# Q.No.1.

**Part a-** What is circulatory . . . heart.

## ANSWER.

### 1. Circulatory System:

Circulatory system is a system in human physiology that transfers blood throughout the body necessary for gaseous and nutrient exchange.

#### 1.1. Function:

Tranfer of blood throughout the entire body for gaseous exchange (i.e. $O_2$ and $CO_2$), transporting nutrients, hormones, enzymes and regulating temperature as well as collecting waste.

#### 1.2. Components:

The components of circulatory system are;

(i) Heart
(ii) Arteries
(iii) Veins
(iv) Capillaries.

## 2. Working of Human Heart:

The heart is the organ responsible for pumping blood throughout the body.

### 2.1. Structure:

The heart is made up of four chambers: two atria (which reciere blood) and two ventricles (that pump blood.

### 2.2. Working: Double Circulation:

Blood passes through heart twice in each complete cycle with muscular contraction (pumping) and dialation (reciering).

#### (A) Pulmonary Circulation:

The right ventricle has deoxygen-ated blood recieved from the body via right atrium. It pumps this blood to lungs where it is oxygenated with the removal of $CO_2$ and then recieved back in left atrium.

(B) Systemic Circulation:

Oxygenated blood is then taken to left ventricle, which is more muscular, pumping the blood throughout the whole body to deliver oxygen and recieving it back in the right atrium.

**Part b-** Explain the internal . . . Earth.

ANSWER.

## 1. Structure of Earth:

Earth's interior is divided into three main layers based on chemical composition and physical state, which are:

(i) Crust
(ii) Mantle
(iii) Core

### 1.1. Crust: The Outermost Solid Layer

This the outermost, thinnest layer of earth with average thickness ranging from 5-70 km.

(A) Composition:

Its mainly composed of silicates having compounds made up of Si, O, Al, Fe, Mg, Ca, etc.

(B) Types of crust:

The two types of crust are:

(i) Continental Crust: Thick, granitic, older.

(ii) Oceanic crust: Thin, basaltic, denser and younger layer.

1.2. Mantle: The Semi-Solid Interior Layer:

This layer with thickness of upto 2900 km extends beneath the crust to outer core.

(A) Composition:

It's mainly composed of silicate minerals rich in magnesium and iron.

(B) Divided into:

It's further divided into:

(i) Upper Mantle: It includes asthenosphere (partially molten) which drive plate tectonics.

(ii) lower Mantle: It has Mesosphere which is more rigid due to pressure. Convection currents exist here too.

1.3. Core: The metallic innermost layer the depth begins at 2900 km to Earth's centre (6300 km)

(A) Composition:

Mainly composed of Iron and Nickle.

(B) Two Parts:

The two parts are:

(i) Outer Core: liquid state, responsible for generating Earth's magnetic field.

(ii) Inner Core: Solid due to immense pressure, having very high temperatures

**Part C-** Explain the production ... Bio-gas.

**ANSWER.**

## 1. Production of Bio-Diesel:

The process used for the production of Bio-Diesel is known as Transesterification.

### 1.1. Transestirification Method:

(i) Feedstock: Vegetable oils (Soybean, canola) or animal fats which are rich in Tryglecuride are the basic component taken for further action.

(ii) Reaction. The oil/fat is chemically reacted with short-chain alcohol (methanol or ethanol).

(iii) Catalyst. A strong base (sodium hydroxide) or enzyme speeds up the reaction.

(iv) Process: Transglycerides are converted into Fatty acid Methyl Esters (bio-diesel) and glycerol.

(v) Seperation: The lighter biodiesel forms top layer, while denser glycerol settles at bottom, allowing for seperation and purification.

## 2. Production of Bio-gas:

The process used for production of bio-gas is known as Anaerobic Digestion (i.e. Microbial Action).

### 2.1. Anaerobic ~~Respiration~~ Digestion Method:

(i) Feedstock: Organic matter like animal manure, food waste, sewage sludge, or energy crops.

(ii) Environment: The material is placed in an oxygen-free container.

(iii) Microbial Action: Anaerobic Microorganisms break down complex organic molecules in several stages (hydrolysis, acidogenesis, acetogenesis, methanogenesis).

(iv) Gaseous Output: The final product is ~~bigas~~ biogas, primarily a mix of 50-70% methane ($CH_4$) and rest of carbon dioxide ($CO_2$).

(v) Byproduct: A nutrient rich liquid/solid called "digestate remains", useful as fertilizer.

**Part d** - Explain the . . . earth quake.

## ANSWER.

### 1. Earthquakes - Definition:

The sudden shaking of Earth's surface from energy release in tectonic plates is called earthquake.

1.1. Focus / Hypocenter: The origin of energy release.

This is the point inside Earth where the earthquakes originate.

1.2. Epicenter:

This is the point on surface directly above the focus.

1.3. Causes of earthquakes:

The main causes of earthquakes are:

(i) Tectonic plate movement (subsiding)
(ii) Volcanic Activity
(iii) Human Activities (Deep drilling).

1.4. Mechanism:

The energy is transported from focus in all directions through Siesmic waves, travelling through solids, liquids or gases, due to different motions. The most destructive earthquake is caused when these seismic waves travel ~~to~~ along the earth's surface.

1.5. Measurement:

The most notable measurement is done with Richter Scale, which

measures magnitude of energy. Other methods are Moment Magnitude Scale (Modern and more accurate) and Mercalli Scale (measuring intensity).

## Q. No. 3.

**Part a.** What is Hepatitis . . . measures.

### ANSWER.

### 1. Hepatitis:

#### 1.1. Definition:

Hepatitis is a disease in which inflammation of lives occurs.

#### 1.2. Causes:

The most notable causes of Hepatitis are:

(i) Viral infection: This is the most common cause of Hepatitis, transmitted through fecal/oral mechanisms, blood (needles, transfusion), or exchange of body fluids.

(ii) Alcohol

(iii) Drugs

(iv) Toxins

(v) Autoimmune

## 1.3. Common Symptoms:

The most common symptoms of Hepatitis are:

(i) Fatigue and weakness in body

(ii) Jaundice (yellowing of skin/eyes)

(iii) Dark Urine

(iv) Pale Stools

(v) Abdominal pain (right corner).

(vi) Nausea, Vomiting

(vii) Loss of Apetite

(viii) Fever.

## 1.4. Prevention Mechanism:

Following are some of notable preventive mechanisms for Hepatitis:

(i) Vaccination (possible for Hepatitis A & B)

(ii) Safe drinking water and food

(iii) Good hygiene (handwashing)

(iv) Safe blood transfusion

(v) Avoid sharing needles

(vi) Safe - sexual practices.

**Part b.** Explain the solar system.

ANSWER.

## • Solar System

1. Definition:

Solar system is a gravitationally bound system comprising Sun (star) and all orbiting objects around it.

2. Age: Approximately 4.6 billion years.

3. Components:

The solar system is composed of:

(i) Sun - the central star having 99.8% of the total mass.

(ii) 8 planets revolving around sun.

(iii) Dwarf planets.

(iv) Moon (celestial bodies revolving around planets).

(v) Asteroids (Rocky structures).

(vi) Comets (Icy structures)

## 4. Planets of Solar system:

Planets of solar system can be divided into two types based on physical and structural properties.

### 4.1. Inner / Terrestial Planets:

These are small, rocky planets i.e.

(i) Mercury (Smallest)

(ii) Venus

(iii) Earth

(iv) Mars.

### 4.2. Outer / Jovial Planets:

These are gas/ice giants i.e.

(v) Jupiter (Largest).

(vi) Saturn

(vii) Uranus

(viii) Neptune

5. Belts in Solar System:

There are two major belts in solar system given below:

5.1. Asteroid belt: Between Mars and Jupiter containing rocky, metallic bodies.

5.2. Kuiper belt: Beyond Neptune containing gaseous, icy bodies and Pluto (dwarf planet).

**Part C.** How Gaseous exchange . . . body?

**ANSWER.**

## 1. Gaseous Exchange in Human Body:

Gaseous exchange in human body happens mainly in lungs in tiny air sacs (alveoli) through diffusion, where inhaled oxygen

moves into surrounding cappilaries (blood vessels) and waste $CO_2$ moves from blood into the alveoli to be exhaled, supported by ventilation (breathing) and perfusion (blood flow).

## 1.1. Process of Gas Exchange:

### (A) Ventilation:

Air enters through nose/mouth, travels down the trachea, bronchi, and bronchioles, reaching millions of alveoli.

### (B) Diffusion in Alveoli (External Respiration)

(i) Oxygen in: Oxygen ~~in~~ from inhaled air diffuses through thin walls of alveoli and cappilaries into the blood, binding to hemoglobin.

(ii) $CO_2$ out: Simultaneously, carbon dioxide from blood cells diffuses from capillaries to alveoli to be exhaled.

(C) Perfusion:

The cardiovascular system pumps oxygenated blood to body tissues.

(D) Diffusion in Tissues (Internal Respiration):

In the body tissues, the reverse happens: oxygen leaves the blood for cells, and $CO_2$ moves from cells into the blood to be carried back to lungs via heart.

**Part d.** Define solar & lunar . . . types.

ANSWER.

- **Eclipses:**

1. **Solar Eclipse - Definition:**

Solar eclipse occurs when Moon comes in between Earth and Sun, blocking sunlight and creating a shadow on Earth.

## 2. Lunar Eclipse - Definition:

Lunar eclipse occurs when Earth comes in between ~~earth~~ Sun and Moon, casting a shadow on the moon.

## 3. Types:

### 3.1. Solar Eclipse:

The three types of solar eclipse are:

(i) Total Eclipse:

Happens when the moon completely covers the the sun from giving light to a specific region on Earth. It causes night time on that region for a few minutes during the day.

(ii) Partial Eclipse:

When moon partially covers sun, letting some sunlight reach Earth.

(iii) Annular:

When moon is further away from Earth and covers sun partially in such a way that it creates a "Ring of Fire (Sunlight" effect.

3.2. Lunar Eclipses:

The three types of lunar eclipse are:

(i) Total:

When Earth completely covers Sun, casting a shadow over the entire moon accompanied by "Blood Moon" effect due to "Rayleigh Scattering" of light from Earth's atmosphere.

(ii) Partial:

When Earth casts a partial shadow on the moon.

(iii) Penumbral:

Occurs when moon passes through Earth's outer shadow (faint) but misses dark inner shadow (umbra), causing moon to appear slightly dimmer or shaded.