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Q. No. 3

(a) Structure of Human heart :

The human heart is a muscular organ located in the thoracic cavity, slightly tilted to the left. It is about the size of a fist.

Main structural parts of Human Heart :

There are five main parts of human heart are following :

(i) Chambers (4 total)

(ii) Valves (4)

(iii) Septum

(iv) Blood vessels connected to the heart.

(v) Conducting system (Pacemaker)

Functions :

- Pump and receive blood
- Prevent backflow
- Separates oxygenated/deoxygenated blood
- Transport blood
- Controls heart beat

Cardiac cycle :

Explanation :

The cardiac cycle refers to the

Complete sequence of events that occurs in one heartbeat including the contraction and relaxation of the heart chambers.

It ensures blood is pumped through the body and lungs efficiently.

Phases of cardiac cycle:

There are three main phases:

1. Atrial systole (0.1 seconds)
2. Ventricular systole (0.3 seconds)
3. Diastole (0.4 seconds)

1. Atrial systole (0.1 seconds):

The atria contract, pushing blood into the ventricles.

Valves involved:

- AV valves (tricuspid and mitral) are open.

- Semilunar valves (aortic and pulmonary) are closed.

2. Ventricular systole (0.3 seconds):

The ventricular contract, forcing blood into the aorta and pulmonary artery.

- Valves involved:

AV valves closed, this causes the first heart sound ("lub").

- Semilunar valves open to allow blood to exit.



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3. Diastole (0.4 seconds):

Both atria and ventricles relax.

The heart fills with blood again.

Valves involved:

- Semilunar valves close - causes the second heart sound ("dub")
- AV valves open, allowing blood to follow passively from atria to ventricles.

Role of Heart

The heart acts as a muscular pump that keeps blood flowing continuously throughout the body and lungs.

It plays a central role in the circulatory system, supplying oxygen, nutrients and hormones to tissues and removing waste products like carbon dioxide.

How does heart regulates Blood pressure

The heart regulates blood pressure by controlling how forcefully and how often it beats, and by adjusting the amount of blood it pumps into the arteries. This is done through coordination with nerves, hormones and blood vessels.

Q. No. 3

b. Biofuels :

- Biofuel is a fuel that is produced over a short time span mostly from biomass, rather than being produced by the very slow natural process involved the formation of fossil fuels, such as oil.
- Unlike fossil fuels, they can be quickly replenished on a time scale meaningful to humans.

Advantages :

- In case of spillage during transportation they are easily biodegradable.
- There's no need for changing car engines or machinery.
- It can easily be produced in any country which could set up the manufacturing industry.
- It can end the dominance of OPEC countries.

Disadvantages :

- Deforestation
- Food vs Fuel conflicts
- High water usage
- Low energy yield
- Greenhouse gas emissions
- Soil Degradation
- Manufacturing Farming

Biofuels contribute to reducing GHGs:

Biofuels can reduce green house gases (GHGs) in several ways:

1. Carbon Neutrality
2. Lower Carbon Content than Fossil Fuels
3. Reduced Methane and Sulphur emissions
4. Use of waste waste Material
5. Sustainable Farming Practices

6. Biofuels reduce green house gases because the plants they are made from absorb CO_2 from the air. When we burn the fuel, the same CO_2 goes back to the air, so it's not extra like in fossil fuels.

6.

Key Factors of Food Quality:

There are some different factors of food quality

1. Nutritional Value:

- Amount of proteins, carbohydrates, fats, vitamins and minerals.

2. Safety:

Food must be free from harmful substances such as:

- Pesticide residues

- Bacteria and viruses

- Chemical contamination (e.g. heavy metals etc).

3 - Taste and Flavour :

- Includes the natural taste, aroma, and freshness of food.

4 - Appearance :

- Includes color, shape, size and texture.

5. Cleanliness and Hygiene :

- Food must be handled, processed, and served under sanitary conditions.

Importance of food safety :

- Prevents foodborne illnesses
e.g; Food poisoning, cholera etc.

- Protects public health :

By keeping food free from harmful bacteria, viruses and chemicals.

- Reduces disease outbreaks :

In communities and public institutions.

- Preserve nutritional value :

Food during storage and preparation.

- Support Sustainable Development :

And Food security.

Role of food quality :

Role of food quality control measures in preventing foodborne illnesses are :

1. Ensure safe production and processing

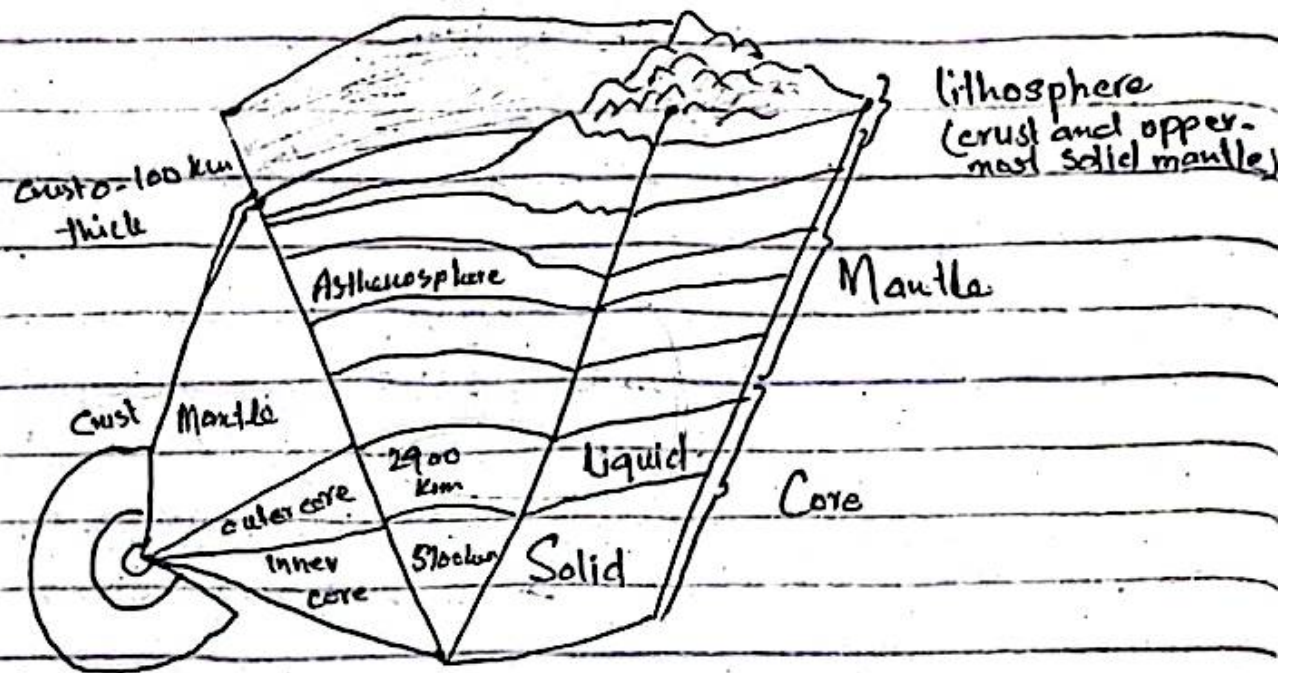
2. Maintains Proper Hygiene Standards.
3. Regulates temperature and Storage Conditions.
4. Controls additives and Chemical usage
5. Detects Food Adulteration.
6. Ensure Proper Food Labelling

" Food quality control measures act like a shield. they stop germs, chemicals, and unsafe practices from entering our food, which keeps people safe from foodborne disease."

How consumers can ensure they are consuming safe and Healthy Food:

1. Check Expiry and manufacturing dates
2. Read Food labels carefully
3. Buy from trusted sources
4. wash fruits and vegetables thoroughly
5. Cook Food properly
6. Store food at the right temperature
7. Practice Personal Hygiene

" By being careful - checking labels, washing food, cooking it well we can protect ourselves and our families from unsafe food."



Crust :

- The central most layer of the earth is called core.
- The inner core is solid.
- The outer core is liquid.
- The inner core is composed of iron.

Mantle :

The Earth's mantle is a layer of silicate rock between the crust and the outer core.

Core :

- The central part, divided into
- Outer Core
 - Inner Core

Differences :

Oceanic	Continental crust
Under the ocean	Forms the continents
Thin	Thick
More Dense	Less dense
Mainly basalt	Mainly granite
younger	older
Dark-colored	Light colored

How do plate tectonics shape the earth's surface :

Plate tectonics is the scientific theory explaining the movement of the earth's lithospheric plates. These plates float on the semi-molten asthenosphere and constantly move, causing major changes to the earth's surface.

Q. No. 4

a. Characteristics of tropical cyclones.

There are few characteristics of tropical cyclones :

- Form over warm tropical oceans.
- Are intense low pressure systems.
- Wind speeds 119 km/h .
- Typically occur between 5° - 30° latitude.
- Life span ranges from a few days to over a week.

b.

Formation process and the factors that influence its intensity:

Formation process:

1. Warm Ocean Water
2. Evaporation
3. Rising Warm Air
4. Condensation
5. Latent heat Fuels the cyclone
6. Development of low pressure system

Factors:

- Higher sea surface temperature
- More moisture in the atmosphere
- Low vertical wind shear
- Continuous heat and moisture supply
- Strong Coriolis effect

Impact on Coastal Communities:

1. Damage to infrastructure
2. Power lines and communication system
3. Storm surge
4. Ports and harbors
5. Heavy rainfall and flooding

b.

Remote sensing :

Remote sensing is the technique of obtaining information about a place or object from a distance, typically using satellites or sensors.

Use in environmental monitoring:

- Deforestation Monitoring
- Monitoring wild fires
- Air Pollution tracking
- Water quality Assessment
- Agricultural Monitoring
- Ocean and coastal monitoring

Advantages:

- Wide area coverage
- Repeated observations
- Real-Time and Historical Data
- Multi spectral and Thermal analysis
- Climate monitoring
- Non-invasion method

Limitations:

- Weather Dependency
- Resolution Limitations
- Need for Ground Verification
- High initial cost
- Technical experts are required.

Conclusion:

Remote sensing is a powerful and essential tool for monitoring land use, vegetation and CC but it must be supported by ground data expertise and suitable technology to overcome its limitations.

Q.No. 4

Q. Types of Vitamins:

1. Fat-soluble vitamins:

- Vitamin A (Retinol)
- Vitamin D (Calciferol)
- Vitamin E (Tocopherol)
- Vitamin K

2. Water soluble vitamins

• Vitamin B complex

• B₁ (Thiamine)

• B₂ (Riboflavin)

• B₃ (Niacin)

• B₅ (Pantothenic Acid)

• B₆ (Pyridoxine)

• B₇ (Biotin)

• B₉

• B₁₂

• Vitamin C (Ascorbic Acid)

Importance :

• For healthy skin :

• Vitamin A

Promote skin cell growth and repair.

• Vitamin C

It Boost collagen production.

• Vitamin E :

Act as a strong antioxidant

• Vitamin B3

Reduces inflammation and dryness.

For healthy hair :

• Vitamin B7

• Vitamin A

• Vitamin D

• Vitamin E

For healthy eyes :

• Vitamin A

• Vitamin C

• Vitamin E etc.

Consequences :

• Skin problems

• Hair problems

• Eye problems

Vitamins play important role in maintaining healthy skin, hair and eyes. A

deficiency is essential vitamins can lead to serious issues like dry skin, hair loss and vision problems. A balanced diet rich in vitamins is crucial for overall health and appearance.

Q.4

Poliomyelitis:

Poliomyelitis commonly known as polio, is a highly infectious viral disease that primarily affects young children and can lead to permanent paralysis.

How is it transmitted?

It is highly contagious and spreads mainly through the fecal-oral route.

Global Efforts:

- Global polio Eradication Initiative
- Polio Vaccination Campaigns
- Surveillance systems
- cross-Border coordination



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Public Awareness Campaigns



CamScanner

Challenges in eradicating Polio:

- Insecurity and Conflicts
- Vaccine Hesitancy
- Poor sanitation and hygiene
- Inaccessible
- Funding shortages
- Vaccine derived Poliovirus

Importance of Vaccination:

- It provides immunity
- To protect young children
- To prevent spread of virus
- Essential for global eradication
- To prevent re-emergence
- To cost effective strategy

Section II

Q.No. 6

(a) Solution

Let's suppose

Cost price = 100

Selling price = x

Then,

$$\text{Profit} = \text{Selling Price} - \text{Cost Price} \\ = x - 100$$

According to the question

New selling price = $2x$

New Profit = $2x - 100$

Triple of original profit = $3(x - 100)$

Two expressions for Profit

$$2x - 100 = 3(x - 100)$$

$$2x - 100 = 3x - 300$$

$$-100 + 300 = 3x - 2x$$

$$200 = x$$

original selling price is 100

Cost price = 100

$$\text{Profit} = 200 - 100 = 100$$

Now,

$$\text{Profit Percentage} = \left(\frac{\text{Profit}}{\text{Cost price}} \right) \times 100 = \frac{100}{100} \times 100$$

$$= 100\%$$

$$\text{Profit} = 100\%$$

Answer.

x

x