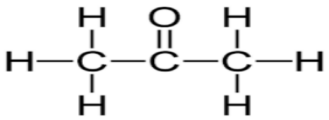
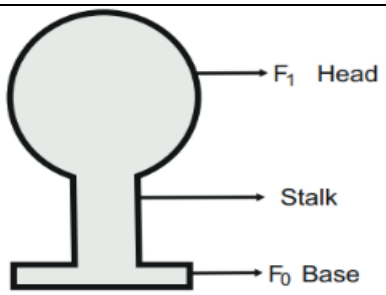
Half Yearly Exam – Vellore - 2025
Standard - X
SCIENCE – Key Answer

Q.No.	Answer	Marks
1	c) change of momentum	1
2	d) either positive or negative	1
3	c) Ohm	1
4	a) Kalpakkam	1
5	c) Carbon dioxide	1
6	a) 17^{th}	1
7	a) homogeneous	1
8	b) mitochondrial matrix	1
9	b) 33 segments	1
10	a) SA node	1
11	b) Pituitary gland	1
12	c) Jean Baptiste Lamarck	1
13	When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure. $P \alpha 1/V$	2
14	They are made curved because the sound after reflecting from the ceiling reaches every corner of the concert hall and the audience will hear the sound clearly.	2
15	Dilute or concentrated Nitric acid does not attack aluminium, but it renders aluminium passive due to the formation of an oxide film on its surface.	2
16	Solutions which are made of two components (solute and solvent) are called binary solutions.	2
17	Common name : Acetone IUPAC name : Propanone Structural formula : CH_3COCH_3 or 	2

<table>
<tr><td>18</td><td> 

Structure of Oxysomes</td><td>2</td></tr>
<tr><td>19</td><td>$I\ \frac{2}{1}, C\ \frac{0}{0}, PM\ \frac{3}{2}, M\ \frac{3}{3}$</td><td>2</td></tr>
<tr><td>20</td><td><table><tr><th>Voluntary actions</th><th>Involuntary actions</th></tr><tr><td>Actions performed with our will and control is called Voluntary actions. They are controlled by Cerebellum.</td><td>Actions performed without our control is called involuntary actions. They are controlled by Medulla and Spinal cord.</td></tr></table></td><td>2</td></tr>
<tr><td>21</td><td>1. Embryonic stem cells.
2. Adult stem cell or somatic stem cell</td><td>2</td></tr>
<tr><td>22</td><td>Current through the conductor I = 2 A
Potential difference V = 30 v
From Ohm’s law R = V / I
Therefore , R = 30 / 2 = 15 Ω</td><td>2</td></tr>
<tr><td>23</td><td><table><tr><th>Mass</th><th>Weight</th></tr><tr><td>It is the quantity of matter contained in the body</td><td>It is the gravitational force exerted on the body due to Earth’s gravity</td></tr><tr><td>Scalar quantity</td><td>Vector quantity</td></tr><tr><td>Unit is kilogram (kg)</td><td>Unit is newton (N)</td></tr><tr><td>Remains the same</td><td>Varies from place to place</td></tr></table></td><td>4</td></tr>
</table>

24

1. Light is a form of energy.

2. Light always travels along a straight line.

3. Light does not need any medium for its propagation. It can even travel through vacuum.

4. The speed of light in vacuum or air is, $c = 3 \times 10^8 ms^{-1}$.

5. Since, light is in the form of waves, it is characterized by a wavelength (λ) and a frequency (ν), which are related by the following equation: $c = \nu \lambda$ (c - velocity of light).

6. Different coloured light has different wavelength and frequency.

7. Among the visible light, violet light has the lowest wavelength and red light has the highest wavelength.

8. When light is incident on the interface between two media, it is partly reflected and partly refracted.

(any five points)

4

25

a.

a. BARC	**Mumbai**
b. India's first atomic power station	**Tarapur**
c. IGCAR	**Kalpakkam**
d. First nuclear reactor in India	**Apsara**

2

b. The first nuclear reactor was built in 1942 at Chicago, USA.

2

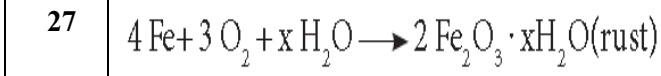
26

Reversible reactions	Irreversible reactions
It can be reversed under suitable conditions.	It cannot be reversed.
Both forward and backward reactions take place simultaneously.	It is unidirectional. It proceeds only in forward direction.
It attains equilibrium.	Equilibrium is not attained.
The reactants cannot be converted completely into products.	The reactants can be completely converted into products.
It is relatively slow.	It is fast.

4

27

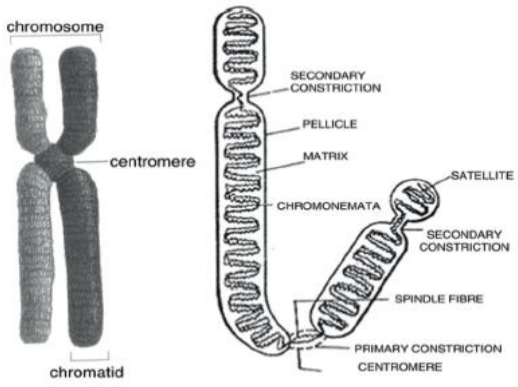
a. When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as Rust.



2

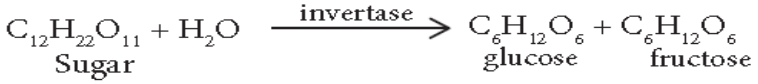
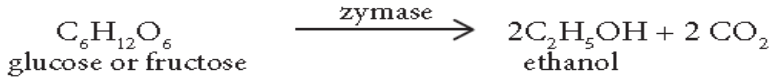
b. **i) water and ii) oxygen**

2

28	**i) Transport of respiratory gases (Oxygen and CO_2).** **ii) Transport of digested food materials to the different body cells.** **iii) Transport of hormones.** **iv) Transport of nitrogenous excretory products like ammonia, urea and uric acid.** **v) It is involved in protection of the body and defense against diseases.** **vi) It acts as buffer and also helps in regulation of pH and body temperature.** **vii) It maintains proper water balance in the body.**	**4**
29	**1. Application of gibberellins on plants stimulate extraordinary elongation of inter node. e.g. Corn, Pea.** **2. Treatment of rosette plants with gibberellins induces sudden shoot elongation followed By flowering. This is called bolting.** **3. Gibberellins promote the production of male flowers in monoecious plants (Cucurbits)** **4. Gibberellins break dormancy of potato tubers.** **5. Gibberellins are efficient than auxins in inducing the formation of seedless fruit - Parthenocarpic fruits (Development of fruits without fertilization) e.g. Tomato.**	**4**
30	**The chromosomes are thin, long and thread-like structures consisting of two identical strands called sister chromatids.** **They are held together by the centromere.** **Each chromatid is made up of spirally coiled thin structure called chromonema.** **The chromonema has number of bead-like structures along its length which are called chromomeres.** **The chromosomes are made up of DNA, RNA, chromosomal proteins and certain metallic ions.** **These proteins provide structural support to the chromosome.**  Structure of chromosome	**4**
31	**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 provides traditional uses of plant.** **It gives information about certain unknown and known useful plants.** **The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologists and practitioners of herbal medicine.** **Tribal communities utilize ethnomedicinal plant parts like bark, stem, roots, leaves, flower bud, flowers, fruits, seeds, oils, resins, dyes, gum for the treatment of diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites, leprosy, etc.**	**4**

32	**i. One mole of $CaCO_3$** **ii. gram molecular mass** **= (40x1) + (12x1) + (16x3)** **= 40 + 12 + 48** **= 100 g** **iii. One mole of CO_2**	**1** **2** **1**
33 a.	**i) Electric current is defined as the rate of flow of charges in a conductor. This means that the electric current represents the amount of charges flowing in any cross section of a conductor in unit time.** **If a net charge 'Q' passes through any cross section of a conductor in time 't', then the current flowing through the conductor is I = Q/t** **ii) The SI unit of electric current is ampere (A). The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross-section of a conductor, in one second.** **1 ampere = 1 coulomb / 1 second** **iii)Ammeter is used to measure the electric current and it should be connected in series in circuits.**	**2** **3** **2**
33 b.		**7**

Properties	α rays	β rays	γ rays
What are they?	Helium nucleus ($_2He^4$) consisting of two protons and two neutrons.	They are electrons ($_{-1}e^0$), basic elementary particle in all atoms.	They are electromagnetic waves consisting of photons.
Charge	+2e	-e	Zero
Ionising power	100 time greater than β rays and 10,000 times greater than γ rays	Comparatively low	Very less ionization Power
Penetrating power	Low penetrating power	Penetrating power is greater than that of α rays.	They have a very high penetrating power
Effect of electric and Magnetic field	Deflected by both the fields.	Deflected by both the fields; but the direction of deflection is opposite to that for alpha rays.	They are not deflected by both the fields.
Speed	Their speed ranges from 1/10 to 1/20 times the speed of light.	Their speed can go up to 9/10 times the speed of light.	They travel with the speed of light.

34 a.	**There are three main factors which govern the solubility of a solute. They are :** **i) Nature of the solute and solvent ii) Temperature and iii) Pressure** **i) <u>Nature of the solute and solvent</u> : The nature of the solute and solvent plays an important role in solubility. Although water dissolves an enormous variety of substances, both ionic and covalent, it does not dissolve everything. Polar compounds are soluble in polar solvents and Non-polar compounds are soluble in non-polar solvents. For example: Common salt is a polar compound and dissolves readily in polar solvent like water, Fat which is a non polar compound dissolves in non polar solvent ether.** **ii) <u>Effect of Temperature</u> : Generally, solubility of a solid solute in a liquid solvent increases with increase in temperature. For example, a greater amount of sugar will dissolve in warm water than in cold water. In endothermic process, solubility increases with increase in temperature. In exothermic process, solubility decreases with increase in temperature.** **iii) <u>Effect of Pressure</u> : Effect of pressure is observed only in thecase of solubility of a gas in a liquid. When the pressure is increased, the solubility of agas in liquid increases. The common examples for solubility of gases in liquids are carbonated beverages.**	**7**
34 b.	**Ethanol is manufactured by the fermentation of molasses, which is a by-product obtained during the manufacture of sugar from sugarcane. Molasses contain about 30% of sucrose, which cannot be separated by crystallization. It is converted into ethanol by the following steps :** **i. Dilution of molasses : Molasses is first diluted with water to bring down the concentration of sugar to about 8 to 10 %.** **ii. Addition of Nitrogen source : If the nitrogen content of the molasses is poor, it may be fortified by the addition of ammonium sulphate or ammonium phosphate.** **iii. Addition of Yeast : The solution obtained in step (ii) is collected in large 'fermentation tanks' and yeast is added to it. The mixture is kept at about 303K for a few days. During this period, the enzymes invertase and zymase present in yeast, bring about the conversion of sucrose into ethanol. The fermented liquid is called wash.**   **iv. Distillation of wash, containing 15 to 18 percent alcohol, is now subjected to fractional distillation. The main fraction is ethanol which contains 95.5% of ethanol and 4.5% of water. This is called rectified spirit. This mixture is then refluxed over quicklime for about 5 to 6 hours and then allowed to stand for 12 hours. On distillation of this mixture, pure alcohol (100%) is obtained. This is called absolute alcohol.**	**7**

35 a.

i) During fertilization process the pollen grain produces two male gametes (two sperms). The fusion of second sperm with the secondary nucleus is called triple fusion. It forms the primary endosperm which provides food to the endosperm. **2**

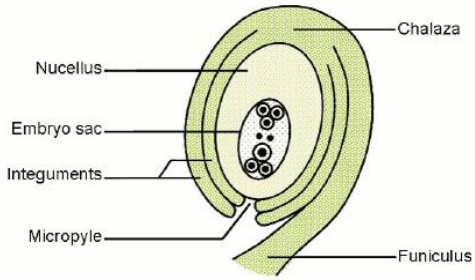
ii) The main part of the ovule is the nucellus which is enclosed by two integuments leaving an opening called as micropyle.

The ovule is attached to the ovary wall by a stalk known as funiculus. Chalaza is the basal part.

The embryo sac contains seven cells and the eighth nuclei located within the nucellus **5**

Three cells at the micropylar end form the egg apparatus and the three cells at the chalaza end are the antipodal cells.

The remaining two nuclei are called polar nuclei found in the center. In the egg apparatus one is the egg cell (female gamete) and the remaining two cells are the synergids.



Structure of the Ovule

35 b.

i) **4**

Differences between Type-1 and Type-2 Diabetes Mellitus

Factors	Type-1 Insulin dependent diabetes mellitus (IDDM)	Type-2 Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10-20%	80-90%
Age of onset	Juvenile onset (< 20 years)	Maturity onset (>30 years)
Body weight	Normal or Underweight	Obese
Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine

ii) The main purpose of rainwater harvesting is to make the rainwater percolate under the ground so as to recharge 'groundwater level'. Methods of rainwater harvesting are, **3**
i) Roof top rainwater harvesting : Rooftops 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 rainwater 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.