MAN IN HEALTH AND DISEASES

18 HOURS – 27 MARKS
• HOMEOBSTASIS
• BODY DEFENCE AND IMMUNITY
• DIGESTION
• CIRCULATION
• RESPIRATION
• EXCRETION
• NERVOUS SYSTEM
DIGESTION
DIGESTION

Structure of digestive system.
Process of digestion of carbohydrates, proteins and lipids.
Disorders of the system.
Balanced diet.
Structure of digestive system:
It consists of alimentary canal or gastro intestinal tract and digestive glands. Alimentary canal consists of mouth, pharynx, oesophagus, stomach, small intestine, large intestine, rectum and anus.
Digestive glands

Unicellular glands - Gastric glands and Intestinal glands.

Multicellular glands - Salivary glands, Liver and Pancreas.
Digestion of carbohydrates

Buccal cavity: Action of salivary amylase on starch or glycogen.

Small intestine: Action of pancreatic amylase on starch or glycogen.

Action of disaccharidases on disaccharides like maltose, sucrose and lactose.
Digestion of proteins

**Stomach**: Action of pepsin and rennin on proteins.

**Small intestine**: Action of trypsin, chymotrypsin, chymotryptsin and carboxypeptidases. Action of aminopeptidases.
Digestion of lipids

Emulsification of lipids by bile salts followed by digestion of lipids by pancreatic lipase.
HYPERACIDITY & PEPTIC ULCERS

Over secretion of HCl and pepsin.

- Tension
- Stress
- Smoking

- Alcoholism
- Frequent intake of coffee and aspirin
JAUNDICE OR ICTERUS

• Skin, mucus membrane and sclera of eyes become yellowish in colour.
• It is caused due to the presence of large quantities of bilirubin in the extra cellular fluids exceeding 2mg/dL.
HEPATITIS

It is the inflammation of liver where the hepatocytes are either damaged or destroyed.

Types - Viral, toxic and alcoholic hepatitis.
ONE Mark Questions
1. Name the digestive enzyme present in saliva.

Salivary amylase or ptyalin
2. Which cell found in the lining of stomach secretes HCl?
   Parietal cell

3. Which gland secretes bile juice?
   Liver
4. Name the longest part of small intestine.
Ileum

5. Mention the non digestive enzyme present in intestinal juice.
Enterokinase
6. Where do you find ileo-caecal valve?
Between ileum and caecum

7. What is chyme?
Liquefied, acidic, pulpy partially digested food present in the stomach is called chyme.
TWO Marks Questions
1. Give the composition of gastric juice.

- Water
- HCl
- Enzymes like Pepsin and Rennin
- Gastric lipase and mucus
2. List any four functions of HCl.

- HCl changes the medium into acidic
- Loosens the fibrous contents of food
- Inactivates ptyalin and activates pepsinogen into pepsin
- Kills bacteria
3. What is bile? Where it is stored?

Bile juice is an alkaline, olive green coloured liquid secreted by liver.

It is stored in the gall bladder.
4. What is succus entericus? Name the carbohydrate digesting enzymes present in it.

Secretion of intestinal glands is called succus entericus. Disaccharidases like sucrase, maltase and lactase.
5. What is Jaundice? Mention its types.

It is a disorder in which the skin, mucus membrane and sclera of eyes become yellowish in colour due to the presence of large quantities of bilirubin in the extra cellular fluids.
Types:

- 1. Obstructive or Extrahepatic Jaundice
- 2. Hepatic or Haemolytic Jaundice
- 3. Viral or Infective Jaundice
6. Give the composition of bile juice.

Water, bile pigments – bilirubin and biliverdin, bile salts – Na\(^+\) and K\(^+\) glycocholate and taurocholate, cholesterol and lecithin. Bile does not contain any digestive enzymes.
7. State any two functions of large intestine.

a. The cells of large intestine or colon absorb water, electrolytes, minerals, vitamins and finally convert the liquid contents into semi solid faeces.
b. The colon bacteria synthesize Vitamin K and biotin.

c. The cells of large intestine also secrete $K^+$ and $HCO_3^-$ ions.
FIVE Marks Questions
1. Describe the process of digestion of carbohydrates.
Buccal cavity: Salivary amylase acts on starch and converts it into dextrins or maltose.

Small intestine: Pancreatic amylase acts on starch or glycogen and converts them into maltose.
• Disaccharidases present in the intestinal juice acts on disaccharides like maltose, sucrose and lactose and converts them into monosaccharides.

• Maltose into glucose, lactose into glucose and galactose, etc.
Describe the process of protein digestion.

**Stomach**: Pepsin is an endopeptidase which acts on internally situated peptide bonds of protein and converts proteins into short fragments (polypeptide chains).
Action of rennin

Rennin or chymosin acts on casein converting it into paracasein. Paracasein is converted into calcium paracaseinate which settles down as curds. This is further hydrolysed by pepsin into polypeptides or proteoses.
Small intestine: Trypsin and chymotrypsin acts on proteins and converts them into proteoses, peptones and polypeptides. Carboxypeptidases hydrolyses terminally situated peptide bond and releases tripeptides, dipeptides and amino acids.
Action of intestinal proteases:
They act on fragments of proteins and converts them into amino acids.
Amino peptidase, tripeptidase and dipeptidase.
Draw a neat diagram of human alimentary canal and label the following parts: oesophagus, stomach, ileum, caecum, descending colon and rectum

Diagram : 2 marks
Correct labellings : $\frac{1}{2}$ mark each
Vikasana
Reasoning type questions
1. Colon bacteria are useful in large intestine. Because they synthesise vitamin K and biotin in large intestine.
2. Healthy gastric mucus is of great advantage. Because it prevents auto digestion of cells in normal individuals.
3. Villi help in absorption.
Because they are the foldings present in the inner layer of intestine lined with columnar epithelium which increases the surface area for absorption.
4. The bacterial fermentation of food does not occur in the stomach. Because bacteria cannot survive in the stomach due to HCl which maintains acidic environment.
5. Bile salts are essential for the digestion of fats. As they help in emulsification of lipids so that the surface area will be increased for the action of pancreatic lipase.
HOMEOSTASIS
• Definition
• Factors to be kept constant to maintain homeostasis
• Role of Liver and Pancreas in maintaining homeostasis
• Diabetes mellitus
Definition

It is defined as the maintenance of a constant internal environment within tolerable limits in relation to changing external environment.
Factors to be kept constant:

- Acid base balance
- Ionic balance
- CO₂ and O₂
- Temperature
- Nutrients
- Wastes
- Hormones
Role of liver and pancreas in maintaining blood glucose level

**Role of Liver**

- Liver acts as a glucostat.
- Glycogenesis
- Glycogenolysis
- Gluconeogenesis
- Lipogenesis
Role of pancreas

- Insulin - hypoglycemic factor
- Glucagon - hyperglycemic factor
DIABETES MELLITUS (DM)

Disorder of the carbohydrate metabolism due to hyposecretion of insulin.

Types of DM:

a. Type I or IDDM
b. Type II or NIDDM
Characters of DM:
- Glycosuria
- Polydypsia
- Polyuria
- Ketonuria
- Polyphagia
ONE Mark Questions

Vikasana
1. Who coined the term homeostasis?
   Walter Cannon

2. Who introduced the concept of homeostasis?
   Claude Bernard
3. What is glycogenesis?
Conversion of glucose to glycogen is known as glycogenesis.

4. Which organ acts as glucostat?
Liver
5. Name the hypoglycemic factor.
   Insulin

6. Name the hyperglycemic factor.
   Glucagon
7. What is glycosuria?
   Presence of glucose in urine.

8. What is polyuria?
   Excessive loss of water in urine – a symptom of diabetes mellitus.
TWO Marks Questions
1. Give the composition of ECF.

Extra Cellular Fluid is composed of electrolytes like Na⁺, Cl⁻, nutrients like glucose, fatty acids, gases like O₂ and CO₂, amino acids and cellular byproducts.
2. List any four factors to be kept constant to maintain homeostasis.

Acid base balance, Ionic balance, CO$_2$ and O$_2$, Temperature, Nutrients, Wastes and Hormones.
3. Mention the long term effects of Diabetes mellitus.

- Retinopathy
- Gangrene of limbs
- Neuropathy
- Diabetic coma
- Nephropathy

Vikasana
FIVE Marks Questions
Define homeostasis. Explain the role of liver and pancreas in maintaining blood glucose level.
It is defined as the maintenance of a constant internal environment within tolerable limits in relation to changing external environment.
Role of liver

Liver acts as a glucostat.
Glycogenesis
Glycogenolysis
Gluconeogenesis
Lipogenesis
Role of pancreas

Insulin - hypoglycemic factor.
Stimulates the liver, skeletal muscles and adipocytes to absorb glucose from blood and lowers the blood glucose level. It inhibits glycogenolysis.
Glucagon-hyperglycemic factor
Promotes glycogenolysis and releases glucose into blood by the liver cells. Promotes gluconeogenesis – synthesis of glucose from lactic acid, amino acids and fatty acids.
Reasoning type questions
1. Insulin is a hormone of feast. As it is released to control blood glucose level when there is an abundance of glucose in the blood.
2. Glucagon is a hormone of fast. As it is released to increase the blood glucose level when there is low level of glucose in blood.
BODY DEFENCE AND IMMUNITY
• Non specific defence
• Specific defence
• Types of immunity
Surface barriers – Skin and Mucous membrane.

Cellular and Biochemical defence - Phagocytosis, Natural Killer Cells, Interferons and Inflammatory response.
Role of B and T lymphocytes:

B lymphocytes - Plasma cell and memory cell.

T lymphocytes - $T_H$ cell, $T_C$ cell and $T_S$ cell.
Natural and Acquired Immunity

Acquired – active and passive
ONE Mark Questions
1. Mention the components of first line of defence.
   Skin and Mucous membranes.

2. Name the second line of defence.
   Cellular and Biochemical defence.
3. What are interferons?

They are proteins released by virus infected cells that protect other healthy tissue from getting infected i.e., they are antiviral proteins.
4. Name the gland where T lymphocytes mature.
   Thymus

5. To which group of protein do antibody belong?
   Immunoglobulins or Globular proteins
TWO Marks Questions
1. Mention the components of second line of defence.

Phagocytosis
Natural killer cells
Interferons
Inflammatory response
2. Distinguish B lymphocyte from T lymphocyte.

<table>
<thead>
<tr>
<th>B lymphocyte</th>
<th>T lymphocyte</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiates in bone marrow.</td>
<td>Differentiates in thymus.</td>
</tr>
<tr>
<td>They attack the invading cells by secreting antibodies.</td>
<td>They attack the cells directly and kill them.</td>
</tr>
<tr>
<td>B lymphocyte</td>
<td>T lymphocyte</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>----------------------------------------</td>
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<tr>
<td>They have a short life span.</td>
<td>They have a long life span.</td>
</tr>
<tr>
<td>They become active and multiply to form plasma cells and memory cells.</td>
<td>They differentiate into $T_H$, $T_C$ and $T_S$ cells.</td>
</tr>
</tbody>
</table>
3. List the differences between antigen and antibody.

<table>
<thead>
<tr>
<th>Antigen</th>
<th>Antibody</th>
</tr>
</thead>
<tbody>
<tr>
<td>They are foreign particles which induce formation of antibodies.</td>
<td>They are globular proteins produced in response to antigens.</td>
</tr>
<tr>
<td>Low molecular weight</td>
<td>High molecular weight</td>
</tr>
</tbody>
</table>
4. List the characters of inflammatory response.

Swelling
Redness
Heat
Pain
5. What are antigens? Give examples.
Antigens are foreign particles which stimulate antibody production. Any proteins, polysaccharides, nucleic acids, complex lipids, pollen grains, bacteria, fungi and viral particles can act as antigens.
FIVE Marks Questions
Explain the role of surface barriers in defence mechanism.

They constitute the body’s first line of defense and includes skin and mucous membranes.
• Sweat from skin prevents the growth of bacteria (pH 3-5).
• Sebum from sebaceous glands contains chemicals that are bactericidal and fungicidal.
• Vaginal secretions are acidic inhibiting the growth of fungi and bacteria in the female reproductive tract.
• Lacrimal fluid (tears) contain lysozyme that destroys bacteria.
• Gastric cells produce HCl that kills bacteria in stomach.
• The cilia propel dust and bacteria towards mouth preventing it from entering lower respiratory tract.
• Saliva destroys bacteria due to the presence of hydrolytic enzymes like lysozyme.
• Ear wax in the ear canal traps the dust, micro-organisms and insects that enter into the ear.
• The melanin pigment of the epidermis protects the skin by absorbing the harmful UV rays.
Reasoning type questions
1. Interferons alert uninfected cells.
They stimulate the unaffected cells to synthesize proteins which can interfere with or inhibit viral replication.
2. NK cells are not considered as phagocytes. Because they attack the membrane of the target cells and releases the cytolytic enzymes which makes the membrane porous ultimately leading to programmed cell death.
3. Only variable regions of antibody binds to antigen.

They have antigen binding sites which recognizes and interacts with the antigen similar to active site of enzyme interacting with substrate.