

# Question # 5:-

## General Instructions (a)

1. Give numbering to headings
2. Do not write lengthy paragraphs. Write medium sized paragraphs with headings.
3. Do not use table for comparison and contrast questions.
4. Draw figures/diagram/flowchart where needed.
5. Start new question from fresh page.
6. Write unit of the answer in ability section.
7. Explain mathematical steps and the reasoning for better score.
8. Change colour scheme for references to give them more visibility.
9. Manage time well.
10. Wide page borders are discouraged.

## a) Outer Ear

It consists of  
1. Pinna / auricle → outer funnel like structure

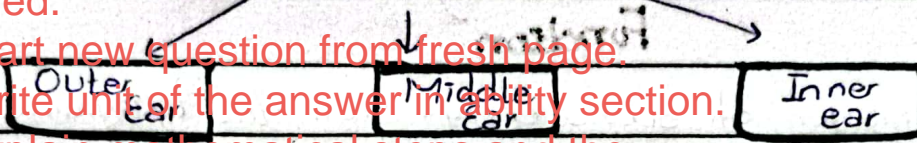
2. External auditory meatus or auditory canal → S-shaped tube

### Function

The auricle of the ear helps to collect sound waves travelling through air and directs them into auditory canal. Some wave entering the auditory canal hit ear drum which is the boundary between outer and inner ear. → Sound wave vibrate the eardrum and the vibration is then transferred to the small bones of the middle ear.

## b) Middle Ear

It consist of air filled space having 3 small bones called **auditory ossicles**. These are some of the smallest bones in the body and are named after their



These all parts work together so you can hear and process sound. The outer and middle part are involve only in hearing, whereas the inner part is involved in maintaining equilibrium along with hearing.

## 11. Avoid writing wrong references.

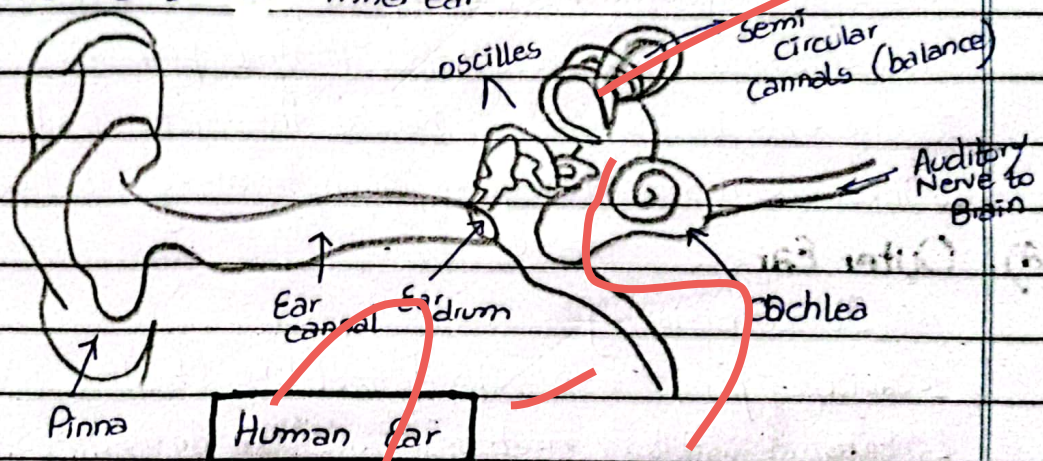
12. Give more weightage to expressedly asked parts of the question.

1. Malleus (hammer)
2. Incus (anvil)
3. Stapes (stirrup)

The handle of Malleus is attached to the ear and the bases of stapes fits into oval window. A Eustachian tube connect middle ear to the throat. This tube allows the passage of air between the tympanic cavity and outside via throat and mouth. For normal hearing, air pressure needs to be maintained on both sides of the eardrum.

### Function

Transmission of sound energy from the tympanic membrane to - inner ear



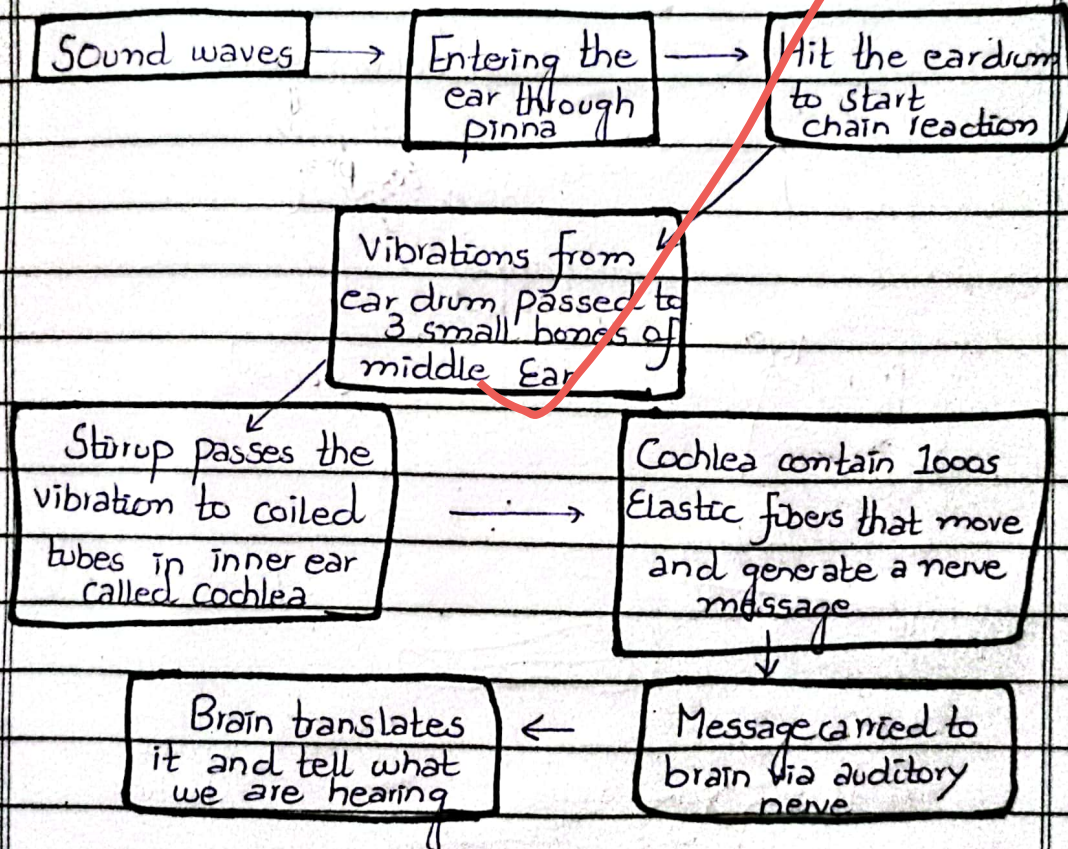
### c) Inner Ear

It consist of a complex system of interconnecting chambers and tubes called labyrinth. It is divided into 3 parts

- (i) Cochlea → that function in hearing
- (ii) Semi circular cannals → provide a sense of equilibrium
- (iii) Vestibule → bony chamber between the cochlea and semi circular cannals that is membranous structure and involve in both hearing and equilibrium

Cochlea as the name suggest is a snail shaped structure. which contain bony core and a thin bony shelf that winds around the core like threads of a screw. They are filled with perilymph. It contain many thousand stiff and elastic fibers whose length vary from base to apex. Vibration enters and causes movement in fibers. The fibers intum generate a message that is sent to brain via auditory cannal.

## MECHANISM OF HEARING



(b)

## Digestive System

It can be defined as

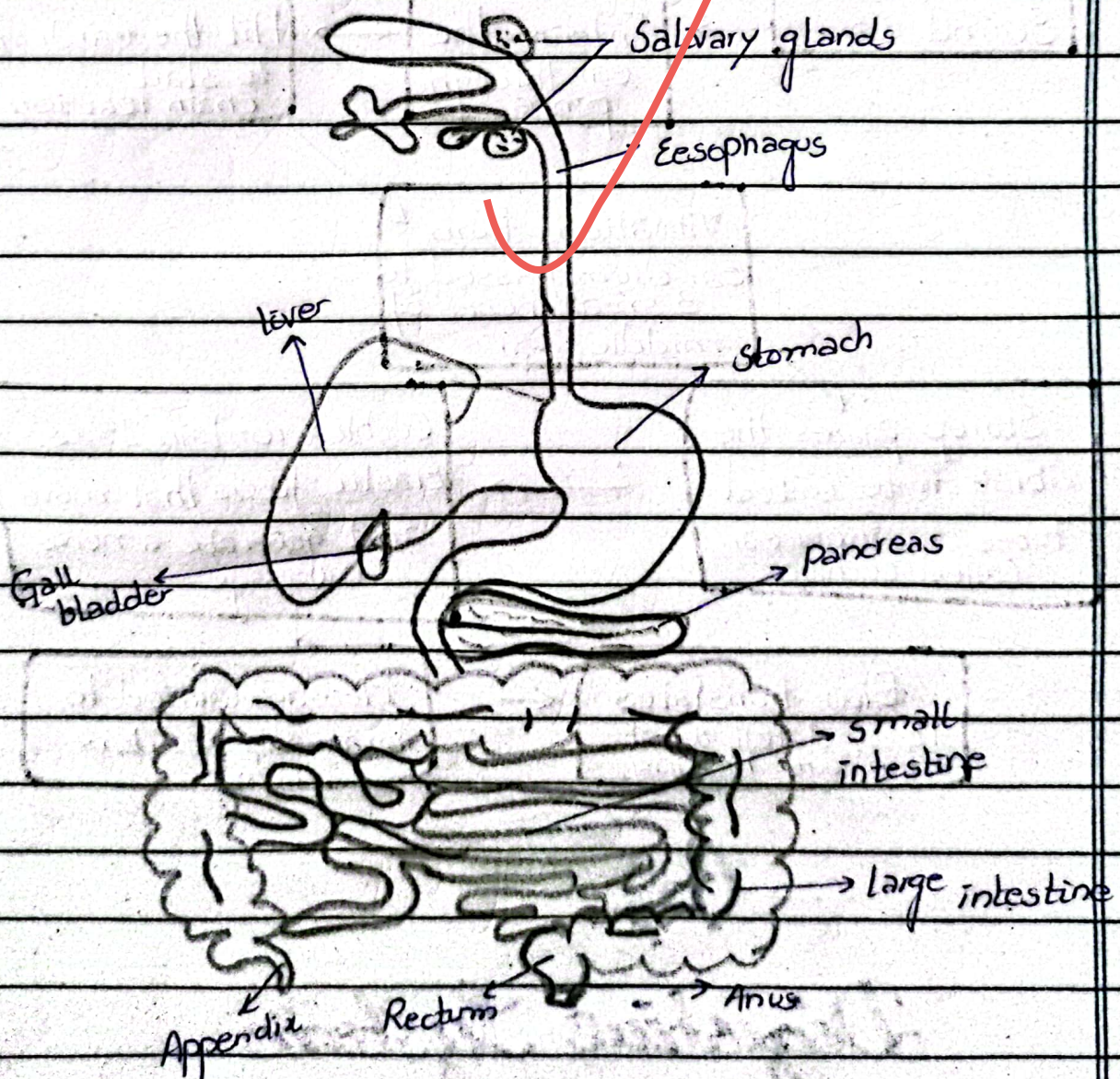
The system responsible for the break-down of larger food particles into simpler and smaller ones that are

absorbable in the body is called  
digestive system"

Larger food particles include

1. Carbohydrates → broken down into Glucose
2. Proteins → broken down into Amino acids
3. lipids/ fats → broken down into fatty acids.

## COMPONENTS OF DIGESTIVE SYSTEM



# Small Intestine

It is the <sup>one of the</sup> longest part of digestive system that is about 6 m. Remaining digestion i.e. 90% of digestion takes place here. This part not only complete the process of digestion but also begins the process of absorption.

## PARTS:

Small intestine is divided into 3 parts

1. Duodenum 20-25cm - It release enterokinase.

Many other reduction process are carried out here.

with the help of enzymes e.g. Amylase convert

starch into maltose, lipase converts fats into

fatty acids. Enterokinase releases Trypsinogen

that neutralizes trypsin converting proterins into

poly peptides

2. Jejunum → there is a release of intestinal juices

a. Amino peptidase → polypeptide into dipeptides

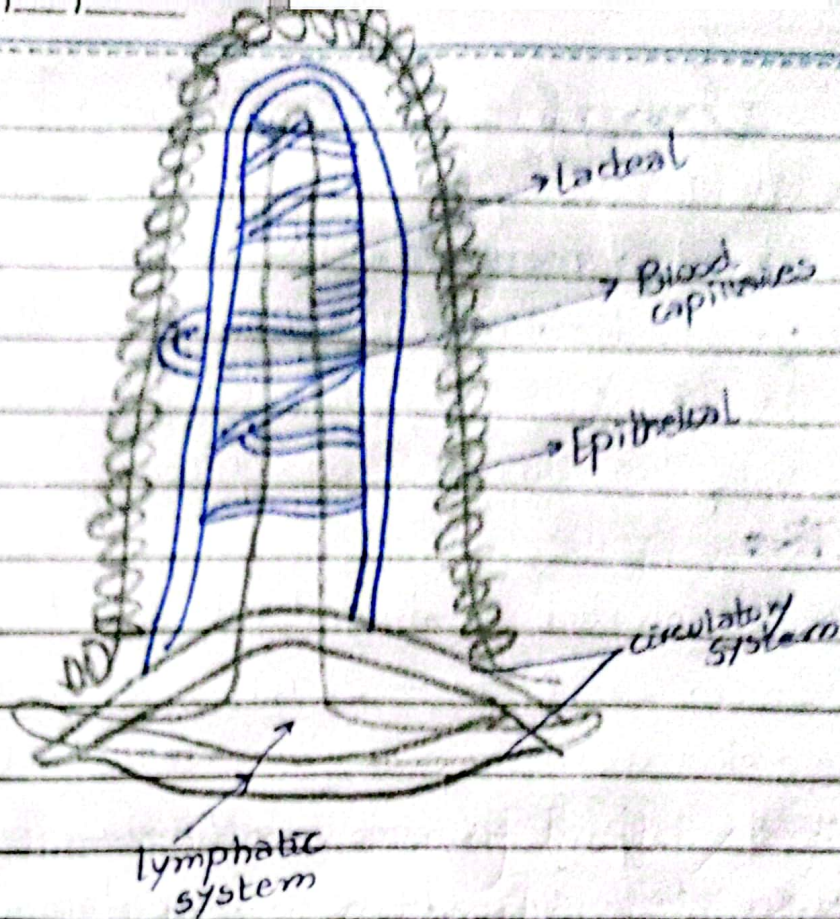
b. Erypsin → dipeptides to amino acids

c. Lipase → fats into fatty acids

d. Maltase → Glucose

e. Lactase → Lactose to Glucose.

3. Ileum → contain micro fiber projection called the villi that contain a network of capillaries that helps in the reabsorption of the nutrients back in the body.



**STRUCTURE OF VILLI**

**Vitamins (C)**

Vitamins are essential compounds which are essential for growth of the body.

**TYPES**

Fat soluble vitamins  
A, D, E, K

Water Soluble vitamins  
B and C

**FAT SOLUBLE VITAMINS**

**Vitamin A** → responsible for growth and body repair, keep the skin smooth  
Ee essential for vision.

Sources: milk, butters, eggs, cream,  
leafy vegetables, carrot

Deficiency: Night Blindness

Vitamin B → Important for growth of children

Sources: Eggs, yolks, liver, fish and milk

Deficiency: Rickets in children

Osteoporosis in adults

Vitamin K → Important in blood clotting

Sources: milk, fish, green vegetables

Deficiency: Blood clotting disorder

Vitamin E → Role in wound healing, prevents damage of cell due to aging

Sources: Soya bean, cotton seed, liver, nuts, yolk

Deficiency: Slow down RBCs Formation

### WATER SOLUBLE VITAMINS

Vitamin C → Essential for bone protection & healthy teeth  
(Ascorbic acid)

Sources: Citrus fruits, guava, pineapples, tomatoes, spinach, strawberry

Deficiency: Scurvy

Vitamin B12 → important for fat & carbohydrates metabolism, function of blood, growth of children

Sources: Meats, fish, vegetables, fruits

Deficiency: Anemia

Vitamin B<sub>6</sub> : Essential for antibodies production  
(Pyridoxine) for CNS, protein metabolism

Sources: Meat, fish, poultry & vegetables

Deficiency: Skin problems, nervous system disorders, Muscle spasms, sleeplessness

## (d) FUNCTION OF PITUITARY GLANDS

It is the master gland of the body especially the anterior lobe as in addition to production of primary hormones it also produce trophic hormones that control the secretion of hormones in other endocrine glands

### ANTERIOR LOBE

#### 1. SOMATOTROPHIN HORMONE (STH)

It is also called the growth hormone. SRF secreted by hypothalamus that in turn trigger the release of STH. After adolescence growth ceases so this hormones than promote protein synthesis.

**Over secretion:** 1. Gigantism → more than normal height (during growth)

2. Acromegaly → abnormal hand (after adolescence) & feet size

**Under secretion:** Dwarfism → slow development, short stature



## 2) Thyroid Stimulating Hormone

Thyroxine in blood  $\rightarrow$  Hypothalamus <sup>acts on</sup>  $\rightarrow$  Thyroxine Releasing factor (TRF)

Thyroxine  $\leftarrow$  Thyroid gland  $\leftarrow$  TSH  $\leftarrow$  Anterior lobe

It is secreted throughout the life. It reaches high level during the period of rapid growth & development.

Add diagram

## 3) Adrenocortic Hormone

It is also called Corticotrophic Hormone

Steroid in blood  $\rightarrow$  Hypothalamus <sup>acts on</sup>  $\rightarrow$  activating CRF

Cortico steroid  $\leftarrow$  Adrenal gland  $\leftarrow$  ACTH  $\leftarrow$  Anterior lobe

Excess or deficiency of ACTH  $\rightarrow$  disturbance in normal adrenal function.

## MEDIAN LOBE

It secretes Melanin Stimulating hormone. Its secretion is governed by external light. Its production increases during pregnancy. It stimulates the melanocytes in skin to produce melanin which darkens the skin. Excess causes Addison's disease

## POSTERIOR LOBE

### 1. ANTIDIURETIC HORMONE / Vasopressin

It causes decrease in bp, volume and osmotic pressure of blood. Increased levels lead to increase reabsorption in distal part of nephron

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decrease production leads to **Diabetes Insipidus** i.e. large quantity of dilute urine and more thirst

## 2. Oxytocin

Responsible for smooth muscles contraction during child birth and also causes ejection of milk from mammary glands.

**SECTION I****QUESTION NO 4****(a) CAUSES OF LAND POLLUTION****1) SOLID WASTE**

Human produce vast quantities of waste - in factories, offices and schools and in such unlikely places as hospitals. Waste material sent to land fill site which end up in polluting the environment

**2) HERBICIDES, INSECTICIDE AND PESTICIDE**

With growing human population there is an increase in the demand of food. For more production farmer use highly toxic fertilizers and at the same time to get rid of insects, fungi and bacteria from their crops uses different insecticides that lead to soil contamination and poisoning.

**3) MINING ACTIVITY**

Surface mining involves the removal of top soil to get the valuable rocks. This removal of top soil leads to pollution. Mostly metals are found in rocky mixtures called ores from which they are extracted by chemical, electrical and other processes. That leaves behind waste product which pollute both land and air.

**4) CHEMICAL AND NUCLEAR WASTE:**

The left over material created by nuclear plants during their functioning are buried under the earth leading to Land pollution.

## 5. DEFORESTATION AND SOIL EROSION

Deforestation leads to dry lands <sup>via erosion</sup> and once the land become dry it can never be fertile again no matter what methods are opted.

## 6. LAND CONVERSIONS

Conversions where land is altered and modified for use to make it worthy for specific purposes is another major cause.

## (d) FUNDAMENTALS OF AI

Back in 1950s the fathers of the field Minsky and Mc Carthy described intelligence as any task performed by a program of a machine if a human carried out the same activity, we would say that the human had to apply intelligence to accomplish the task.

### Philosophy of AI

While exploiting the power of computer systems, the curiosity of humans led him to wonder "Can a machine think and behave like humans do?". Thus the development of AI started.

John Mc Carthy said; The science and engineering of making intelligent machines, especially intelligent computer programs.

### Intelligent

1. Able to solve problem
2. Able to communicate well
3. Able to predict future
4. Able to recognize images & shapes

Detail missing.

## (c) Role of GIS in Environmental Science

1. GDSS → Geographic decision support system
2. Strategic planning: land information (planning and use) and infrastructure need
3. Conservation of resources (H<sub>2</sub>O & minerals)
4. Weather, mapping natural disasters and DRM
5. Population characteristics
6. Vegetations, forestry, agriculture & soil monitoring
7. Soil suitability for various land use activities
8. Environmental Impact Analysis
9. Zoning of land slides Hazards.

## (b) MAIN GOALS OF COP-27

COP-27 is the meeting of 198 countries that are a part of UN Framework convention of Climate change. It was scheduled on 6-18 Nov in Egypt.

- ① Mitigation: To reduce emission of green house gases. This involve setting and revising emission reduction targets the participant countries.
- ② Adaptation: aims to address the impact of climate change and enhance resilience in vulnerable communities and ecosystem via adaptation.

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- ③ Finance: Negotiation on it, including funding mechanism to help developing countries like Pakistan in their climate actions
- ④ Technology Transfer: Promoting transfer of clean and sustainable technology
- ⑤ Social and Environmental Justice: to ensure that climate change does not disproportionately harm vulnerable countries.