Mon Tue Wed Thu Fri Sat Sun

Date

'Exam'

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Title :-

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Code :-

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Subject :-

General Science and Ability

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Date :-

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Part-II

SECTION-I

Question: 3:

a- Why cells form organelles? Discuss mitochondria in a human cell.

Answer:-

Cell:-

It is the unit of structure and function of all living things. The cells are so small that one cannot see a single cell with a naked eye. The word cell is derived from latin term "Cellula" which means "little room". The cell was discovered by Robert Hooke in 1665. Cytology is the study of all aspects of cell.

Cell Organelle

It is a specialized subunit within a cell that performs distinct functions essential for the cell's life and operation. These create compartmentalized environments.

Why cells form Organelles:-

Cells form organelles because compartmentalization allows different biochemical processes to occur efficiently and simultaneously without

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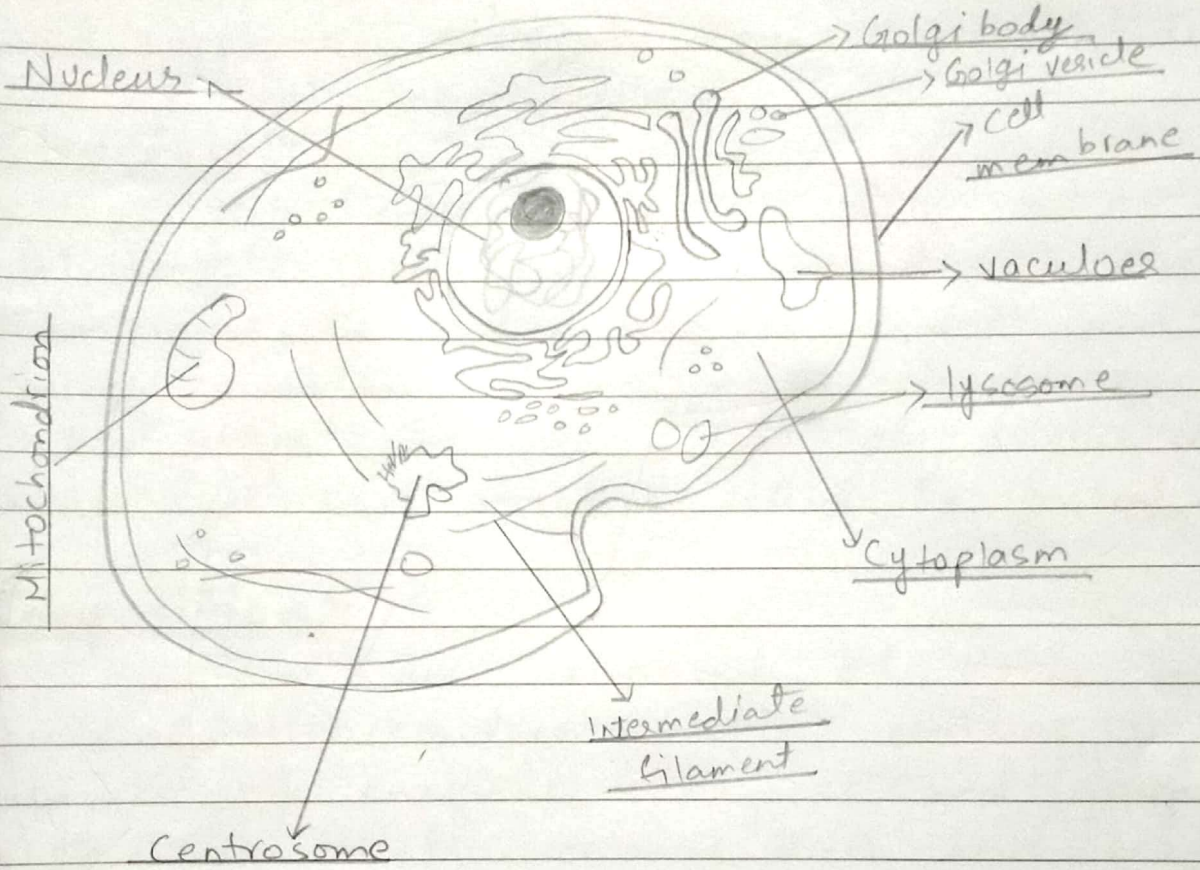
interference. Organelles create specialized environments, optimize reactions and help organize cellular functions like protein synthesis and waste disposal.



Types of Cell Organelles:-

1- Endoplasmatic reticulum
2- Ribosomes
3- lysosomes
4- Nucleus
5- Mitochondria
6- Chloroplasts
7- Centrosomes.
8- Vacuoles.

Mitochondria:-

It is known as the powerhouse of the cell. These are present only in Eukaryotic cells. Mitochondria is involved in the manufacturing and supply of energy to the cell. Mitochondria are self-replicating organelles.

Structure:-

Mitochondria may be vesicle rod or filament shaped. These are bounded by two membranes; the outer one is smooth and the inner membrane forms many infoldings called cristae. The inner surface of cristae contains small knob like structure, called F_1 particles.

Composition:-

These are composed of lipids and proteins. Mitochondria matrix contains large number of enzymes, coenzymes and inorganic salts. They also contains DNA and ribosomes.

Function:-

Many important metabolic processes take place in it. These are fatty acid metabolism, kerbs cycle etc. Energy is released from organic food during these metabolic processes which is transferred to energy rich compound called ATP.

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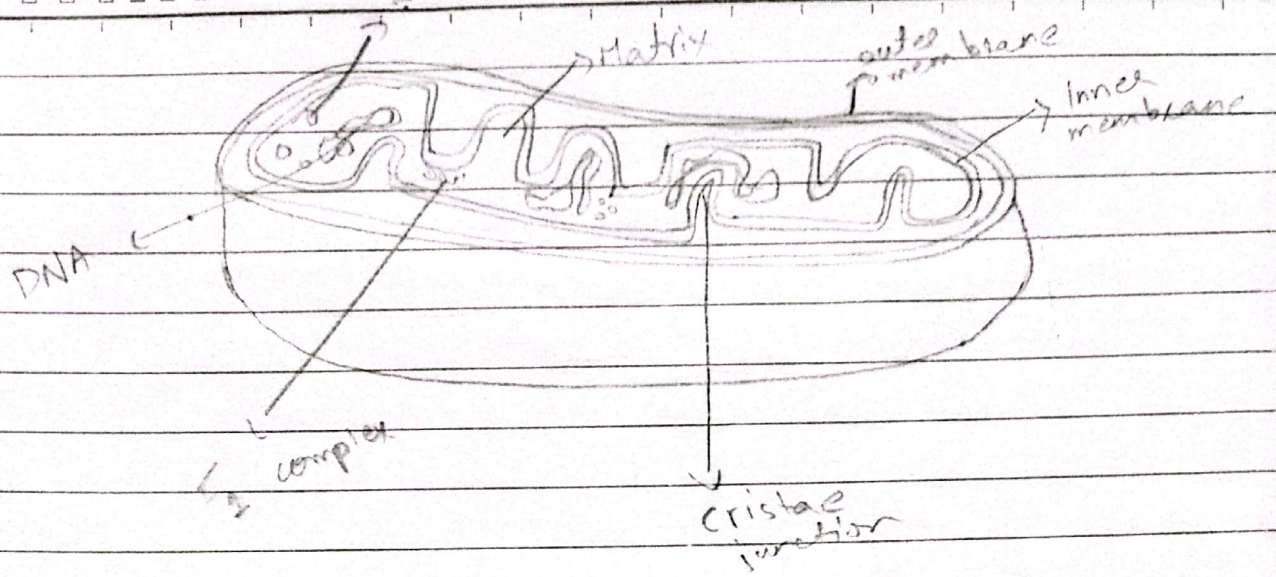


b: What is doping? Discuss different types of semiconductors?

Answer:

Doping:-

Doping is a fundamental process in semiconductor manufacturing, involving the intentional addition of impurity atoms called dopants. They are used to pure semiconductor materials like silicon. This process modifies the electrical properties of the material, enabling it to conduct electricity in a controlled manner, which is essential for creating electronic components such as transistors, diodes and integeated circuits.

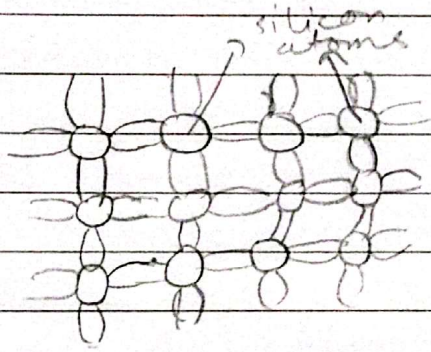
How does Doping works:-

Doping introduces free charge carriers i.e electrons or holes into the semiconductor, significantly increasing its conductivity from nearly insulating to conductive.

galaxy

Semiconductor:

These are used extensively in electronic circuits. It is a material that conducts current but partly. Its conductivity can be controlled to act as a switch, enabling it to be used for building electronic devices like transistors and integrated circuits. Most semiconductors are crystals made of certain materials. The common semiconductors include chemical elements and compounds such as silicon, germanium, selenium etc.



Types of semiconductor:

There are two main types of semiconductors:

1) N-type semiconductor:

It is created when the dopant is an element that has five electrons in its valence player. Phosphorus is commonly used for this purpose while donating extra electrons (negative charge carriers). These extra electrons start to behave like the single valence electrons in a regular conductor

such as copper.

2) P-type semiconductor:-

These are doped with elements having fewer valence electron e.g boron in silicon while creating holes (positive charge carriers). Like positive charge, holes attract electrons but when an electron moves into a hole, the electron leaves a new hole at its previous location. Thus, holes are constantly moving around within the crystal as electrons constantly try to fill them up.

c) State some of the merits and demerits of volcanic eruption?

Answer:-

Volcanic Eruption:-

A volcano is simply an opening or vent on earth's surface through which molten magma, escape on to the earth's surface. Volcano happens when magma rises and to the surface which cause bubbles of gas to appear in it. This gas can cause pressure to build up in the mountain, and it eventually explodes. When the magma bursts out of earth, it is called lava.

Types of Volcanoes:-

1) still active
2) Dormant (temporarily inactive).

3) Extinct (never likely to erupt again).

Merits of Volcanic Eruption:-

1) Fertilizess soil with nutrient-rich ash, enhancing agriculture.
2) Generates geothermal energy useful in electricity production.
3) Creates new land forms and attracts tourism
4) Brings valuable minerals closer to the surface for mining.

Demerits of Volcanic Eruption:-

1) can cause loss of life and property destruction.
2) Damage to habitants and landscapes.
3) Volcanic activity in sea can trigger tsunamis.
4) Hazardous ash clouds can affect air travel and climate.
5) Disruption of economic activities and businesses.

d) What is dengue? Discuss symptoms, causative agents and remedies?

Answer:-

Dengue:-

It is a mosquito-borne viral infection caused by the dengue virus transmitted mainly by Aedes aegypti mosquitoes. It is widespread throughout the tropics, with local variations

in risk influenced by rainfall, temperature and unplanned urbanization (rapid).

Symptoms:-

- High fever
- Severe headache
- Pain behind eyes
- Rash
- Mild bleeding from nose or gums.
- Joint or muscle pain
- Rapid breathing.
- Persistent vomiting.

Causative agents:-

It is caused by dengue virus. It is transmitted to humans ~~by~~ through the bites of infected female mosquitoes.

Remedies:-

1) Vaccination:- In late 2015 and early 2016, first dengue vaccine was registered.
2) Preventing mosquitoes from accessing egg-laying habitats by environmental management.
3) disposing of solid waste properly.
4) Applying appropriate insecticides to water shortage outdoor containers.

Question: 4:

a) Write a note on plant kingdom "chlorophyll".

Answer:-

Chlorophyll:-

Chlorophyll in a plant kingdom is a green pigment found in the chloroplasts of plant cells. It is essential for photosynthesis, the process by which plants convert sunlight into chemical energy. Chlorophyll absorbs light most efficiently in the blue and red wavelength and reflects green, giving plants their characteristic color. It plays a vital role in capturing light energy to drive the synthesis of organic compound from carbon dioxide and water.

Benefits:-

1) It has antioxidant properities.
2) Eating chlorophyll rich foods ~~are~~ also provide nutrients like fiber which support overall health.
3) It is also available in liquid or tablet form.

b) Describe role of ribosomes in protein synthesis?

Answer:-

Ribosomes:-

These are tiny granular structures present in cytoplasm. Palade was the first person who studied ribosomes in 1955. Ribosomes are composed of ribonucleoprotein

These are mainly present in two forms:
a) Freely dispersed form in cytoplasm.
b) Attached with RER as tiny granules.

Formation of Ribosomes:-

These are synthesized in the nucleolus of the nucleus. The nucleoli of are factories of ribosomes. Ribosomes pass through pores in the nuclear membrane and enter the cytoplasm.

Role of ribosomes in protein synthesis:-

Ribosomes are cell organelles that serve as the site of protein synthesis. During this process, they read messenger RNA sequences and translate them into polypeptide chains by assembling amino acids in the correct order. This function is crucial for cell function and growth, as proteins are fundamental components of cellular structure, enzymes and signaling molecules.

c) Discuss different methods of solid waste Management.

Answer:-

Solid Waste Management:-

"Solid wastes are the discarded leftovers of our advanced consumer society. This growing mountains of garbage and trash represents not only an attitude of indifference toward

valuable natural resources, but also a serious economic and public health problem."

(Jimmy carter).

Methods of Management :-

Following are the different methods for solid waste management :-

1) Landfilling :-

Burying waste in designated areas with protective measures to avoid contamination.

2) Recycling :

Converting waste materials into reusable products to conserve resources.

3) Incineration :-

Burning waste at high temperature to reduce volume and generate energy.

4) Composting :-

Decomposition of organic waste into nutrient-rich soil amendments.

5) Waste-to-Energy :-

Generating energy from waste materials through incineration or other processes.

6) Pyrolysis :-

Thermal decomposition of waste to recover energy or materials.

d) Define the terms :-

1) **Biofuel :-**

A fuel derived from biological

materials such as plants or animal waste, used as an alternative to fossil fuels.

2) Adulteration:-

The process of adding inferior, harmful or unauthorized substances to food or other products.

3) Hydrosphere:-

The total amount of water on Earth, including rivers, oceans, lakes etc.

4) Troposphere:-

Lowest layer of earth's atmosphere where weather occurs and most atmospheric activities take place.

5) Isotopes:-

These are variants of chemical element that have same number of protons but different numbers of neutrons in their nuclei which results in different atomic masses.

SECTION - III

Question: 7:

a) Calculate volume of sphere with diameter 14cm. (use $\pi = 22/7$).

Solution:-

Volume of sphere $\Rightarrow V = \frac{4}{3}\pi r^3$

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The radius r is half the diameter, so here as diameter is 14 cm then $r = 7$ cm.

$$V = \frac{4}{3}\pi r^3$$

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

$$= \frac{4}{3} \times \frac{22}{\cancel{7}^{1}} \times \cancel{343}^{49}$$

$$= \frac{4}{\cancel{3}} \times \frac{1078}{1}$$

$$= 1,437.33 \text{ cm}^3$$

b) Five friends total savings = 25,000 Rs, ratio 1:2:3:4:5. Find the smallest share.

Answer:-

Data:-

Total savings = Rs 25000

Ratios = 1:2:3:4:5

Required:-

Smallest share = ?

Solution!

Sum of ratios = 1 + 2 + 3 + 4 + 5
= 15.

Smallest share => $\frac{1}{15}$.

= $\frac{\text{Smallest share}}{\text{sum of ratio}}$ × Total savings.

= $\frac{1}{15}$ × 25000

= 1666.67 Rs.

c) Spot the error/complete the series:
i; 2, 6, 18, 54, 164, 486 (which number doesn't fit?)
ii. 3, 5, 7, 11, 13 ___ ___.

Solution:-

i) 2, 6, 18, 54, 164, 486.
*) Series multiplies by 3 each time, so there is no error.

ii) 3, 5, 7, 11, 13, 17

-> Next prime no.

d) A triangle with sides 5cm, 12cm, 13cm. Find # all three angles.

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Question: 8 :

a) A hiker walks a right triangle path..... start?

Solution:-

b) Six siblings share ---------- amount?

~~Solution~~ :-

Data :-

Total sharing = Rs 90000

$A = \frac{1}{2} B$

$B = 3C$

$C = 4D$

$D = 2E$

$E = F$

Required :-

each amount = ?

Solution:-

Let suppose

$F = x$

from this :-

- $E = F = x$
- $D = 2E = 2x$

- $C = 4D \Rightarrow 4 \times 2x = 8x$
- $B = 3C = 3 \times 8x = 24x$
- $A = \frac{1}{2} B = \frac{1}{2} \times 24x = 12x$

Sum of all shares:

$$\Rightarrow A+B+C+D+E+F$$
$$= 12x + 24x + 8x + 2x + x + x$$
$$= 48x$$

Total sharing:

$$48x = 9000$$

$$x = \frac{9000}{48} = 187.5$$

Now each amount:

$$F = 187.5$$
$$E = 187.5$$

$$D = 2E$$
$$= 2 \times 187.5$$
$$= 375$$

$$C = 4D$$
$$= 4 \times 375$$
$$= 1600$$

$B = 3C$
$= 3 \times 1500$
$= 4500$

$A = \frac{1}{2} B$
$= \frac{1}{2} \times \frac{2250}{4500}$
$= 2250$.

c) A rectangle ---------- volume?

Data:-

Length = 8m
width = 6m
height = 4m

Required:-

Surface Area and volume.

solution:-

S. Area = $2(lw + lh + wh)$
~~$= 2(8 *$~~
$= 2[(8 \times 6) + (8 \times 4) + (6 \times 4)]$
$= 2(48 + 32 + 24)$
$= 2(104)$
$= 208 m^2$.

Volume = $lwh \Rightarrow 8 \times 6 \times 4$
$= 192 m^3$.