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Mock 04

Paper General Science & Ability

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SECTION-I

QUESTION # 03

d. Purpose of formation of

Organelles:

Cells form organelles in order to divide its functions. These organelles work as labour and perform the designated tasks to complete the functions of cell as a whole.

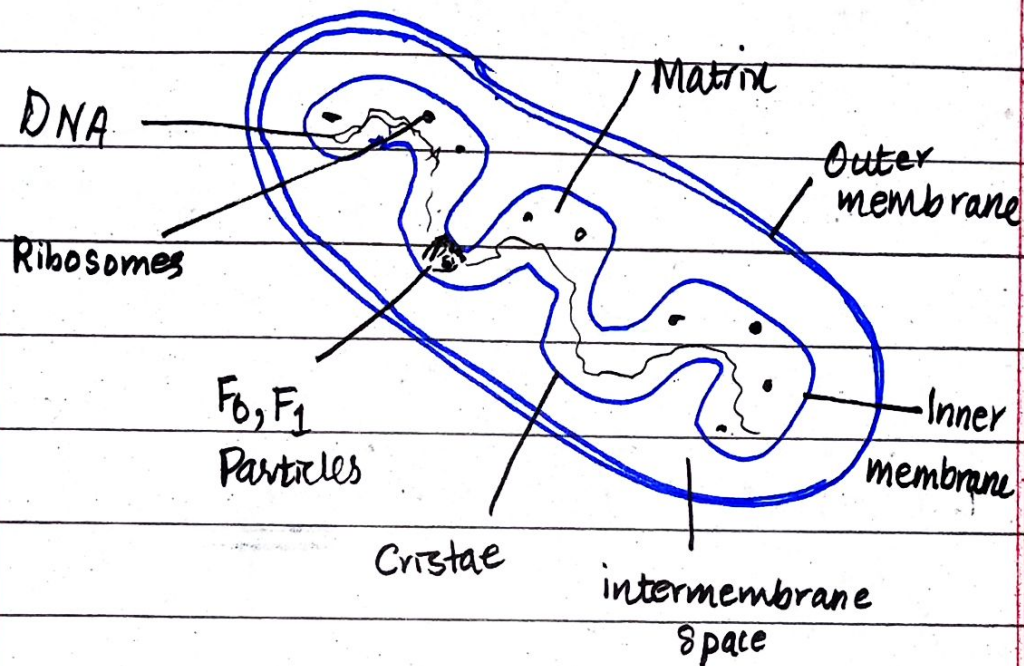
=> Mitochondria in Human Cell:

Mitochondria is one of the most important organelle as it is the powerhouse of cell which generates energy.

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→ Structure of Mitochondria:

→ Mitochondria are bounded by two membranes: outer and inner, and between them is intermembrane space.



→ Inner membrane forms many infoldings called cristae.

→ Cristae contains small knob like structures called F₁ particles.

→ Functions of Mitochondria:

Mitochondria performs very important functions in the body

1) Important metabolic processes like Krebs cycle, aerobic respiration, fatty

acid metabolism takes place in Mitochondria.

- These processes release energy which is transferred to energy rich compounds ATP
- ATP provides energy to cell on demand and breaks to ADP.
- ADP absorbed energy from mitochondria and again becomes ATP.

Metabolic processes



Energy is released



This energy is converted to ATP



ATP breaks to ADP and provide energy to the cell



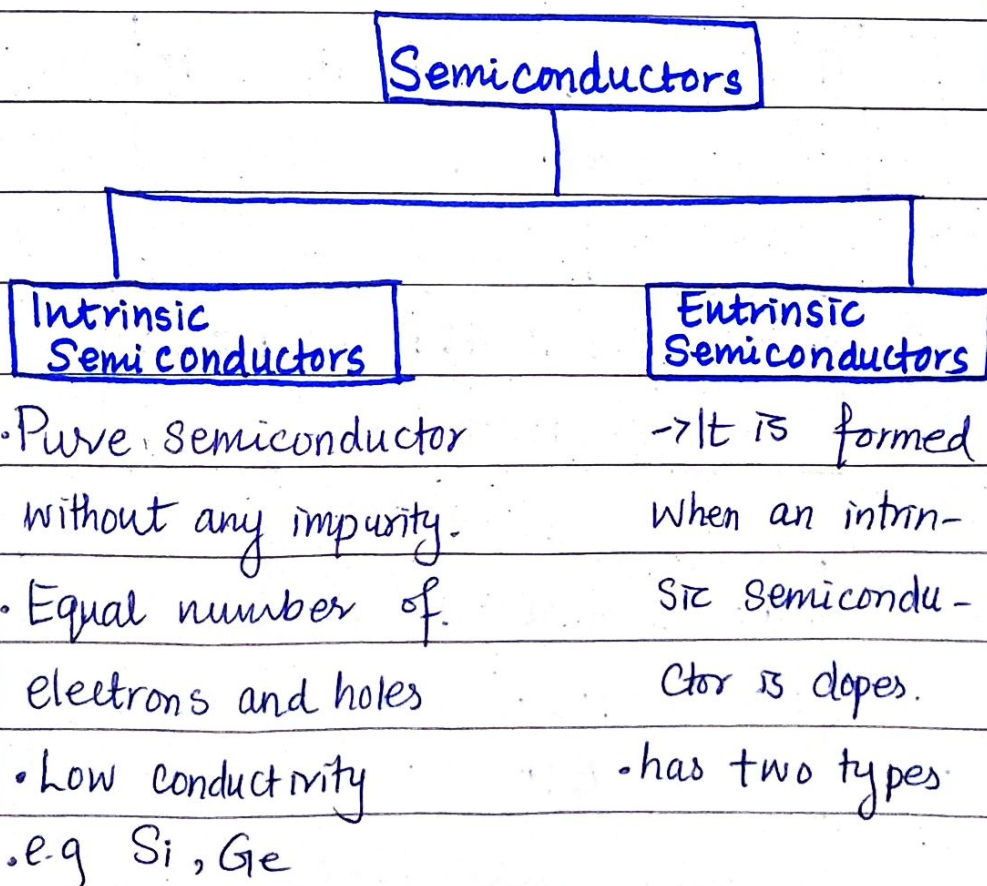
ADP again absorbs energy from mitochondria and becomes ATP

b. DOPING:

Doping is the process of adding small amount of impurities to a pure semi-conductor to change its electrical conductivity.

→ Doping is done for;

- 1) To increase the number of free electrons or ions.
- 2) To control conductivity and make semiconductors usable in transistors, ICs etc.



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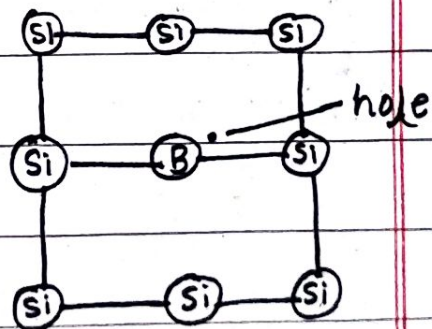
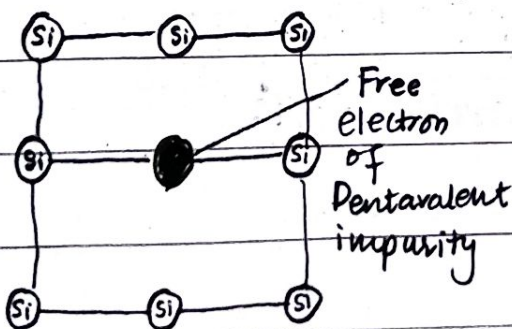
Extrinsic Semiconductor

N-Type Semiconductor

- Doped with a pentavalent impurity
- 4 electrons bond with Si atoms; 5th becomes free.
- Majority carriers are electrons
- Minority carriers are holes
- Negative charge dominates

P-Type Semiconductor

- Doped with a trivalent impurity
- 3 electrons bond with silicon atoms; one remain vacant.
- Majority carriers are holes
- Electrons are minority carriers
- Positive charge dominates.



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Q. c. Merits and Demerits of Volcanic Eruption

Volcanic Eruption:

A volcanic eruption is a sudden release of magma, gases, and ash from beneath the Earth's crust through an opening called a volcano.

When the pressure inside the earth becomes too high, the magma forces its way up and erupts on to the surface, becoming lava.

It has some merits and demerits too.

MERITS OF VOLCANIC ERUPTION

i) Formation of Fertile Soil:

Volcanic ash and lava break down to form rich, mineral soils that are excellent for farming.

ii) Mineral Resources:

Volcanoes bring valuable minerals like copper, gold, and diamond closer to the surface.

iii) Production of Geothermal Energy:

Heat from volcanic activity can be used to produce clean energy

iv) Tourism:

Volcanic landscapes attracts tourism, boosting local economies.

DEMERITS OF VOLCANIC ERUPTION

i) Loss of life and property:

Explosive eruptions can destroy towns and kill people.

ii) Cause of air pollution:

Ash and gases pollute the air, causing breathing problems and acid rain.

iii) Climate impact: Global Cooling:

Volcanic gases can block sunlight, causing global cooling

iv) Destruction of Vegetation:

Lava and ash bury crops and forests.

v) Displacement of people

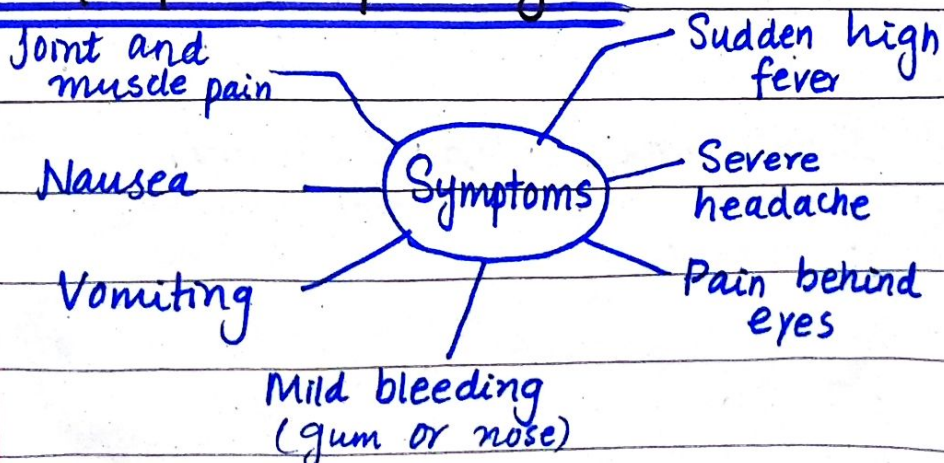
Populations near volcanoes often have to relocate permanently.

d. DENGUE

Dengue is a viral disease transmitted to humans through the bite of infected female *Aedes aegypti* mosquitoes.

→ It is also known as "breakbone fever" because of severe joint and muscle pain it causes.

Symptoms of Dengue:



Causative Agents:

- The disease is caused by Dengue Virus (DENV)
- There are four different strains of the virus:
 - DENV-1
 - DENV-2
 - DENV-3
 - DENV-4

Remedies: Treatment and Prevention.

There is no specific antiviral cure for dengue, but symptoms can be managed-

1) Drink plenty of fluid to prevent dehydration.

2) Use paracetamol for fever and pain.

3) Eliminate mosquito breeding sites

4) Wear long sleeve shirts.

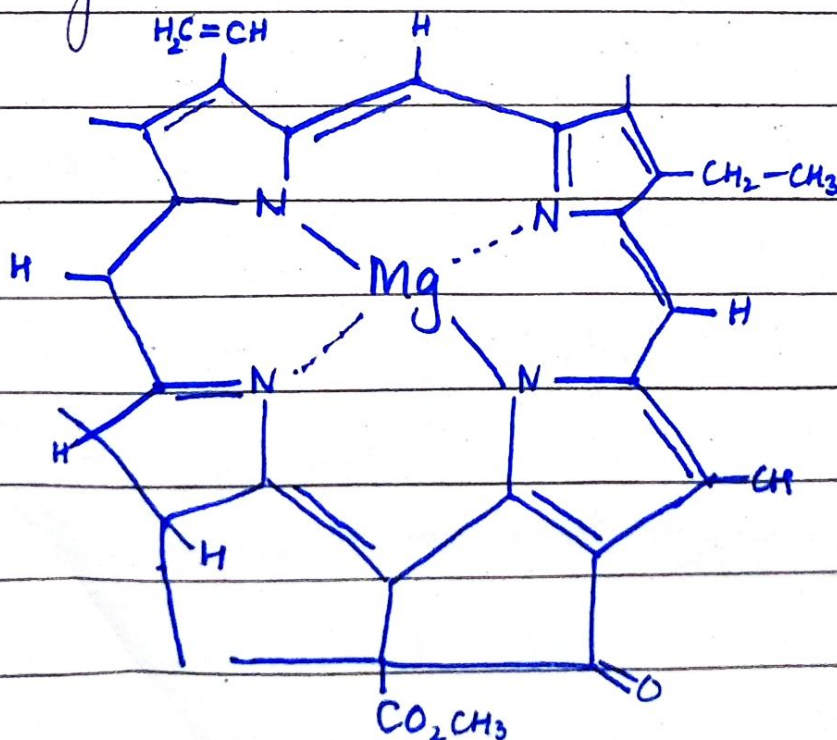
5) Use mosquito repellants & nets.

QUESTION # 04

a. Chlorophyll:

- It is a green pigment found in chloroplast of plant cells.
- It plays a major role in photosynthesis by trapping sunlight.
- Chemical composition:

- It is an organic compound made of carbon, hydrogen, oxygen, nitrogen, and magnesium.
- It has porphyrin ring with a central magnesium atom, which gives it its green color.



Chlorophyll
b

Accessory
pigment—
helps absorb
extra light

Chlorophyll

Chlorophyll
a

• ~~Maintain~~
pigment in
photosynthesis

Chlorophyll
c, d, e

Help in capturing
light at different λ .

Functions of Chlorophyll:

- 1) Absorbs sunlight and reflects green light.
- 2) Converts light energy into chemical energy.
- 3) Passes absorbed energy to other molecules to produce glucose, which serves as food for the plant.

b. Ribosomes:

Ribosomes are small, round, non-membranous organelles found in all living cells.

They are also known as 'protein factories' because they are the site of protein synthesis.

Process of Protein formation:

Protein formation occurs in two steps;

- 1) Transcription
- 2) Translation.

In 2nd, Ribosomes play their role.

- i. **Initiation** → Small subunit of the ribosome binds to mRNA.
- tRNA carrying the amino acid methionine (AUG) starts codon binds to ribosome.
 - large subunit then joins to form a complete ribosome.

- ii. **Elongation** → Ribosomes move along the mRNA codon by codon.

- Each codon on mRNA matches with an anticodon on tRNA.
- Ribosomes help form peptide bonds between amino acids $\rightarrow$ forming a polypeptide chain.

iii. **Termination** → When the ribosome reaches a stop codon (UAA, UAG, UGA), it releases a completed protein.

- The ribosome then detaches from mRNA and separate into its subunits.

c. Solid Waste Management:

Solid Waste management refers to the systematic control, collection, treatment, and disposal of solid wastes in an environmentally friendly

economical manner.

i- Open Dumping

- ^{Waste} Water is dumped in open areas or landfills without any treatment.
- Simple and cheap method.
- Causes foul smell, pollution, and diseases

ii. Landfilling:

- Waste is buried in a properly pit or trench.
- Cost effective and can be used to reclaim low-lying land.
- Can cause groundwater contamination.

iii. Incineration:

- Waste are burned at higher temperatures, reducing them to ash.
- Can generate energy
- Can release ~~ex~~ harmful gases if not managed properly.

iv. Composting:

- Biological decomposition of organic waste into nutrient rich compost.
- Eco-friendly and inexpensive.
- Not suitable for inorganic waste.

d. Define the following terms:

i) Biofuel:

It is a type of fuel produced from biological sources e.g plants, animal wastes.

For example, Ethanol, biodiesel.

ii) Adulteration:

It is the process of adding inferior, harmful, or cheaper substances to food to increase profit.

For example, mixing water in milk.

iii) Hydrosphere:

It includes all the water present

on earth's surface, underground,
and in the atmosphere.

e.g. Oceans, river, glaciers, lakes etc

iv) Troposphere:

It is the lowest layer of the
earth's atmosphere, where all
weather phenomena occurs.

v) Isotopes:

Isotopes are atoms of the same
element that have same proton
number but different Neutron
number (Atomic mass).

e.g. ^1_1H Hydrogen has 3
isotopes:

→ Protium ^1_1H

→ Deuterium ^2_1H

→ Tritium ^3_1H

SECTION-II

QUESTION # 06

a. Given data:

Candies = Apple, Berry, Cherry, Date

$$\text{Ratio} = 3 : 6 : 2 : 5$$

If apple candies exceed Date candies by 35, how many Berry candies are there?

$$\text{As } \text{Apple} - \text{Date} = 35$$

$$3n - 5n = 35$$

$$-2n = 35$$

$$n = -17.5$$

Now the total ratio becomes

$$A : B : C : D$$

$$5 : 6 : 2 : 3$$

$$5n - 3n = 2n = 35, n = 17.5$$

$$\text{Berry} = 6n = 6 \times 17.5 = 105$$

So, the berry candies = 105

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b. Given Data:

Price of Camera = \$200

Discount = 25%

Tax = 6%

Total amount to be paid:

At first we have to find the price after discount. So,

25% of 200 = ?

$$\frac{25}{100} \times 200 = 50$$

It's mean the price will be:

$$200 - 50 = 150 \$$$

As, there is 6% tax, So we have to find 6% of 150-

6% of 150 =

$$\frac{6}{100} \times 150 = \frac{90}{10} = 9$$

So,

Total Price = Discounted price + Tax

$$= \$150 + \$9$$

Total price = \$159

c. Given Data:

Total distance covered = 36 Km

Speed = 18 Km/hr

Starting time = 1:00 PM

Time does it reach = ?

As we know that;

~~Velocity~~ Dist

Distance = Velocity $\times$ Time

$$S = vt$$

$$t = \frac{S}{v}$$

$$t = \frac{36 \text{ Km}}{18 \text{ Km/hr}}$$

$$t = 2 \text{ hr}$$

So, if the starting time was 1 PM

then, it would have reached by
3 PM as it took 2 hours

$$\text{So, } 1 \text{ PM} + 2 \text{ hrs} = 3 \text{ PM}$$

d. i. STSTAICITS = STATISTICS

ii. LGEBMAR = GAMBLER

QUESTION # 07

i) Given Data:

$$\text{Diameter} = 14 \text{ cm}$$

$$\text{Volume} = ?$$

As we know that

$$V_{\text{sphere}} = \frac{4}{3} \pi r^3$$

$$V = \frac{4}{3} \pi \left(\frac{d}{2}\right)^3 \quad \because r = \frac{d}{2}$$

$$V = \frac{4}{3} \times \frac{22}{7} \left(\frac{14}{2}\right)^3$$

$$V = \frac{4}{3} \times \frac{22}{7} (7)^3$$

$$V = \frac{4}{3} \times \frac{22}{7} \times 49 \times 7 (343)$$

$$V = \frac{4}{3} \times 22 (49)$$

$$V = \frac{4}{3} \times 1078$$

$$V = 1437.33 \text{ cm}^3$$

$$\begin{array}{r} 49 \\ 49 \\ \hline 7 \\ 343 \end{array}$$

$$\begin{array}{r} 49 \\ 7 \overline{) 343} \\ \underline{28} \\ 63 \end{array}$$

$$\begin{array}{r} 49 \times 22 \\ 98 \\ \hline 1078 \end{array}$$

$$\begin{array}{r} 343 \\ 3 \overline{) 1078} \\ \underline{9} \\ 178 \\ \underline{15} \\ 28 \\ \underline{27} \\ 1 \end{array}$$

b. Five friends total savings

= 25000.

Total Savings = 25000.

Total Ratio = ~~1:2~~ 1:5

Share of 1st friend = $\frac{25000}{15} \times 1$

= 1667

of 2nd friend = $\frac{25000 \times 2}{15}$

= $\frac{50000}{15}$ = 3333

of 3rd friend = $\frac{25000}{15} \times 3$

= 5000

of 4th friend = $\frac{25000}{15} \times 4$

= ~~5000~~ ~~8333~~ 6667

of 5th friend = $\frac{25000}{15} \times 5$

= ~~1000~~ 8333.

The smallest share is of 1st

friend = 1667 Rs.

$$\begin{array}{r} 16 \\ 15 \overline{) 25000} \\ \underline{15} \\ 10000 \\ \underline{90} \\ 1000 \end{array}$$

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c. i. 2, 6, 18, 54, 162, 486

All the numbers fit in this because every next number is multiplied by 3.

1) 2

2) $6 = 2 \times 3$

3) $18 = 6 \times 3$

4) $54 = 18 \times 3$

5) $162 = 54 \times 3$

6) $486 = 162 \times 3$

ii. 3, 5, 7, 11, 13, —

The next number will be 17 as this is the sequence of prime numbers and 17 is the next prime number.

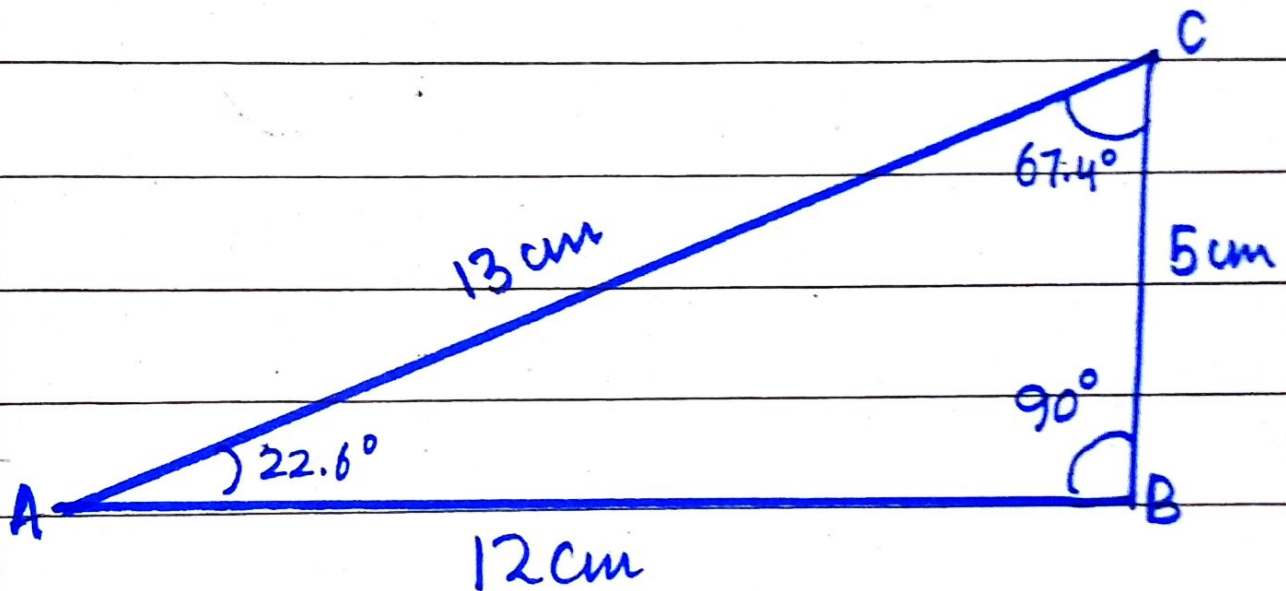
d. Angles.

Side 1 = 12cm

Side 2 = 13cm

Side 3 = 5cm

Let's draw a $\triangle$.



Base = $AB = 12\text{cm}$ $\angle AC = 22.6^\circ$

Perpendicular = $BC = 5\text{cm}$ $\angle AB = 90^\circ$

Hypotenuse = AC $\angle BC = 67.4^\circ$

$$67.4^\circ + 22.6^\circ + 90^\circ = 180^\circ$$