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Batch - 53

LMS ID - 33581

MOCK EXAM 4

General Science and Ability

PART II SECTION I

Q NO 3

(a) What is lunar eclipse? Explain in detail with apt diagrams.

Lunar Eclipse:

A lunar eclipse occurs when earth moves between sun and the moon, casting a shadow on the moon. This can only happen during full moon when the sun, moon and earth are aligned in a straight line. During lunar eclipse, Moon can appear darkened or take a redish color due to the Earth's shadow.

Types of Lunar Eclipse:

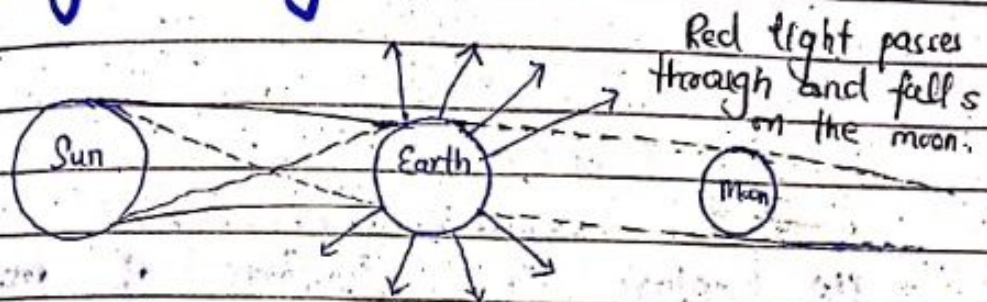
- (i) Total Lunar Eclipse
- (ii) Partial Lunar Eclipse
- (iii) Penumbral Lunar Eclipse

(i) Total Lunar Eclipse:

In total lunar eclipse, the entire moon enters the earth's central part of its shadow (Umbra) blocking direct sunlight from illuminating it.

The moon appears red or coppery, a phenomenon called a "Blood Moon".

Diagrammatically,

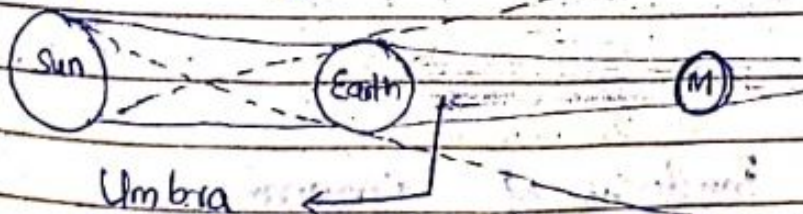


Earth scatters blue light.

iii. Partial Lunar Eclipse:

In partial lunar eclipse, only a part of the moon enters the Earth's umbra, while the rest remains in the penumbra (the lighter part of shadow). This causes only a portion of moon to darken, creating a shadowed effect.

Diagrammatically,

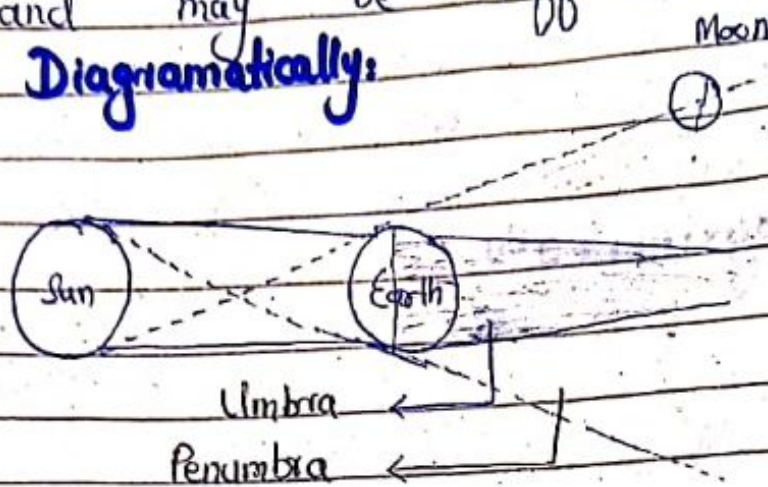


(iii) Penumbra Lunar Eclipse:

In penumbral lunar eclipse, the moon passes through only the earth's penumbra, which causes a subtle

shading on the moon's surface.
- This types of eclipse is often faint
and may be difficult to observe.

Diagrammatically:



(b) Explain the function of enzymes in detail with examples.

Enzymes:

Enzymes are the proteins that are used to speed up the chemical reaction of products. The molecule on which enzymes act are called "substrate." The substrate is converted into different molecules called "product."

Working Model of Enzymes:

There are two models

- (i) Lock and key Model
- (ii) Induced fit Model

Functions of Enzymes:

1. Catalysts or chemical Reaction

3. Specificity of Substrate Binding

3. Regulation of Metabolic Pathways

4. Induced Fit Mechanism

5. Role in DNA Replication and Repair

6. Environmental Influence on Enzyme Activity

7. Enzyme-Substrate Complex Formation

1. Catalysts for Chemical Reaction:

Enzymes lower the activation energy of reactions, enabling faster reaction rates without being consumed in the process.

Example: Amylase in saliva breaks down starch into simple sugar, facilitating digestion.

2. Specificity of substrate Binding:

Each enzyme is highly specific, recognizing and binding to only particular substrates due to the shape of its active site.

Example: Lactase specifically binds to lactose and breaks it down into glucose and galactose in

the digestive system.

3. Regulation of Metabolic Pathways:

Enzymes regulate metabolic pathways by acting as "On" or "Off" switches, allowing the body to conserve energy and resources.

Example: Hexokinase in glycolysis catalyzes the first step in glucose breakdown, controlling the pathways based on cellular energy needs.

4. Induced Fit Mechanism:

Enzymes change shape slightly upon substrate binding, enhancing the reaction and ensuring precise binding.

Example: Glucokinase changes shape to better hold glucose and phosphate, ensuring efficient energy capture.

5. Role in DNA Replication and Repair:

Enzyme ^{like} DNA polymerase help replicate and repair DNA, ensuring accurate genetic information transfer.

Example: DNA Polymerase adds nucleotides to DNA strand during replication, maintaining genetic continuity.

6. Environmental Influence on Enzyme Activity:

Factors like temperature, pH, and concentration can impact enzyme activity, affecting the efficiency

of biochemical reactions.

Example: Pepsin in the stomach requires an acidic environment (low pH) to function optimally in protein digestion.

2. Enzyme-Substrate Complex Formation

Enzymes form temporary complexes with substrates, facilitating the conversion into products and speeding up reactions.

Examples: Carbonic Anhydrase forms a complex with carbon dioxide and water to quickly form carbonic acid in blood.

(c) Give a brief account of electromagnetic radiations? What is EMR spectrum?

Electromagnetic Radiations (EMR)

Electromagnetic radiations (EMR) are waves of electric and magnetic fields that travel through space at the speed of light. They do not require any medium and can propagate through a vacuum. EMR includes a wide range of wavelengths and frequencies, from very short wavelengths (high frequency) to very long wavelengths (low frequency). The behavior of these waves can vary based on their

frequency affecting how they interact with matter.

Electromagnetic Radiation Spectrum:

The EMR spectrum, or electromagnetic spectrum, is the range of all possible frequencies of electromagnetic radiation. It includes different types of EM waves, ordered from longest wavelength to shortest:

• Radio waves

• Microwaves

• Infrared (IR)

• Visible light

• Ultraviolet

• X-Rays

• Gamma Rays

• **Radiowaves:** long wavelength, used for communication.

• **Micro waves** Used in cooking and satellite transmissions.

• **Infrared** Felt as heat, used in heaters and remote controls.

• **Visible Light** Visible The only part of the spectrum visible to human eye.

• **Ultraviolet** Can cause sunburn, used in sterilization.

• **X-Rays** Used in medical imaging.
• **Gamma Rays** High energy, used in cancer treatment and emitted by radioactive materials.

Each type of radiation on the spectrum has unique applications and effects on matter due to differences in wavelength, energy and frequency.

(d) Are earthquake and volcanic eruption interconnected? If yes, then how?

Yes, earthquake and volcanic eruption are interconnected with each other. Both are the results of tectonic activity.

Movement of plate tectonic in the earth's crust produce pressure and stress under beneath the earth's surface which causes earthquake and volcanic eruption.

How earthquake and volcanic eruption are interconnected?

There are several similarities of activities that's why they are interconnected with each other. Those activities are as follows.

1-

Movement of plate tectonic

2

Release of Pressure

3. Volcanic Eruption triggering Earthquake

4. Earthquake triggering Volcanic eruption

1. Movement of Plate Tectonic:

The surface of earth is divided into different plate tectonic. These plate tectonic have different moving patterns such as Convergent, Divergent and Transformed. The movement of these tectonic plates causes earthquake and volcanic eruption.

Example: At convergent boundaries, one plate forced another to subduction, melting into magma that can lead to volcanic eruption. This movement causes seismic activity which results into earthquake.

2. Release of Pressure:

Beneath a volcano, molten magma build up and cause increase in temperature. Earthquake occurs as the pressure shifts and crack rocks around the magma chamber.

Example:

When the becomes extreme, an

eruption may follow as magma forces its way to the surface. Small earthquakes or "Volcanic tremors", often precede an eruption, signaling movement of magma below the surface.

3. Volcanic Eruption Triggering Earthquake.

A volcanic eruption can cause stress in the surrounding rocks, which may trigger earthquake.

When magma rises, it forces rocks apart, leading to the release of seismic energy in the form of tremors or even larger earthquakes.

4. Earthquake Triggering Volcanic Eruption.

Larger earthquake near volcano can disturb magma by shaking it and changing the pathway of magma. Which causes volcano to erupt.

This interaction is mostly common in tectonically active areas such as "Pacific Ring of Fire", where volcanic eruption and earthquake frequently co-occurs.

Q no 4

(a) What is noise pollution? Give its harmful effects and ways to curb.

Noise Pollution:

It is a type of pollution that is related to noise. Human eyes are sensitive and can hear upto specific limit. When this limit goes up then it may damage human eye & ears. Simply we can say that

- "Any form of noise that can produce harmful impact on human ears and human body is considered as noise pollution."

Types / Forms of Noise Pollution:

1. Transport Noise
2. Machinery Noise
3. Household Noise
4. Electronic Equipments
5. Loud Speakers
6. Loud Music

Harmful Impacts of Noise Pollution:

1. Hearing loss
2. Cardiovascular Issues
3. Sleep Disturbance
4. Mental Health Problems

5. Lowered Academic and work Performance

6. Reduced Wildlife Population.

Ways to Curb Noise Pollution

There are many steps that should be taken to curb noise pollution such as

- Reduced Industrial Noise
- Use soundproofing material
- Implement Noise Regulation
- Limit Vehicle Noise
- Create Green Buffers
- Awareness Campaigns
- Encourage quieter home practices.

These steps if should be taken then noise pollution can be reduced.

(c) Elaborate drinking water quality and standards.

Drinking water Quality and Standards

There are guidelines to ensure the quality and standard of water for human consumption. These standard

are set by the International organisations such as World Health Organisation (WHO) and EU (European Union). Nationally like Pakistan Environmental Protection Agency (PakEPA) are the bodies that ensure public health by limiting the presence of contaminants in drinking water.

Parameters of Drinking Water:

Parameters of Drinking water are divided into three major categories

1. Microbiological Parameter

2. Chemical Parameter

3. Physical Parameter

Some are of them are

• Arsenic

• Lead

• Nitrate

• Fluoride

• PH

Therefore, drinking water have parameters to identify and make

sure the water can be consumed by the public is of better quality and based on standard or a contaminated water.

(d) Explain Lithosphere. What are rocks and minerals?

Lithosphere:

Lithosphere is the outer most layer of earth crust and the upper part of mantle.

- It is divided into large solid sections which is called tectonic plates.
- Lithosphere is involved in geological processes like earthquake, mountain formation and volcanic eruption etc.

Rocks:

Rocks are naturally occurred solid aggregates of one or more minerals.

- Rocks are divided into different types such as

1.

Igneous
Rocks

2.

Sedimentary
Rocks

3.

Metamorphic
Rocks

Minerals :

Minerals are naturally occurring, organic substances with defined chemical composition and crystalline structure.

• Minerals are building block of rocks and have specific physical properties

• Minerals are classified into

1. Carbonates

2. Oxides

3. Silicates