

Q. NO. 2

(a)

What is dengue? Give a brief account of its causative agents and its symptoms.

Dengue:

It is a viral infection transmitted to humans through the bites of infected Aedes Mosquitoes.

Causative agents: The infection is caused by the dengue virus (DENV), which has four distinct but closely related serotypes: DENV-1, DENV-2, DENV-3, and DENV-4. These are RNA viruses and primary vector is the Aedes mosquito. The mosquito is especially active in urban and semi-urban areas, where stagnant water provides breeding grounds.

Symptoms:

These are following symptoms of Dengue fever:

i High Fever: High fever can be upto 104°F or 40°C .

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ii Severe Headache: Severe headache following by the pain behind the eyes is another symptom of the dengue.

iii Joint and Muscle pain: Dengue cause huge pain in joints and muscles that is why it is also called "breakbone fever".

ix Nausea and Vomiting: Patients of dengue often suffer from nausea and vomiting.

Skin Rash: It may appear several days after the fever begins.

vi Fatigue and Weakness: Symptoms of dengue also include extreme fatigue and weakness in the body of the patient.

v Bleeding and blood plasma leakage: In extreme conditions, patients can show life-threatening conditions such as bleeding and blood plasma leakage and dangerously low blood pressure.

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Explain dark energy.

Dark matter one of universe.

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(b)

Explain dark matter and dark energy.

Dark matter and dark energy is one of the mysteries of the universe. Dark matter consists of the 27% of the universe while dark energy consists of 68% of the world.

Dark matter: Dark matter is the matter that is not normal matter and it is called dark matter because it does not absorb, emit or reflect light. The scientists observe it indirectly through the effect of gravitational force. For instance, it is observed that stars in galaxies on the outer edges orbit move faster than expected. However, they should be moving slower.

The explanation of this phenomenon is present in the presence of gravitational force of the dark matter.

Dark Energy: Dark energy is even more mysterious than dark matter. It is the energy that explains the phenomenon of expansion of the universe, against

Explain by giving subheadings

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gravitational force. Alternately,
dark energy could be a new,
unknown energy field, sometimes
called "quintessence", but
its nature remains a profound
mystery.

Why are dark energy and dark
matter important?

Together, they make 95% of
the universe, while the ordinary
matter we can see and interact
with - like stars, planets,
and galaxies makes up just
about 5% of the universe.

Understanding them is crucial
because they influence the structure,
behavior, and ultimate fate of
the universe. Without dark
matter, galaxies wouldn't hold
together, and without dark
energy, the universe wouldn't
be expanding as it is.

They remain the biggest mysteries
in modern physics and cosmology.
However, scientists continue to
study them using advanced
telescopes, particle detectors, and
theoretical models in hopes of
unlocking the series of these
invisible forces that shape our

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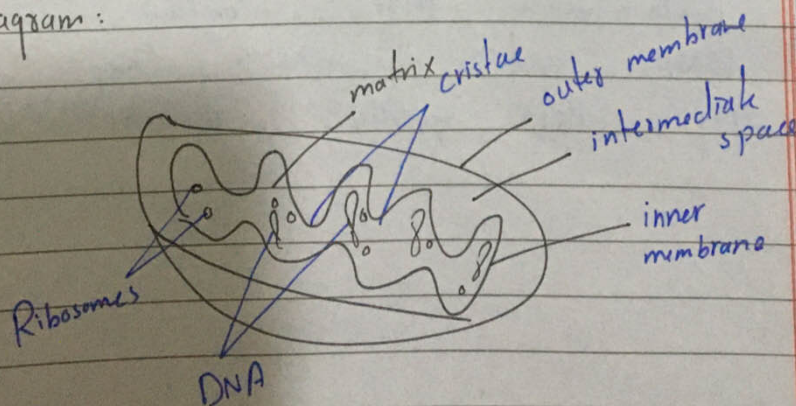
Q. Discuss structure and function of mitochondria. How is it the powerhouse?

Mitochondria: Mitochondria is a self-replicating organelle present in the cells of plants and animals. It contains DNA that is why it is self-replicating and number of mitochondria present in the cell varies.

Structure of mitochondria:

It consists of double membrane. The inner membrane folds in a way to form "Cristae". Cristae form in the matrix of mitochondria. Matrix is the space that contains enzymes, ribosomes and other materials.

Diagram:



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Functions: These are following functions of mitochondria:

- They manufacture and supply energy to the cell.
- Enzymes present in mitochondrial matrix help in metabolic processes such as Krebs cycle, aerobic respiration, and fatty acid metabolism. These processes extract energy from the organic food and convert it into ATP.

(Adenosine Triphosphate)

- They also regenerate ATP from ADP (Adenosine diphosphate), the spent energy.

This is why, they are called powerhouse of the cell as they provide energy to the cell.

Mitochondria also contain DNA and ribosomes; thus, they also synthesise proteins.

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What are covalent bonds?
Explain types along with
elaborating structures.

Covalent bonds:

Covalent bonds are types of bonds that form due to mutual sharing of electrons between atoms. They may be polar covalent bonds or non-polar covalent bonds.

Types:

• Polar Covalent bonds:

When two different atoms are joined by a covalent bond, the electron pair is not equally shared between the bonded atoms.

Hence, one end of the molecule becomes partially positive and other end becomes partially negative and polarity is created between them.

This is called polar covalent bond.

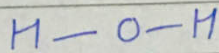
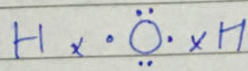
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Examples:

The bonds that form water (H_2O) is of covalent in nature and are polar because bonds form between highly electronegative atom (O) and electropositive atom (H).

Structure: Water.



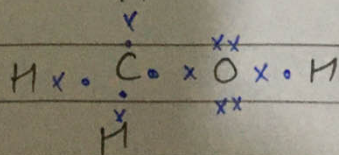
There are six valence electrons in the valence shell of Oxygen atom while one electron in the Hydrogen atom (H).

These valence electrons make bond to become stable.

ii Methanol (CH_3OH)

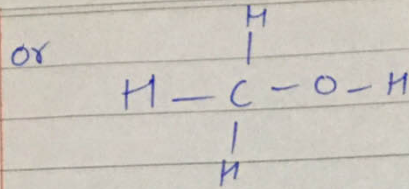
In methanol, there are four valence electrons of C and six valence of Oxygen (O) and 1 valence electron in each Hydrogen atom.

The bond formation will be as follows:



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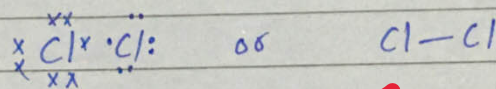
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ii Non-Polar Covalent bond:

In Non-polar covalent bond, bond is formed between two alike atoms and there is even distribution of electrons between them. For example.

Cl_2 in chlorine gas, each Cl is having seven valence electrons.



Similarly: H_2
 $\text{H} \times \text{H} \quad \text{or} \quad \text{H}-\text{H}$

Covalent bonds may be single, double or triple depending upon no. of sharing of electrons. e.g. in N_2 , triple covalent bond is formed.

$:\text{N}:::\text{N}:$ or $:\text{N}\equiv\text{N}:$
each nitrogen atom has 5 valence electrons.

Good answers!!