1000^\circ\text{C}$  to get alumina.



Hall's Process

- Aluminium is produced by the electrolytic reduction of fused alumina ( $\text{Al}_2\text{O}_3$ ) in the electrolytic cell.
- Cathode:** Iron tank linked with graphite
- Anode:** A bunch of graphite rods suspended in molten electrolyte.
- Electrolyte:** Pure alumina + molten cryolite + fluorspar (fluorspar lowers the fusion temperature of electrolyte)
- Temperature:**  $900 - 950^\circ\text{C}$
- Voltage used:** 5-6 V
- Overall reaction:**  $2 \text{Al}_2\text{O}_3 \rightarrow 4 \text{Al} + 3 \text{O}_2\uparrow$

b) i)

Hygroscopic substances	Deliquescence substances
1. When exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve.	When exposed to the atmospheric air at ordinary temperature they absorb moisture and dissolve.
2. Hygroscopic substances do not change its physical state on exposure to air.	Deliquescent substance change its physical state on exposure to air.
3. Hygroscopic substances may be amorphous solids or liquids.	Deliquescent substance are crystalline solids.

ii)

Deliquescent substances	Hygroscopic substances
Conc. Sulphuric acid, Copper sulphate pentahydrate, Silica gel, Gypsum salt.	Calcium chloride

iii)

Mass of solvent : 180 g

Mass of solute : 45 g

Mass percentage of solute =

$$= \frac{\text{Mass of solute}}{\text{Mass of solvent} + \text{mass of solute}} \times 100$$

$$= \frac{45}{180 + 45} \times 100$$

$$= \frac{4500}{225} = 20\%$$

Mass percentage of solute = 20 %

Mass percentage of solvent

$$= 100 - \text{Mass percentage of solute}$$

$$= 100 - 20 = 80\%$$

35. a) i) The **cortisol** hormones are also known as life-saving hormone. Cortisol serves to maintain the body in living condition and recover it from the severe effects of stress reactions. Thus an increased output of cortisol is "life saving" in "shock conditions".

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**ii) Physiological effects of Gibberellins:**

- Application of gibberellins on plants stimulate extraordinary **elongation of internode**.  
*E.g.* Corn and Pea.
- Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called **bolting**.
- Gibberellins promote the **production of male flowers** in monoecious plants (Cucurbits).
- Gibberellins **break dormancy** of potato tubers.
- Gibberellins are efficient than auxins in inducing the formation of seedless fruit - **Parthenocarpic fruits** (Development of fruits without fertilization) e.g. Tomato.

**iii) Functions of blood**

- Transport of respiratory gases (Oxygen and CO<sub>2</sub>).
- Transport of digested food materials to the different body cells.
- Transport of hormones.
- Transport of nitrogenous excretory products like ammonia, urea and uric acid.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and helps in regulation of pH and body temperature.

**b) (i) Roof top rainwater harvesting:**

- Roof-tops are excellent **rain catchers**.
- The rain water that falls on the roof of the houses, apartments, commercial buildings etc. is collected and stored in the surface tank and can be used for domestic purpose.

**(ii) Recharge pit:**

- In this method, the rain water is first collected from the roof tops or open spaces and is directed into the **percolation pits** through pipes for filtration.
- After filtration the rainwater enters the **recharge pits** or **ground wells**.

- People living in rural areas adopt a variety of water collecting methods to capture and store as rain water. Some of the **methods used** are

**(i) Digging of tanks or lakes (Eris):**

- It is one of the **traditional water harvesting system** in Tamil Nadu.
- Eris are constructed in such away that if the water in one eri overflows, it automatically gets diverted to the eri of the next village, as these eris are inter connected.

**(ii) Ooranis:**

- These are **small ponds** to collect rainwater.
- The water is used for various domestic purposes (drinking, washing and bathing). These ponds cater the near by villages.

**ii) POCSO Act**

The Ministry of Women and Child Development championed the introduction of the Protection of Children from Sexual Offences (POCSO) Act, 2012. People who traffic children for sexual purposes are also punishable under the provisions relating to the Act.

**Objectives of the POCSO Act, 2012**

1. To protect children from the offences of
  - Sexual assault
  - Sexual harassment
  - Pornography
2. To establish Special Courts for speedy trial of such offences.