

Mock Exam for - CSS - 2025
October - 2024 (mock - 5)
Batch # 059 (online)
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General Science & Ability

Question : 2

A: what is dengue? Give a brief account of its causative agents and its symptoms?

Dengue definition:-

Dengue is a mosquito-borne viral disease caused by the dengue virus (DENV).

Causative Agents:-

- Dengue virus (DENV) has four serotypes (DENV-1 to DENV-4)
- Aedes aegypti and Aedes albopictus mosquitoes transmit the virus.

Symptoms:-

- Fever
- Headache
- Joint and muscle pain
- Rash
- Nausea and vomiting
- Severe cases: hemorrhaging, shock, and organ failure.

Section : B

b. Explain dark matter and dark energy?

- Dark Matter :-

- Invisible matter making up 27% of the Universe's mass-energy density.
- Doesn't interact with light, making it invisible.
- Affects galaxy rotation, cosmic structures formation and gravitational lensing.

- Dark Energy :-

- Mysterious energy driving the Universe's accelerating expansion.
- Accounts for 68% of the universe's mass-energy density.
- Causes space to expand faster over time.

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

- Mitochondria Structure :-

- Double membrane-bound organelles
- Inner membrane: folded into cristae, increasing surface area
- Crystalline space contains enzymes, DNA and ribosomes.

- Function :-

- Cellular respiration generates ATP (energy) through oxidative phosphorylation
- Powerhouse of the cell: produces most ATP
- Regulates cell growth, division, and apoptosis.

- Why Mitochondria is the Powerhouse:-

- Generates 90% of Cellular energy
- Converts glucose into ATP through Cellular respiration
- Essential for Cellular metabolism

D. what are Covalent bonds? Explain types along with elaborating structures?

- Covalent Bonds:-

Covalent Bonds are chemical bonds formed by sharing electrons between atoms.

- Types:-

- 1- Sigma (σ) Bonds; formed by end-to-end overlap of atomic orbitals
- 2- Pi (π) bonds; formed by side-by-side overlap of atomic orbitals.
- 3- Polar Covalent bonds; Unequal electron sharing between atoms.
- 4- Nonpolar Covalent bonds: equal electron sharing between atoms.

- Elaborating Structures-

- Single bond (σ); one pair of shared electrons (e.g. H_2)
- Double bond ($\sigma + \pi$); two pairs of shared electrons (e.g. O_2)
- Triple bond ($\sigma + 2\pi$); three pairs of shared electrons (e.g. N_2)

Question # 3

day/date

Q3: A: what is lunar eclipse? Explain in detail with apt diagrams?

- Lunar eclipse :-

A lunar eclipse occurs when Earth passes between the Sun and the Moon, blocking sunlight from reaching the Moon.

- Types of Lunar Eclipses :-

- Penumbral Lunar Eclipse; Earth's Penumbra (Partial Shadow) falls on the Moon.

- Partial Lunar Eclipse; Earth's Partial Shadow falls on the Moon.

- Total Lunar Eclipse; Earth's Umbra (Complete Shadow) falls on the Moon.

- Diagram:

Sun → Earth → Moon

- Phases of a Total Lunar Eclipse.

- 1- Penumbral phase
- 2- Partial Phase
- 3- Total Phase
- 4- Eclipse maximum

B: Explain function of enzymes in detail with example?

- Enzymes :-

Enzymes are biological molecules (proteins) that catalyze chemical reactions in living organisms.

- Function :-

- Speed up chemical reactions
- Lower activation energy

3- Increase reaction specificity

4- Reusable

- Example -

- Amylase (Saliva): breaks down Starch into Sugars
- Lactase (intestine): breaks down lactose into glucose and galactose
- Protease (digestive system): break down Proteins into amino acids.

C. Give a brief account of electromagnetic radiations. what is EMR Spectrum?

EMR Spectrum are energy waves Propagating through space.

EMR Spectrum:-

- Radio waves (long wavelength, low frequency)
- microwaves
- Infrared (IR) radiation
- Visible light
- Ultraviolet (UV) radiation
- X-Rays
- Gamma Rays (short wavelength, high frequency)

Characteristics:-

- Electric and magnetic field components
- Transverse waves
- Travel at the Speed of light

D. Are earthquakes and volcanic eruptions interconnected? if you then how?

Yes, earthquakes and volcanic eruptions are interconnected.

- Relationship :-

- Tectonic plate movement; earthquakes and volcanic eruptions occur at plate boundaries.
- Magma movement; earthquakes can trigger magma rise, leading to eruptions
- Volatiles release; earthquakes can release gases, increasing eruption likelihood.
- Ground deformation; earthquakes can alter ground shape, affecting volcanic activity.

- Examples :-

- 2010 Iceland volcanic eruption: triggered by earthquake
- 1985 Mexico earthquake: triggered volcanic activity.

- Earthquakes :-

- Alter magma chamber pressure
- Create pathways for magma ascent
- Release gases, increasing eruption likelihood
- Change ground stress, affecting volcanic activity.