# Chapter 08 Nutrition

## Multiple Choice Questions (M.C.Qs)

**Encircle the correct answer:**

**1.** ***Select the mismatched:***
*(a)* Protein → Amino acid *(b)* Carbohydrate → Glucose
*(c)* Fats → Starch *(d)* Nucleic acid → Nucleotide

**2.** ***Deficiency of vitamin-K causes:***
*(a)* Rickets *(b)* Anemia *(c)* Scurvy *(d)* Beriberi

**3.** ***Period of rapid growth and development called:***
*(a)* Childhood *(b)* Adult hood *(c)* Adolescence *(d)* Both "a" and "c"

**4.** ***Deficiency of dietary protein causes an imbalance in the gastro-intestinal system.***
*(a)* Marasmus *(b)* Edema *(c)* Diarrhea *(d)* Kwashiorkor

**5.** ***An animal that migrates great distances would obtain the greatest benefit from storing its energy as:***
*(a)* fats *(b)* carbohydrates *(c)* protein *(d)* minerals

**6.** ***Which of the following vitamins is correctly associated with its use?***
*(a)* Vitamin K ⟶ Production of white blood cells
*(b)* Vitamin C ⟶ Curing rickets
*(c)* Vitamin E ⟶ Protection of skin from cancer
*(d)* Vitamin A ⟶ Incorporated into the visual pigment of the eye

**7.** ***Which of the following statements describes pepsin?***
*(a)* It is manufactured by the pancreas.
*(b)* It helps stabilize fat-water emulsions.
*(c)* It splits maltose into monosaccharides.
*(d)* It begins the hydrolysis of proteins in the stomach.

**8.** ***Which of the following is true of bile salts?***
*(a)* They are enzymes *(b)* They are manufactured by the pancreas
*(c)* They emulsify fats in the duodenum *(d)* They increase the efficiency of pepsin action.

**9.** ***In human digestive system trachea and oesophagus both connect to the:***
*(a)* large intestine *(b)* stomach *(c)* pharynx *(d)* rectum

**10.** ***All are sources of calcium except:***
*(a)* red meat *(b)* green leafy vegetables
*(c)* broccoli *(d)* nuts

**11.** ***Process by which organism obtain and use the nutrients required for maintaining life is called:***
*(a)* nutrition *(b)* digestion *(c)* metabolism *(d)* circulation

## BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

**12.** ***Essential substances that our body needs in order to grow and stay healthy are known as:***
*(a)* vitamins *(b)* minerals *(c)* food *(d)* nutrients

**13.** ***It is the mode of nutrition in which an organism makes its own food from the simple inorganic materials.***
*(a)* Assimilation *(b)* Egestion *(c)* Autotrophic *(d)* Heterotrophic

**14.** ***It is the mode of nutrition in which an organism can't make its own food but depends on other organisms.***
*(a)* Assimilation *(b)* Egestion *(c)* Autotrophic *(d)* Heterotrophic

**15.** ***To synthesize food, plants and some bacteria have the green pigment called:***
*(a)* chromoplast *(b)* chlorophyll *(d)* leucoplast *(d)* lysosomes

**16.** ***Green plants are:***
*(a)* autotrophs *(b)* heterotrophs *(c)* saprotrophs *(d)* holozoic

**17.** ***Green plants synthesize food through the process of:***
*(a)* transpiration *(b)* assimilation *(c)* photosynthesis *(d)* egestion

**18.** ***Photosynthesis is a process by which chlorophyll having green plants, algae and some bacteria, synthesize the:***
*(a)* simple sugar *(b)* glucose *(c)* $CO_2$ *(d)* Both 'a' & 'b'

**19.** ***Photosynthesis is a process by which chlorophyll having organisms, synthesize glucose from:***
*(a)* water& $O_2$ *(b)* water & $CO_2$ *(c)* $CO_2$& $O_2$ *(d)* water, $CO_2$& $O_2$

**20.** ***It is released in the process of photosynthesis.***
*(a)* Water *(b)* $CO_2$ *(c)* $O_2$ *(d)* All of them

**21.** ***Heterotrophs are also called:***
*(a)* consumers *(b)* producers
*(c)* secondary producers *(d)* None of them

**22.** ***All animals, non-green plants and fungi are:***
*(a)* autotrophs *(b)* heterotrophs *(c)* saprotrophs *(d)* holozoic

**23.** ***Herbivores consume:***
*(a)* herbs *(b)* other plants *(c)* animals *(d)* Both 'a' & 'b'

**24.** ***Carnivores consume:***
*(a)* herbs *(b)* other plants *(c)* animals *(d)* Both 'a' & 'b'

**25.** ***Organisms which derive their food from dead and decaying organic material are called:***
*(a)* autotrophs *(b)* parasites *(c)* saprotrophs *(d)* holozoic

**26.** ***Hookworms, tapeworms and leeches are:***
*(a)* autotrophs *(b)* parasites *(c)* saprotrophs *(d)* holozoic

**27.** ***Moulds, mushrooms and yeasts are common examples of:***
*(a)* autotrophs *(b)* parasites *(c)* saprotrophs *(d)* holozoic

**28.** ***In this type of nutrition, complex organic substances are taken in without their being decomposed.***
*(a)* Holozoic *(b)* Saprotrophic *(c)* Autotrophic *(d)* Both 'a' & 'b'

**29.** ***In amoeba, projections of cytoplasm are called:***
*(a)* cilia *(b)* pseudopodia *(c)* false feet *(d)* Both 'b' & 'c'

## BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

**30.** ***Complex food enzymes is broken down into simpler molecules with the help of enzymes produced by an organelle called:***
*(a)* vacuoles *(b)* mitochondria *(c)* Golgi body *(d)* lysosomes

**31.** ***In paramecium, food is ingested through a special opening called:***
*(a)* cytostome *(b)* cilia *(c)* pseudopodia *(d)* pseudocavity

**32.** ***It is essential for plants to synthesize amino acids.***
*(a)* Magnesium *(b)* Nitrogen *(c)* Carbon *(d)* Potassium

**33.** ***In plants, it is required for the production of chlorophyll, nucleic acids and enzymes.***
*(a)* Nitrogen *(b)* Calcium *(c)* Potassium *(d)* Sulphur

**34.** ***Plants need this in the largest amount.***
*(a)* Calcium *(b)* Potassium *(c)* Nitrogen *(d)* Carbon

**35.** ***In plants, stunted growth, reduced yields and pale green foliage show deficiency of:***
*(a)* calcium *(b)* potassium *(c)* magnesium *(d)* nitrogen

**36.** ***In plants, interveinal chlorosis shows deficiency of:***
*(a)* calcium *(b)* potassium *(c)* magnesium *(d)* nitrogen

**37.** ***Extra ammonia can increase:***
*(a)* eutrophication *(b)* emission of greenhouse gas
*(c)* soil acidity *(d)* pest problems

**38.** ***Nitro oxide may cause:***
*(a)* eutrophication *(b)* emission of greenhouse gas
*(c)* soil acidity *(d)* pest problems

**39.** ***Which of following statement is correct?***
*(a)* Starch is a simple carbohydrate *(b)* Sucrose is a complex carbohydrate
*(c)* Both 'a' & 'b' are correct *(d)* Both 'a' & 'b' are wrong

**40.** ***Proteins consist of units called:***
*(a)* amino acids *(b)* lactic acids *(c)* pyruvic acids *(d)* ATP

**41.** ***Number of amino acids is:***
*(a)* 10 *(b)* 15 *(c)* 20 *(d)* 25

**42.** ***Number of essential amino acids is:***
*(a)* 7 *(b)* 9 *(c)* 15 *(d)* 20

**43.** ***The body needs it to maintain and replace tissues and their functions.***
*(a)* Carbohydrates *(b)* Vitamins *(c)* Fats *(d)* Proteins

**44.** ***The energy obtained from carbohydrates, proteins and fats is measured in units called:***
*(a)* calories *(b)* joules *(c)* watts *(d)* erg

**45.** ***An organism needs it in small quantities for the proper functioning of its metabolism.***
*(a)* Carbohydrates *(b)* Vitamins *(c)* Fats *(d)* Proteins

**46.** ***Vitamins are of:***
*(a)* two types *(b)* three types *(c)* four types *(d)* five types

**47.** ***Which of the following statement is correct?***
*(a)* Vitamins A, B, D and E are fat-soluble vitamins
*(b)* Vitamins A, C, E and K are water soluble vitamins
*(c)* Vitamins A, D, E and K are fat-soluble vitamins
*(d)* Vitamins B, C and E are water soluble vitamins.

## BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

**48.** ***Cooking and heating destroys these vitamins easily.***
*(a)* A & B *(b)* E & K *(c)* C & D *(d)* B & C

**49.** ***To make red blood cells, the body needs:***
*(a)* calcium *(b)* iron *(c)* vitamin C *(d)* fibre

**50.** ***For strong bones, we need:***
*(a)* calcium & vitamin D *(b)* iron & vitamin C
*(c)* calcium & vitamin C *(d)* iron & vitamin D

**51.** ***Deficiency of vitamin D causes:***
*(a)* bleeding disorder *(b)* Beriberi *(c)* scurvey *(d)* rickets

**52.** ***Night blindness, eye infection and respiratory infections are due to the deficiency of:***
*(a)* vitamin A *(b)* vitamin B *(c)* vitamin C *(d)* vitamin D

**53.** ***It is a component of haemoglobin in red blood cells and myoglobin in muscle cells.***
*(a)* Calcium *(b)* Zinc *(c)* Iodine *(d)* Iron

**54.** ***Beans, lentils and spinach are the sources of:***
*(a)* vitamin C *(b)* Iron *(c)* Calcium *(d)* Vitamin K

**55.** ***It plays a very important role to prevent from constipation.***
*(a)* Water *(b)* Vitamins *(c)* Fibre *(d)* Meat

**56.** ***It is a condition in which thyroid gland becomes enlarged and it results in swelling in neck.***
*(a)* Goiter *(b)* Anemia *(c)* Marasmus *(d)* Kwashiorkor

**57.** ***Goiter is caused by an insufficient amount of:***
*(a)* iodine *(b)* iron *(c)* vitamin E *(d)* calcium

**58.** ***Haemoglobin molecule contains:***
*(a)* two iron atoms *(b)* three iron atoms *(c)* four iron atoms *(d)* five iron atoms

**59.** ***This leads to obesity, diabetes and cardiovascular problems.***
*(a)* High dose of calcium *(b)* Excess dose of vitamin D
*(c)* High dose of vitamin A *(d)* High intake of carbohydrates

**60.** ***It causes loss of appetite and liver problems.***
*(a)* High dose of calcium *(b)* Excess dose of vitamin D
*(c)* High dose of vitamin A *(d)* High intake of carbohydrates

**61.** ***This can lead to deposition of calcium in various tissue.***
*(a)* High dose of calcium *(b)* Excess dose of vitamin D
*(c)* High dose of vitamin A *(d)* High intake of carbohydrates

**62.** ***An adult's digestive tract is about:***
*(a)* 30 feet long *(b)* 20 feet long *(c)* 10 feet long *(d)* 7 feet long

**63.** ***Mixing of food In the intestine with digestive juices is called:***
*(a)* Propulsion *(b)* Mechanical digestion
*(c)* Segmentation *(d)* Absorption

**64.** ***Removal / elimination of the waste products from the body is called:***
*(a)* propulsion *(b)* segmentation
*(c)* chemical digestion *(d)* egestion

**65.** ***Saliva is secreted by:***
*(a)* scent gland *(b)* sebaceceous gland
*(c)* salivary gland *(d)* mammary gland

## BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

**66.** ***Mastication is:***
*(a)* mixing of food with saliva
*(b)* grinding of food by teeth
*(c)* action of enzymes on food in small intestine
*(d)* movements of oesophagus

**67.** ***Saliva contains an enzyme called salivary:***
*(a)* amylase *(b)* trypsin *(c)* lipase *(d)* bile

**68.** ***Salivary amylase acts on:***
*(a)* starch *(b)* protein *(c)* vitamins *(d)* minerals

**69.** ***Small, slippery, spherical mass of food is called:***
*(a)* caecum *(b)* fundus *(c)* amylase *(d)* bolus

**70.** ***Waves of rhythmic movements of muscle contractions and relaxation which force down food through the oesophagus to the stomach is called:***
*(a)* epiglottis *(b)* peristalsis *(c)* sphincters *(d)* jejunum

**71.** ***At the end of the oesophagus, a muscle that allows food to enter the stomach and preventing food to flow back into the oesophagus is called:***
*(a)* epiglottis *(b)* peristalsis *(c)* sphincters *(d)* jejunum

**72.** ***The largest part of stomach is:***
*(a)* cardiac *(b)* pyloric *(c)* fundus *(d)* jejunum

**73.** ***The stomach produces:***
*(a)* pancreatic juice *(b)* bile juice *(c)* gastric juice *(d)* intestinal juice

**74.** ***The hydrochloric acid in gastric juice converts the inactive enzyme pepsinogen into active form called:***
*(a)* pepsin *(b)* lipase *(c)* amylase *(d)* renin

**75.** ***Gastric juice composed of:***
*(a)* mucous *(b)* hydrochloric acid *(c)* pepsinogen *(d)* All of them

**76.** ***In stomach, the food germs and micro-organisms are killed by:***
*(a)* mucous *(b)* hydrochloric acid *(c)* pepsinogen *(d)* pepsin

**77.** ***Stomach is protected against the action of acid by:***
*(a)* mucous *(b)* hydrochloric acid *(c)* pepsinogen *(d)* pepsin

**78.** ***Pepsin acts on:***
*(a)* starch *(b)* protein *(c)* vitamins *(d)* minerals

**79.** ***The churning action of stomach produces heat which helps to melt:***
*(a)* starch *(b)* protein *(c)* fats *(d)* lipids

**80.** ***In stomach, food has been processed into a thick paste like liquid called:***
*(a)* bolus *(b)* fundud *(c)* chyme *(d)* bile

**81.** ***Stomach opens into:***
*(a)* rectum *(b)* small intestine *(c)* liver *(d)* pancreas

**82.** ***The first part of small intestine is:***
*(a)* Ileum *(b)* duodenum *(c)* rectum *(d)* cloaca

**83.** ***Bile juice is secreted by:***
*(a)* stomach *(b)* rectum *(c)* pancreas *(d)* liver

**84.** ***The secretion of pancreas is called:***
*(a)* pancreatic juice *(b)* bile juice *(c)* gastric juice *(d)* intestinal juice

## BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

**85.** ***Choose the correct statement:***
***Pancreatic juice contains the following enzymes which digest:***
*(a)* trypsinogen → lipids pancreatic lipase → proteins amylase → carbohydrates
*(b)* trypsinogen → lipids pancreatic lipase → carbohydrates amylase → proteins
*(c)* trypsinogen → proteins pancreatic lipase → lipids amylase → carbohydrates
*(d)* trypsinogen → proteins pancreatic lipase → carbohydrates amylase → lipids

**86.** ***Biles salts act on:***
*(a)* fats *(b)* proteins *(c)* vitamins *(d)* lipids

**87.** ***Villi are present in the internal wall of:***
*(a)* oesophegus *(b)* stomach *(c)* small intestine *(d)* rectum

**88.** ***The single lymph vessel inside the villus is called:***
*(a)* hepatic *(b)* lacteal *(c)* arterial *(d)* venous

**89.** ***Nutrients are absorbed into the body through:***
*(a)* blood vessels *(b)* ileum *(c)* duodenum *(d)* villi

**90.** ***Heptic portal vein carries food to the:***
*(a)* stomach *(b)* pancreas *(c)* heart *(d)* liver

**91.** ***Undigested food is passed into:***
*(a)* large intestine *(b)* small intestine *(c)* duodenum *(d)* liver

**92.** ***The pouch at the beginning of the large intestine that joins the small intestine to the large intestine is called:***
*(a)* colon *(b)* colic *(c)* caecum *(d)* rectum

**93.** ***Rectum stores:***
*(a)* food *(b)* water *(c)* faeces *(d)* none of them

**94.** ***Bile is stored in the:***
*(a)* large intestine *(b)* gall bladder *(c)* pancreas *(d)* liver

**95.** ***It occurs when required water is not absorbed in blood from colon.***
*(a)* Diarrhea *(b)* Constipation *(c)* Ulcer *(d)* All of them

**96.** ***It is a sore in gut lining and can be different organs.***
*(a)* Diarrhea *(b)* Constipation *(c)* Ulcer *(d)* All of them

### Answers

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | (c) | 2. | (b) | 3. | (d) | 4. | (d) | 5. | (a) | 6. | (d) | 7. | (d) | 8. | (c) |
| 9. | (b) | 10. | (a) | 11. | (a) | 12. | (d) | 13. | (c) | 14. | (d) | 15. | (b) | 16. | (a) |
| 17. | (c) | 18. | (d) | 19. | (b) | 20. | (c) | 21. | (a) | 22. | (b) | 23. | (d) | 24. | (c) |
| 25. | (c) | 26. | (b) | 27. | (c) | 28. | (a) | 29. | (d) | 30. | (d) | 31. | (a) | 32. | (b) |
| 33. | (a) | 34. | (c) | 35. | (d) | 36. | (c) | 37. | (c) | 38. | (b) | 39. | (d) | 40. | (a) |
| 41. | (c) | 42. | (b) | 43. | (d) | 44. | (a) | 45. | (b) | 46. | (a) | 47. | (c) | 48. | (d) |
| 49. | (b) | 50. | (a) | 51. | (c) | 52. | (a) | 53. | (d) | 54. | (b) | 55. | (c) | 56. | (a) |
| 57. | (a) | 58. | (c) | 59. | (d) | 60. | (c) | 61. | (b) | 62. | (a) | 63. | (c) | 64. | (d) |
| 65. | (c) | 66. | (b) | 67. | (a) | 68. | (a) | 69. | (d) | 70. | (b) | 71. | (c) | 72. | (c) |
| 73. | (c) | 74. | (a) | 75. | (d) | 76. | (b) | 77. | (a) | 78. | (b) | 79. | (d) | 80. | (c) |
| 81. | (b) | 82. | (b) | 83. | (d) | 84. | (a) | 85. | (c) | 86. | (a) | 87. | (c) | 88. | (b) |
| 89. | (d) | 90. | (d) | 91. | (a) | 92. | (c) | 93. | (c) | 94. | (b) | 95. | (a) | 96. | (c) |

## Short / Detailed Answer Questions

**Q.1** ***Define nutrition and nutrients.***

***Ans:*** **Nutrition:** Process by which organisms obtain and use the nutrients required for maintaining life is called nutrition.

Nutrition is the study of nutrients in food, how the body uses nutrients and the relationship between diet, health and diseases.

**Nutrients:** Essential substances that our body needs in order to grow and stay healthy are known as nutrients.

**Q.2** ***Briefly describe the process by which food is obtained or prepared.***

***Ans:*** Plants and animals to not obtain food by the same processes. Plants and some bacteria have the green pigment chlorophyll to synthesize food, while animals, fungi and other bacteria depend on other organisms for food. Based on this, there are two main modes of nutrition:

- autotrophic
- heterotrophic

**Autotrophic Nutrition:** It is the mode of nutrition in which an organism makes its own food from the simple inorganic materials like carbon dioxide, water and minerals present in the surrounding (with the help of energy). These processes are photosynthesis or either chemosynthesis.

**Heterotrophic Nutrition:** It is the mode of nutrition in which an organism can't make its own organic material but depends on other organisms for its food and use it for growth and energy.

**Q.3** ***Name the process by which plants prepare their food.***

***Ans:*** **Photosynthesis:** Green plants, which are autotrophs, synthesize food through the process of photosynthesis. Photosynthesis is a process by which green plants, algae and some bacteria having chlorophyll, synthesize the simple sugar (glucose) from the simple raw materials i.e. water and carbon dioxide by using the energy of sunlight. Oxygen is released in this process. The overall equation of photosynthesis is:

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6H_2O + 6O_2$$

**Q.4** ***Describe heterotrophic nutrition.***

***Ans:*** **Heterotrophic Nutrition:** The word 'heterotroph' is derived from two Greek words-heteros (other) and trophe (nutrition). Unlike autotrophs, which manufacture their own food, heterotrophic organisms obtain food form other organisms. As heterotrophs depend on other organisms for their food, they are also called consumers. All animals, non-green plants like and fungi come under this category.

**Herbivores:** Consumers which consume herbs and other plants are called herbivores.

**Carnivores:** Those consumers which consume animals are called carnivores.

After taking complex organic materials as food, heterotrophs break them into simple molecules with the help of biological catalysts, i.e., enzymes and utilize them for their own metabolism.

**Q.5** ***Mention the types of heterotrophic nutrition.***

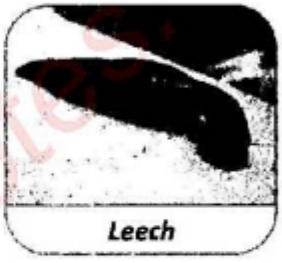
***Ans:*** Depending upon the mode of living and the mode of intake of food, hetertrophs may be parasitic, saprotrophic or holozoic.

(i) **Parasitic Nutrition:** Parasitic organisms, or parasites, live on or inside other living organisms, called hosts, and obtain their food from them. The host does not get any benefit from the parasite. This mode of nutrition is called parasitic nutrition. Different parasites, like Cuscuta (akash-bel), hookworms, tapeworms, leeches etc., have modes of feeding, depending upon habit, habitat and modifications.

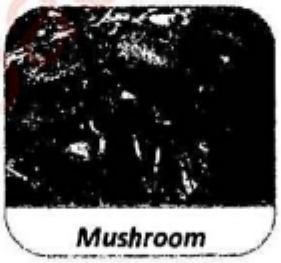

*Cuscuta*

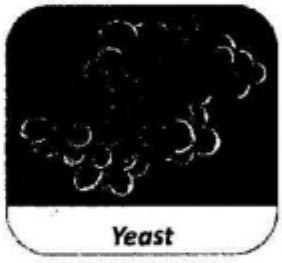

*Hookworm*


*Tapeworm*


*Leech*

(ii) **Saprotrophic Nutrition:** (Gr: Sapros=rotten, Trophic=nutrition):Saprotrophic organisms, or saprotrophs, derive their food from dead and decaying organic material. This mode of nutrition is called saprotrophic nutrition. They secrete enzymes that are released on food material outside their body, these enzymes breakdown complex food into simple forms. Common examples of saprotrophs are fungi (moulds, mushrooms, yeasts) and many bacteria.


*Mushroom*


*Yeast*

(iii) **Holozoic Nutrition:** (Gr: Holo=Whole, Zoikos=of animal): In holozoic nutrition complex organic substances are ingested (taken in) without their being degraded or decomposed. After intake, such food is digested by enzymes produced within the organism. Digested food is absorbed into the body and the undigested product is egested (expelled out) from the body. This kind of nutrition is found mainly in non-parasitic animals-simple ones like Amoeba and complex ones like human beings.

**Q.6** ***How amoeba and parameclum obtain nutrition?***

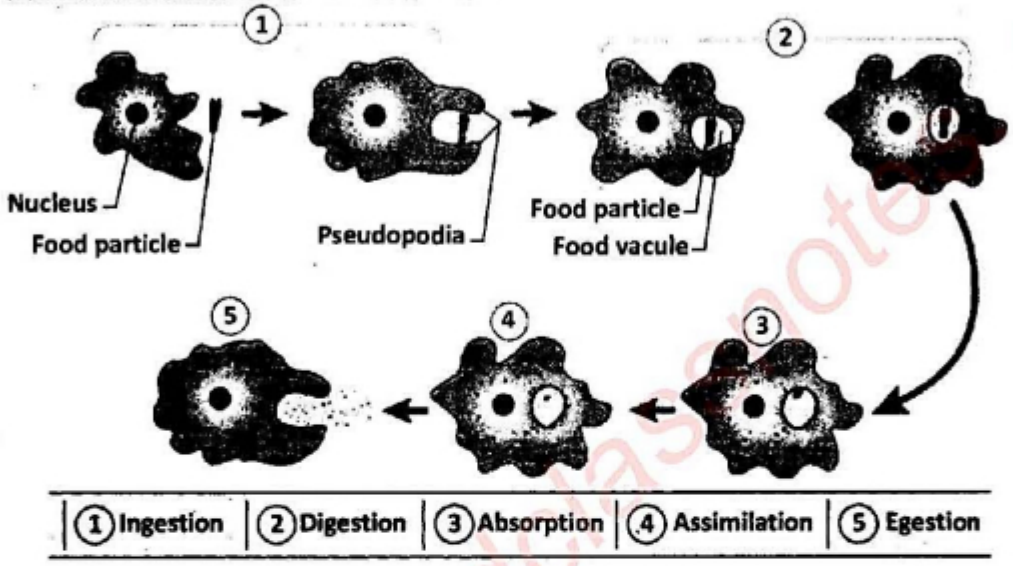
***Ans:*** Different organisms obtain food in different ways.

**Nutrition in Amoeba:** Nutrition in unicellular organisms like Amoeba, involves ingestion by the cell surface, digestion and egestion.

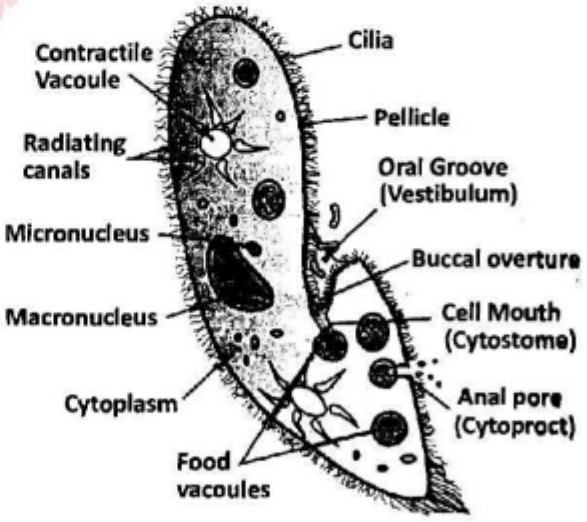
Amoeba takes in complex organic matter as food. Amoeba first identifies its food then throw out a number of small pseudopodia (projections of cytoplasm, also called false feet). These pseudopodia enclose the food particle and prevent it from escaping. The food enclosed in the cell membrane forms a food vacuole.

The complex food in broken down into simpler molecules with the help of digestive enzymes produced by an organelle called lysosome. The digested food is distributed in the cytoplasm and the undigested food is egested through the cell membrane.

## NUTRITION IN AMOEBA




**Nutrition In Paramecium:** In paramecium, a unicellular organism with a specific shape, food is ingested through a special opening, the cytostome (cell mouth). Food is brought to this opening by the lashing movement of cilia that cover the entire surface of the cell.




**Q.7** ***Define mineral nutrition in plants.***

**Ans:** ***Mineral Nutrition in Plants:*** The process involving the absorption, distribution and utilization of mineral substances by the plants for their growth and development is called mineral nutrition.

**Q.8** ***What are macronutrients and micronutrients?***

**Ans:** Plants have the most efficient mechanism for preparing their food by using many elements essential for plant nutrition. Plants require a steady supply of macronutrients and micronutrients. The difference between the two is quite simple: macronutrients are required in large quantities than micronutrients.

The names of the two categories don't apply, indicate that one type of nutrient is more

important than another; it just means that more macronutrients must be present in the soil than micronutrients. Plants obtain nearly all of the nutrients they need from the soil, although some are synthesized produced via photosynthesis.

**Q.9** ***Why nitrogen is essential for plants?***

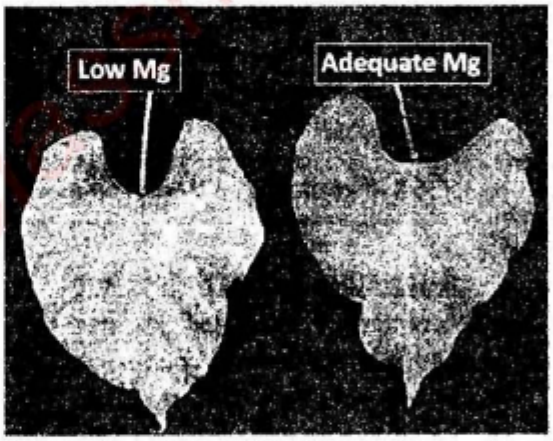
***Ans:*** **Nitrogen:** Nitrogen is essential for plants to synthesize amino acids, which are the building blocks for protein synthesis and also required for the production of chlorophyll, nucleic acids, and enzymes. For all metabolic elements which plants use from soil, nitrogen needs in the largest amounts.

**Q.10** ***What are the symptoms of nitrogen deficiency?***

***Ans:*** **Symptoms of Nitrogen Deficiency:** Nitrogen-deficient plants exhibit stunted growth, reduced yields and their foliage pale green.

**Q.11** ***Why do plants need magnesium? What are the symptoms of magnesium deficiency?***

***Ans:*** **Magnesium:** Many enzymes in plant cells require magnesium in order to perform properly and is a constituent of the chlorophyll molecule, which is the driving force of photosynthesis.




**Symptoms of Magnesium Deficiency:**
Magnesium deficiency is most prevalent on sandy textured soils, which are subject to leaching, particularly during seasons of excess rainfall.
The predominant symptom is interveinal chlorosis (dark green veins with yellow areas between the veins). The bottom leaves are always affected first as shown in above figure.

**Q.12** ***What is the importance of fertilizers?***

***Ans:*** **Importance of Fertilizers:** Fertilizers are substances containing chemical elements such as manure of mixture of nitrates that improves the growth of plants. They give nutrition to the crops and produce more fruit, faster growth, more attractive flowers. When added to soil or water, plants can develop tolerance against pests like weeds, insects and diseases. And the use of manure and composts as fertilizers is probably almost as old as agriculture. Modern chemical fertilizers include one or more of the three elements that are most important in plant nutrition: nitrogen, phosphorus, and potassium. Chemicals fertilizers are simply that nutrients applied to agricultural fields to supplement required elements found naturally in the soil.

**Q.13** ***Describe the environmental hazards related to chemical fertilizers.***

***Ans:*** **Environmental Hazard:** An environmental hazard is a condition, which has the potential to threat natural environment or adversely affect people's health, including pollution and natural disasters.

**Environmental Hazards Related to Chemical Fertilizers:** The farmers apply chemical fertilizer for better growth of their crops, but on the other side these fertilizers pollute water and soil as well. Some effects of chemical fertilizers on the environment are as follows:

**(i) Soil Nutrient Holding Capacity:** The massive quantities of inorganic fertilizers affect the soil nutrient holding capacity.

**(ii) Eutrophication:** The high solubility of fertilizers also degrade ecosystem through eutrophication (means an increase in chemical nutrients typically compounds containing nitrogen or phosphorus in an ecosystem).

**(iii) Emission of Greenhouse Gas:** Storage and application of some nitrogen fertilizers may cause emission of greenhouse gas, e.g. nitrous oxide.

**(iv) Soil Acidity:** Ammonia gas ($NH_3$) may be emitted from applied inorganic fertilizers. This extra ammonia can also increase soil acidity.

**(v) Past problems:** Excessive nitrogen fertilizers can lead pest problems by increasing their reproduction rate.

**(vi) Nutrient Balance:** It is recommended that nutrient content of the soil and nutrient requirement of crop should be carefully balanced with application of inorganic fertilizers. It is critical to apply no more than it is needed; any excess in nutrient will definitely develop pollution of any kind.

**Q.14** ***What are the components of human food?***

***Ans:*** **Components of Human Food:** Holozoic nutrition is the type of heterotrophic nutrition. Heterotrophic organisms have to acquire and take in all the organic substances they need to survive. There are seven major classes of nutrients:

**(i)** carbohydrates, **(ii)** protein, **(iii)** fats, **(iv)** minerals, **(v)** fiber, **(vi)** vitamins and **(vii)** water.

**Q.15** ***Write down the role and sources of carbohydrates, proteins and fats.***

***Ans:*** **Carbohydrates:** Carbohydrates are necessary for our body specially glucose, which is primary source of energy. They are generally divided in two categories:

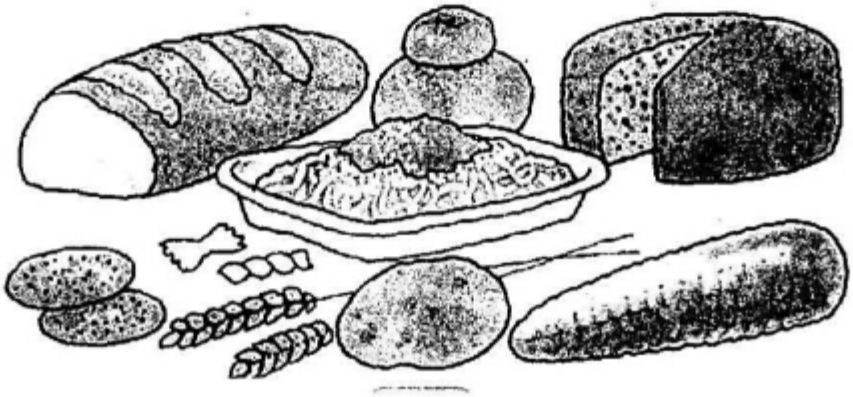
(i) simple carbohydrates (ii) Complex carbohydrates

**Simple Carbohydrates:** Simple carbohydrates such as sucrose, which digest quickly.

**Complex Carbohydrates:** Complex carbohydrate such as starch etc. which digest slowly.

**Sources of Carbohydrates:** Source of simple carbohydrates include fruits, sugars and processed grains, such as white rice or flour. We can find complex carbohydrates in green or starchy vegetables, potatoes, while grains, beans and lentils. The most common and abundant forms are sugars, fibers and starches.

***Carbohydrates These starchy foods give us energy and warmth.***



**Proteins:** Proteins consist of units called amino acids, attach together in complex formations. Proteins are complex molecules; the body takes longer to break them down. As a result, they are much slower and long lasting source of energy than carbohydrates.

**Essential Amino Acids:** There are 20 animo acids. The body synthesizes some of them from components within the body, but it cannot synthesize 9 of the amino acids called essential amino acids. They must be consumed in the diet.

The body needs protein to maintain and replace tissues and their function. Protein is not usually used for energy. However, if the body is not getting enough calories from other nutrients or from the fat stored in the body, protein is used for energy.

***Proteins Help build a strong and healthy body***

**Fats:** Fats are complex molecules composed of fatty acids and glycerol. The body needs fats for growth and energy. It also uses them to synthesize hormones and other substances needed for the body's activities.

Fats are the slowest source of energy but the most energy-efficient form of food. They body deposits excess fat in the abdomen (omental fat) and under the skin (sub cutaneous fat) to use when it needs more energy. The body may also deposit excess fat in blood vessel and within organs, where it can block flow and damage organs, often causing serious disorders.

Some typical sources of saturated fats include:

- Fatty cuts of beef and lamb.
- Poultry skin.
- High fat dairy food (whole milk, butter, cheese, sour cream, ice cream)
- Tropical oils (coconut oil, palm oil, cocoa butter)

***Fats Our body stores up fat to use as energy and protect us from the cold.***

## BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

**Q.16** ***Define calories.***

***Ans:*** **Calories:** The energy obtained from carbohydrates, proteins and fats is measured in units called calories.

**Q.17** ***Write a short note on vitamins.***

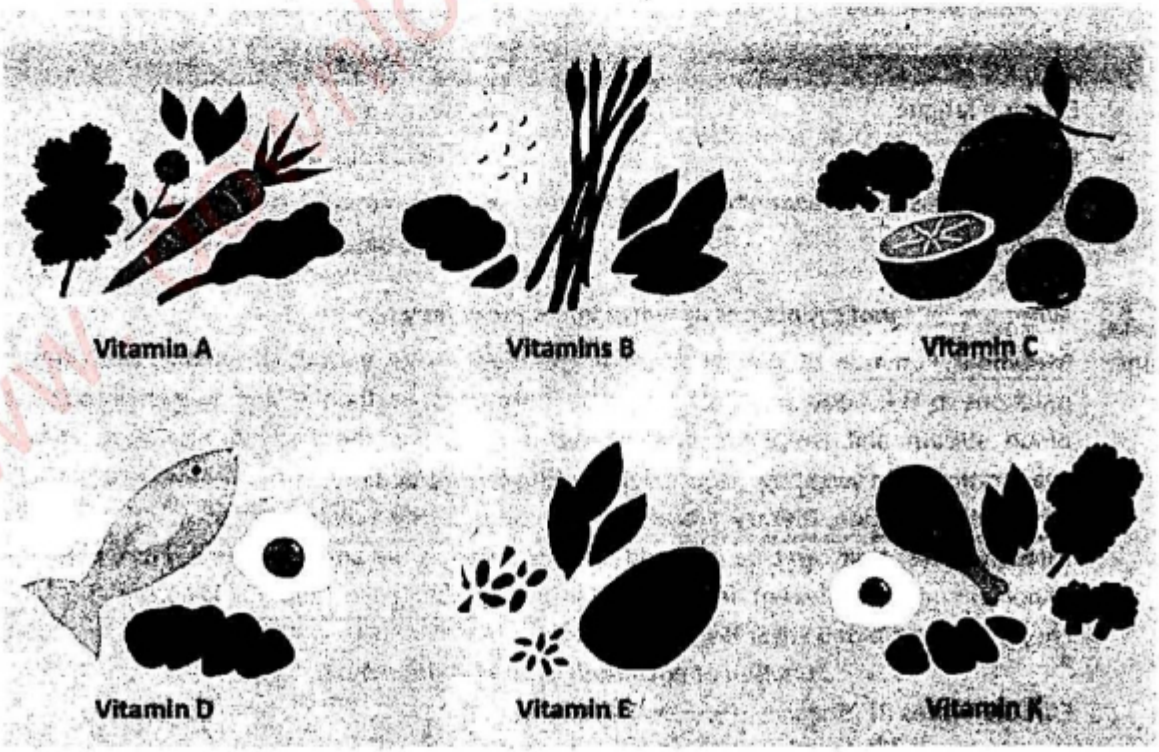
***Ans:*** **Vitamins:** A vitamin is an organic molecule (or related set of molecules), an essential micronutrient that an organisms needs in small quantities for normal health and development. Lack of vitamins can cause several diseases. They are divided into two types:

(i) Fat-soluble vitamins (ii) Water soluble vitamins

**(i) Fat-Soluble Vitamins:** Vitamin which can soluble in organic solvent are called fat-soluble vitamins. They are less excreted from the body as compared to water-soluble vitamins. Vitamins A, D, E and K are fat-soluble vitamins.

**(ii) Water soluble Vitamins:** Vitamin which are soluble in water are called water soluble vitamins. These are vitamins B and C. Cooking or heating destroys the water soluble vitamins more readily than the fat-soluble vitamins.

| *Vitamin generic name* | *Deficiency diseases* |
|---|---|
| Vitamin K | Bleeding disorder |
| Vitamin D | Rickets and osteomalacia |
| Vitamin C | Scurvey |
| Vitamin B | Beriberi |
| Vitamin A | Night blindness, eye-infection, rough skin, respiratory infections |



**Q.18** ***Write a short note on minerals.***

***Ans:*** **Minerals:** A class of naturally occurring solid inorganic substances with a characteristics crystalline form. Minerals are vital for proper human health.

Essential minerals include calcium, iron, zinc, iodine and chromium. Deficiencies can result in serious health conditions such as brittle bones and poor blood oxygenation. Minerals are found in a variety of foods including dairy and meat products.

**Metabolic Function of Calcium:** Calcium metabolism refers to the movements and regulation of calcium ions ($Ca^{+2}$) in and out of various body compartments. Good calcium nutrition, along with low salt and high potassium intake, prevents from hypertension and kidney stones.

Sources of calcium include:

* Milk, cheese and other dairy foods
* Green leafy vegetables
* Soya beans
* Nuts
* Bread
* Fish

Deficiency Symptoms of Calcium:

* Fainting
* Chest pains
* Heat failure
* Wheezing
* Difficulty swallowing
* Numbness and tingling sensations around the mouth or in the fingers and toes
* Muscle cramps, particularly in the back and legs; may progress to muscle spasm (tetany)
* Voice changes due to spasm of the larynx

**Metabolic Function of Iron:** Iron plays a major role in oxygen transport and storage. It is a component of haemoglobin in red blood cells and myoglobin in muscle cells.

Some of the best plant and animal sources of iron:

* Beans and lentils
* Tofu
* Dark green leafy vegetables such as spinach

| *Deficiency symptoms of iron:* | |
|---|---|
| • Extreme fatigue | • Weakness |
| • Pale skin | • Headache, dizziness |
| • Chest pain, fast heart beat or shortness breath. | • Inflammation or soreness of tongue |
| • brittle nails | • Poor appetite in infants |

**Q.19** ***What are metabolic functions of water and dietary fibres?***

***Ans:*** **Metabolic Function of Water:** Water is the medium for various enzymatic and chemical reactions in the body. It moves nutrients, hormones, antibodies and oxygen through the blood stream and lymphatic system. Water maintains the body temperature through evaporation as in sweating. Severe dehydration causes cardio-vascular problems.

**Metabolic Function Dietary Fibres:** Dietary fiber is the edible part of plants, or similar carbohydrates, that can't be digested and absorbed in the small intestine. Fibre plays very important role to prevent from constipation. Soluble fibre helps in lowering the blood cholesterol and blood sugar level.

***Function of each body type in Human body***

Carbohydrates (i) Sugar ⟶ For energy

(ii) Starch ⟶ For energy

(iii) Fibre ⟶ Prevents constipation
Proteins ⟶ For growth and repair of cells
Fat ⟶ For energy and insulation
Vitamins (i) Vitamin C ⟶ For healthy skin/gums
(ii) Vitamin D ⟶ For strong bones
Minerals (i) Calcium ⟶ For strong bones
(ii) Iron ⟶ For make red blood cells
Water ⟶ to dissolve and transport substances

**Q.20** ***Define and describe the balanced diet related to age, sex and activity.***

***Ans:*** **Balance Diet:** A diet which contains all of the nutrients like carbohydrates, fats, proteins, vitamins and minerals in proper proportion according to the requirement of the body is called balanced diet.

**A Balanced Diet Related to Age, Sex and Activity:** Different factors affect the nutritional requirement during the periods of body growth and development. Energy requirements change through life and depend on many factors, such as: Age, Sex and Level of activity.
The key stages in life include:

**Childhood:** The energy requirements of children increase rapidly because they grow quickly and become more active. Young children do not have large stomachs to cope with big meals. Therefore, to achieve the relatively high energy intake for their age, foods should be eaten as part of small and frequent meals.

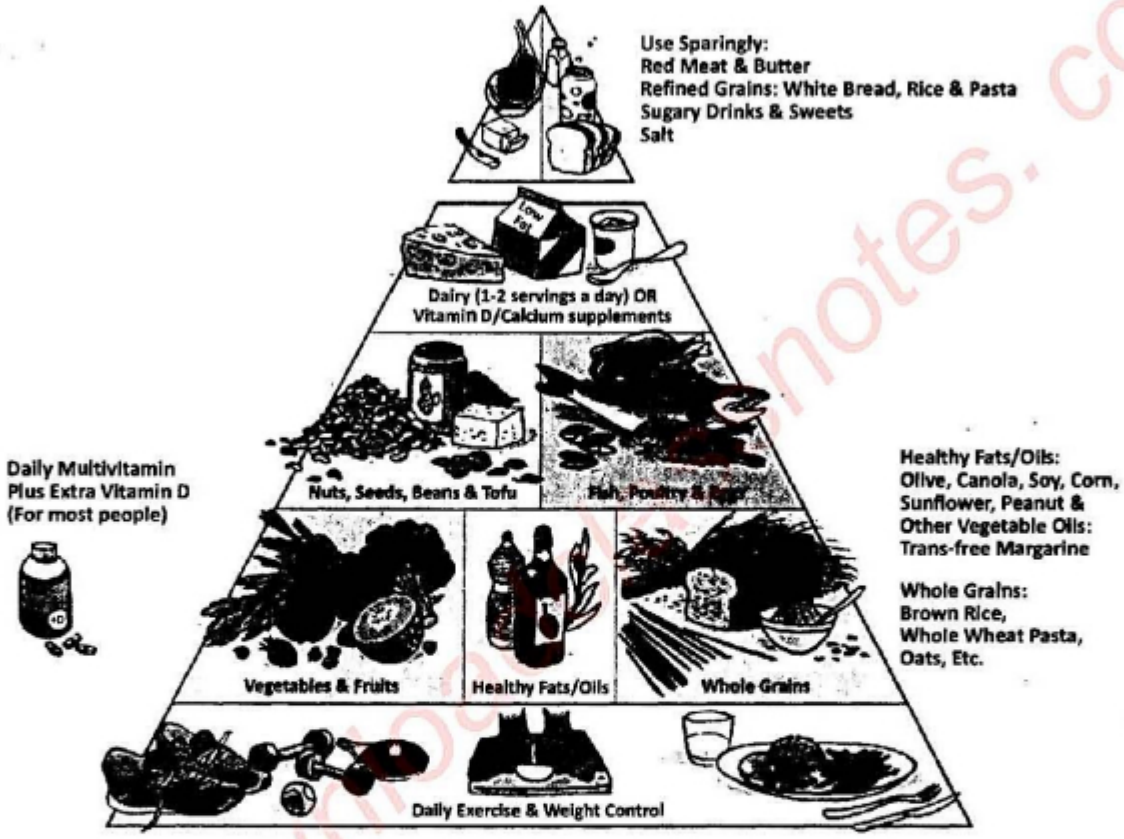
**Adolescence:** It is a period of rapid growth and development and is when puberty occurs. The demand for energy and most nutrients are relatively high. Boys need more protein and energy than girls for growth. Children should be encouraged to remain a healthy weight with respect to their height.

**Adulthood:** A good supply of protein, calcium, iron, vitamin A and D, as part of healthy, balanced diet, are important. Calcium is needed for healthy tooth development, and together with vitamin D, can help develop strong bones.

**Sex and Level of Activity:** Men are more active than women so they need more energy than

women of same age group. Muscular tissues are more in men, their body size is large, and therefore, boys of growing age need more body building nutrients (Proteins, Calcium) as compared to girls of same age.

***THE HEALTHY EATING PYRAMID***




**Q.21** ***Describe problems related to Nutrition (Malnutrition).***

***Ans:*** **Problems Related to Nutrition (Malnutrition):** Problems related to nutrition are grouped as malnutrition. The malnutrition is a condition that occurs when a body does not get enough nutrients. Malnutrition results from a poor diet or a lack of food. It happens when the intake of nutrients or energy is too high, too low, or poorly balanced. Consuming less than 2011 calories a day, one is considered to be under-nourished and suffering from hunger.

According to the World Health Organization (WHO), malnutrition is the gravest single threat to global public health. Globally, it contributes to 45 percent of deaths of children aged less than 5 years.

**Types of Malnutrition:** There are two types of malnutrition:

**(i) Chronic Malnutrition:** Characterized by delayed growth in the children.

**(ii) Acute Malnutrition:** Characterized by insufficient weight in relation to the child's height (emaciation). Acute malnutrition can be moderate of severe according to the child's weight. Under-nourishment and malnutrition have serious consequences for the health of the younger children. Worldwide, three nutrient deficiencies are of particular concern:

- Vitamin A deficiency is the world's most common cause of preventable child blindness and

vision impairment.

- Iron deficiency is associated with decreased cognitive abilities and resistance of disease.
- Iodine deficiency is the major preventable cause of mental retardation worldwide.

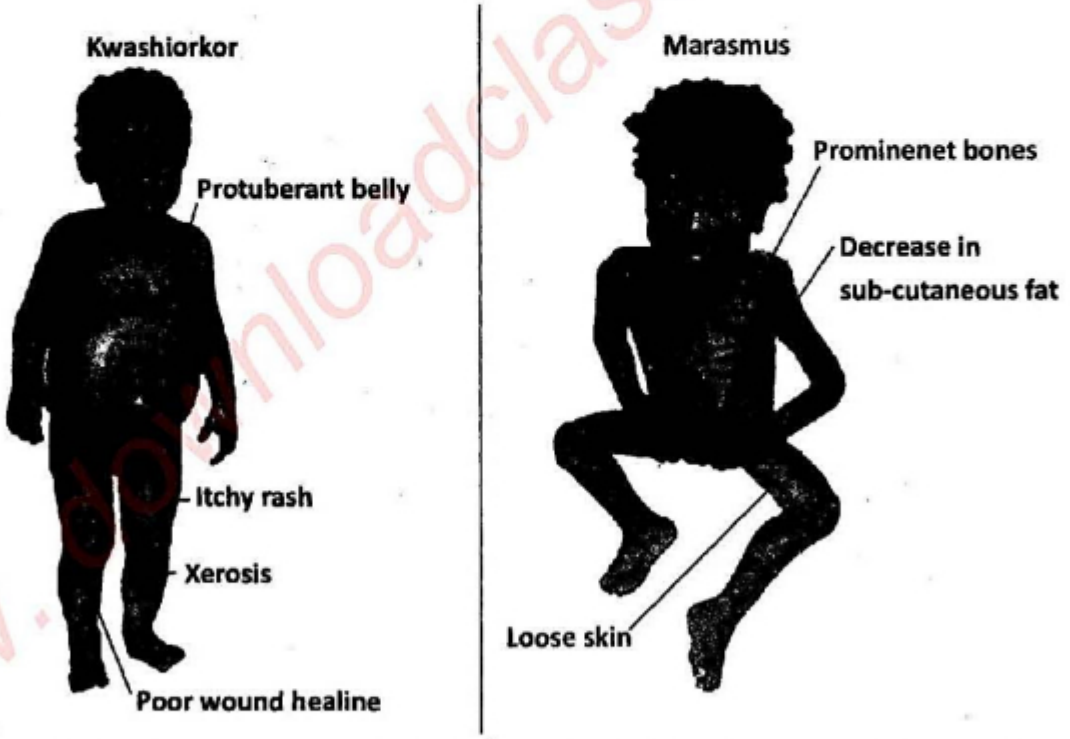
**Q.22** ***What do you know about malnutrition problem in Pakistan?***

***Ans:*** Malnutrition is one of the most prevalent public health problems in Pakistan. It is one of the major underlying factors for high infant and under 5 mortality rate in Pakistan. Poverty, lack of education, poor environmental hygiene and food fads are some of the reasons for its high prevalence in Pakistan.

**Q.23** ***Describe protein deficiency disorders.***

***Ans:*** **Protein Deficiency Disorders:** Protein energy malnutrition (PEM) refers to inadequate availability or absorption of energy and proteins in the body. It is the leading cause of death in children in developing countries. PEM may lead to diseases such as:

**(i) Kwashiorkor:** Kwashiorkor is a severe form of malnutrition, caused by a deficiency in dietary protein. The extreme lack of protein causes an osmotic imbalance in the gastro intestinal system causing swelling of the gut diagnosed as an edema or retention of water as shown in the given figure.



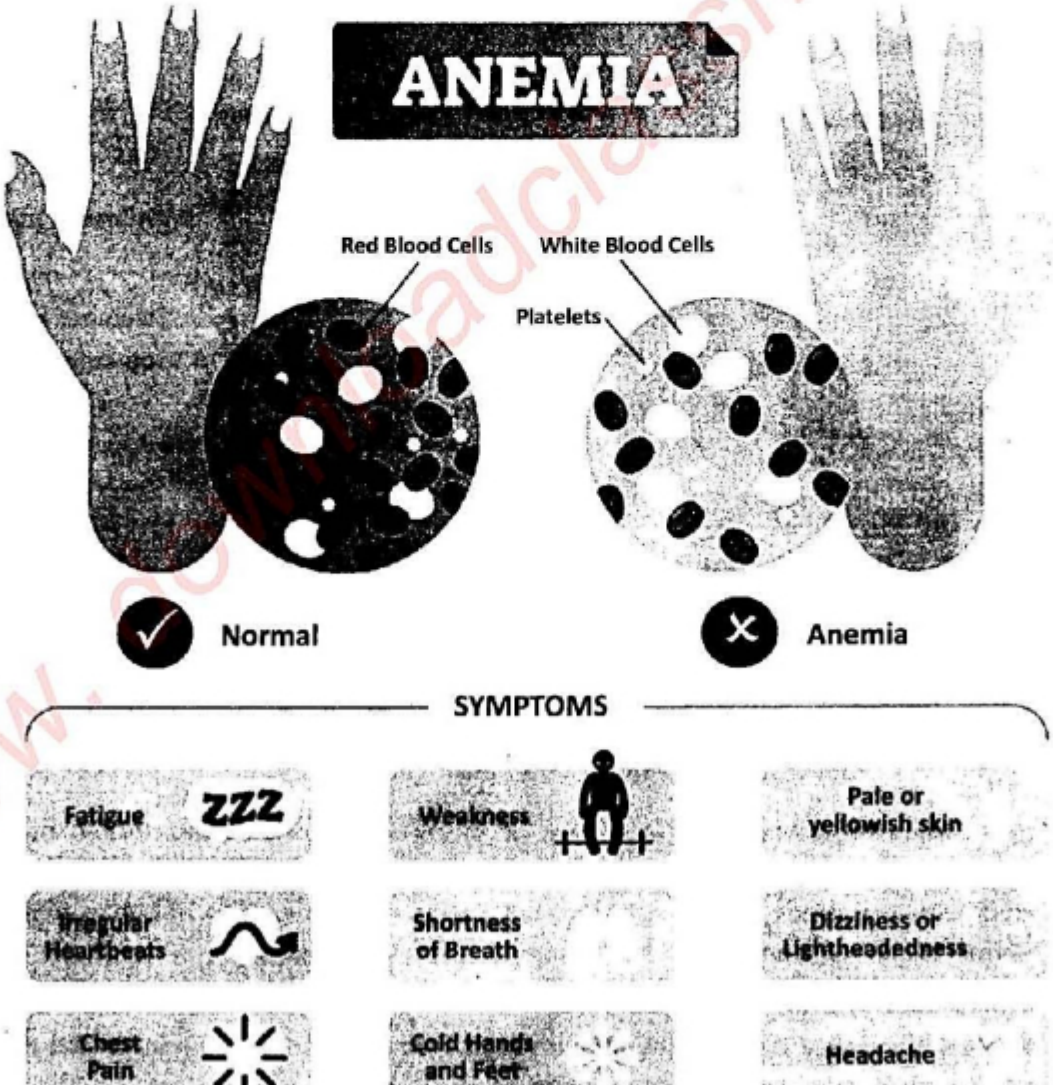

**(ii) Marasmus:** Marasmus is a form of severe malnutrition characterized by energy deficiency. It can occur in anyone with severe malnutrition but usually occur in children. A child with marasmus looks emaciated. Body weight is reduced to less than 62% of the normal (expected) body weight for the age as shown in the figure.

**Q.24** ***Describe mineral deficiency diseases.***

***Ans:*** **Mineral Deficiency Disease:** Diseases resulting from deficiency of a mineral are relatively rare among humans some are given below:

**(i) Goiter:** Goiter is a condition in which thyroid gland becomes enlarged and it results in swelling in neck. Goiter is caused by an insufficient amount of "iodine" in diet. Iodine is used by thyroid gland to produce hormones that control the body's normal functioning and growth.

**(ii) Anemia (most common of all mineral deficiency diseases):** The term anemia literally means "a lack of blood". The condition is caused when number of red blood cells reduced to a level lower than normal. Haemoglobin molecule contains four atom of iron. If body fails to receive sufficient amount of iron, an adequate number of haemoglobin will not be formed. So, there are not enough functioning red blood cells. A person becomes weak and there is shortage of oxygen supply to body's cells.



**Q.25** ***What do you know about over intake of nutrients?***

***Ans:*** **Over Intake of Nutrients:** It is a form of malnutrition in which more nutrients are taken than the amount required for normal growth, development and metabolism. The effects of over intake of nutrients are usually intensified when there is reduction in daily physical activity (decline in energy expenditure). High intake of carbohydrates and fats leads to obesity, diabetes and cardiovascular problems. Similarly, high dose of Vitamin A causes loss of appetite and liver problems. Excess dose of vitamin D can lead to deposition of calcium in various tissues.

**Q.26** ***Describe the effects of malnutrition on human.***

***Ans:*** **The Effects of Malnutrition:** Malnutrition hurts people both mentally and physically. The more malnourished a person is; the more nutrients the person is missing, the more likely person will experience health issues. Some of them are given below:

**(i) Starvation:** It is a severe deficiency in caloric energy intake. It is the most extreme form of malnutrition. In humans, prolonged starvation can cause permanent organ damage and eventually, death.

**(ii) Heart Diseases:** The term "heart disease" is often used interchangeably with the term "cardiovascular disease". Cardiovascular disease generally refers to conditions that involve narrowed or blocked blood vessels that can lead to a heart attack, chest pain (angina) or stoke. Heart problems occur in those people who take unbalanced diet. Fatty foods increase blood cholesterol level. It obstructs the blood vessels leading to heart diseases.

**(iii) Constipation:** People do not schedule their meals. This irregularity cause many health problems like constipation. It can be well defined, a condition in which there is difficulty in emptying the bowels, usually associated with hardened faeces.

**(iv) Obesity:** It is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health. Obesity is most commonly caused by a combination of excessive food intake, lack of physical activity, and genetic susceptibility. Obesity is known as mother-disease and may lead to heart problems, hypertension, diabetes etc.

**Q.27** ***Discuss the social problems related to malnutrition.***

***Ans:*** **Social Problems Related to Malnutrition:** Chronic malnutrition disables and even kills its victims. The World Health Organization (WHO) believed that malnutrition is a causative factor in nearly half of the 10.4 million deaths among children under age five in developing countries. An adequate amount of food or dietary energy supply is necessary to enjoy a healthful and productive life. Malnutrition is not a simple problem with a simple solution. It results from the complex interplay of social and biomedical factors.

**(i) Food Insecurity:** Food insufficiency refers to insufficient food supplies to meet minimum daily diet requirement.

Several countries in Africa and parts of other developing countries do not produce enough food to keep up with the food needs and increased population. Not only do they not produce sufficient food supplies to meet their own needs, but they are economically unable to purchase available food from the exporting countries, which has led to food insecurity in poor countries; as a result, millions are hungry and malnourished. Besides these problems

drought (lack of water) and flood (over flow of water) play terrible role in decreasing crop yields.

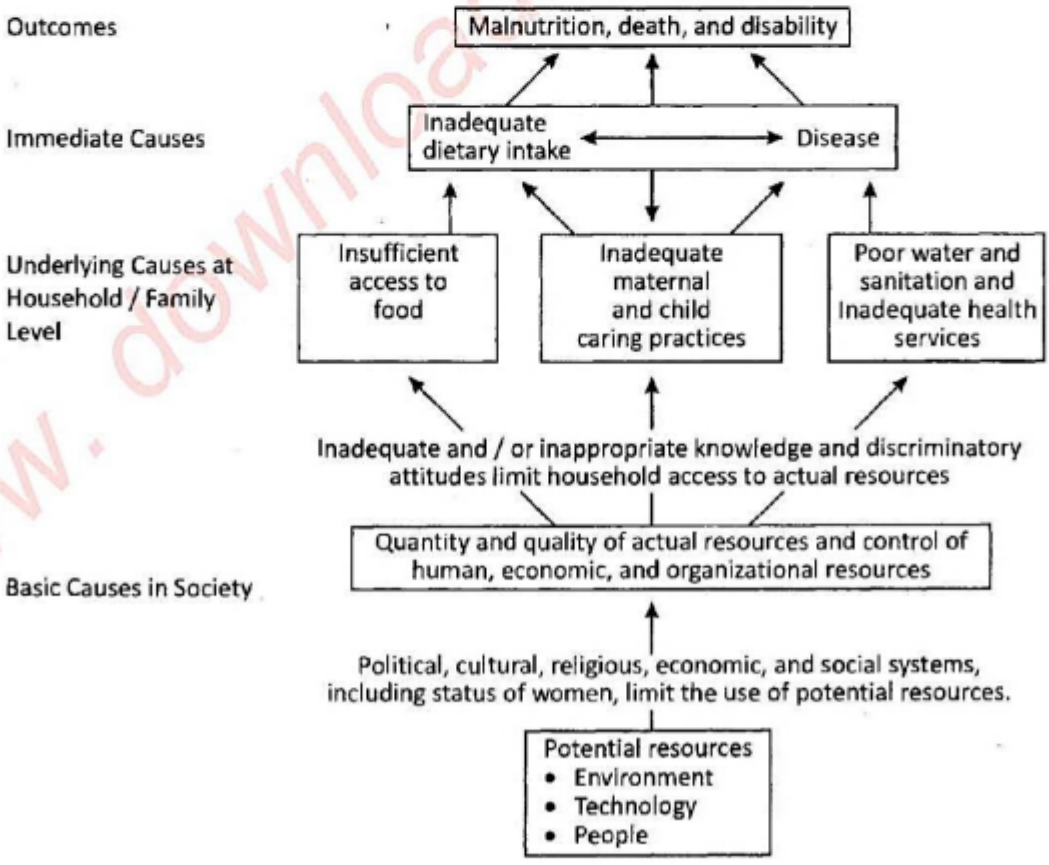
Despite the profound effects of malnutrition problems on human and social developments, the world has shown only limited public alarm.

**(ii) Poverty:** For various reasons people in developing countries are increasingly unable to produce enough food to meet their own needs. To meet the ongoing demand for food, food-deficit countries (those unable to produce sufficient food to meet their needs) must import additional food and make it available to people. Even if there is an abundance of food, some people may not have access to it, because more and more, access to food in developing countries is determined by household income.

**(iii) Inequality:** Because of a cultural preference for men over women in many developing countries, many women risk malnutrition throughout their lives. The risk of malnutrition in girls begins at an early age. Although nutritional needs are the same for boys and girls in the first 10 years of life, boys often get more food and girls do.

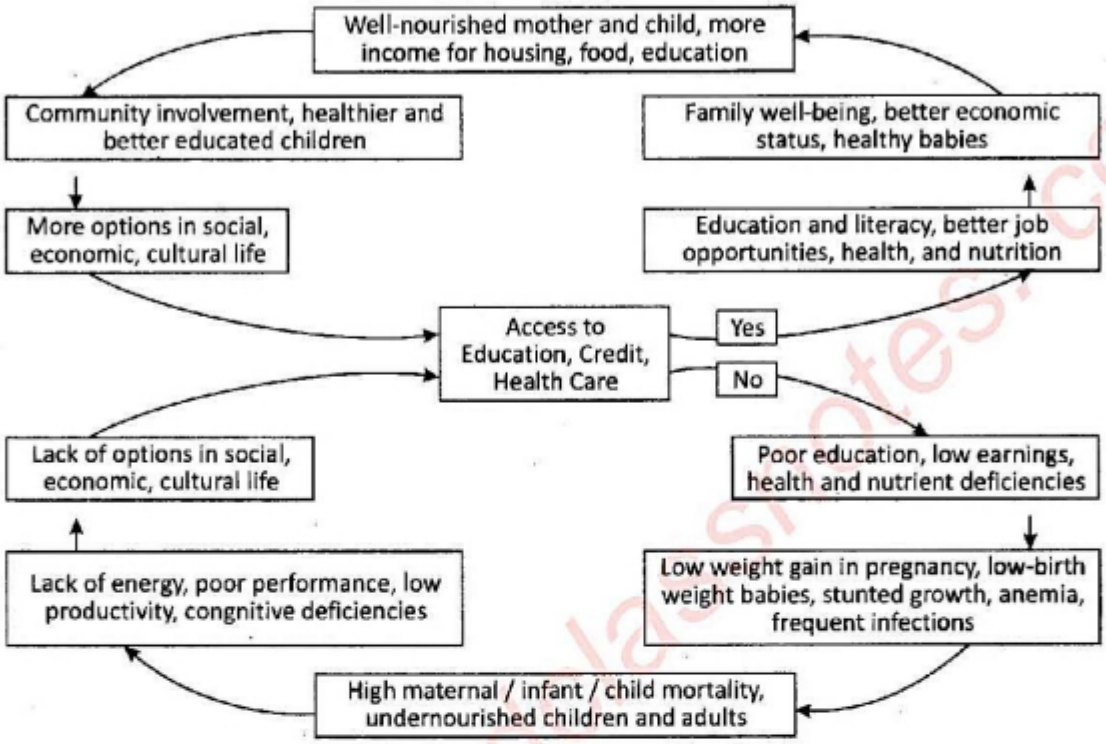
**(iv) Risk of Infection:** The normal human body has the capacity to resist foreign organisms to toxins through the immune system, but the immune system ceases to function properly when the body is malnourished. When the immune system (the general process of body) is compromised by malnutrition, the skin's ability to resist the invasion of organisms, the acid secretion produced by the stomach to resist foreign agents, or the production of chemical compounds in the blood that destroy toxins can be affected adversely.

***Graphic representation of the role of society regarding malnutrition***



## BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

***Graphic representation: how to overcome social and economic problems related to mulnitrition?***




**Q.28** ***Define the terms digestion and egestion.***

***Ans:*** **Digestion:** Digestion is the process in which large and non-diffusible molecules of food are converted into small and diffusible molecules that can cross the membranes.

Digestive is important for breaking down food into nutrients, which the body uses for energy, growth and cell repair. Food and drinks must be changed into smaller molecules of nutrients before the blood absorbs them and carries them to cells throughout the body.

**Egestion:** After absorption of the digestible material, indigestible material expelled out of the body through the process of egestion.

**Q.29** ***Describe human digestive system.***

***Ans:*** **The Digestive System of Human:** The digestive system is made up of the alimentary canal and the other abdominal organs that play a part in digestion, such as the liver and pancreas.

**Alimentary Canal of Human:** The alimentary canal (also called the digestive tract) is the long tube of organs-including the oral cavity, oesophagus, stomach and intestines-that runs from the mouth to the anus. An adult's digestive tract is about 30 feet (about 9 meters) long.

**(i) Oral Cavity:** It is the first part of alimentary canal. It is equipped with four kinds of teeth. The teeth grind the food. Oral cavity or mouth also has three pairs of salivary glands which produced saliva.

*Functions:* Saliva contains an enzymes Ptyalin which converts starch into maltose (sugar).

**(ii) Pharynx:** The pharynx, a passageway for food and air, is about 5 inches (12.7 centimeters) long. A flexible flap of tissue called the epiglottis reflexively closes over the windpipe when we swallow to prevent choking.

*Functions:* From the throat, bolus travels down a muscular tube in the chest called the esophagus.

**(iii) Oesophagus:** It is a long muscular tube which opens into stomach. At the end of the oesophagus, a muscular ring called a sphincter allow food to enter the stomach and then squeezes shut to keep food or fluid from flowing back up into the oesophagus.

*Functions:* This tube brings food into the stomach.

**(iv) Stomach:** It is a large bag like, thick walled organ which stores food. Its walls contain gastric glands which secrete gastric juice which contains HCl and enzymes called pepsin and renin.

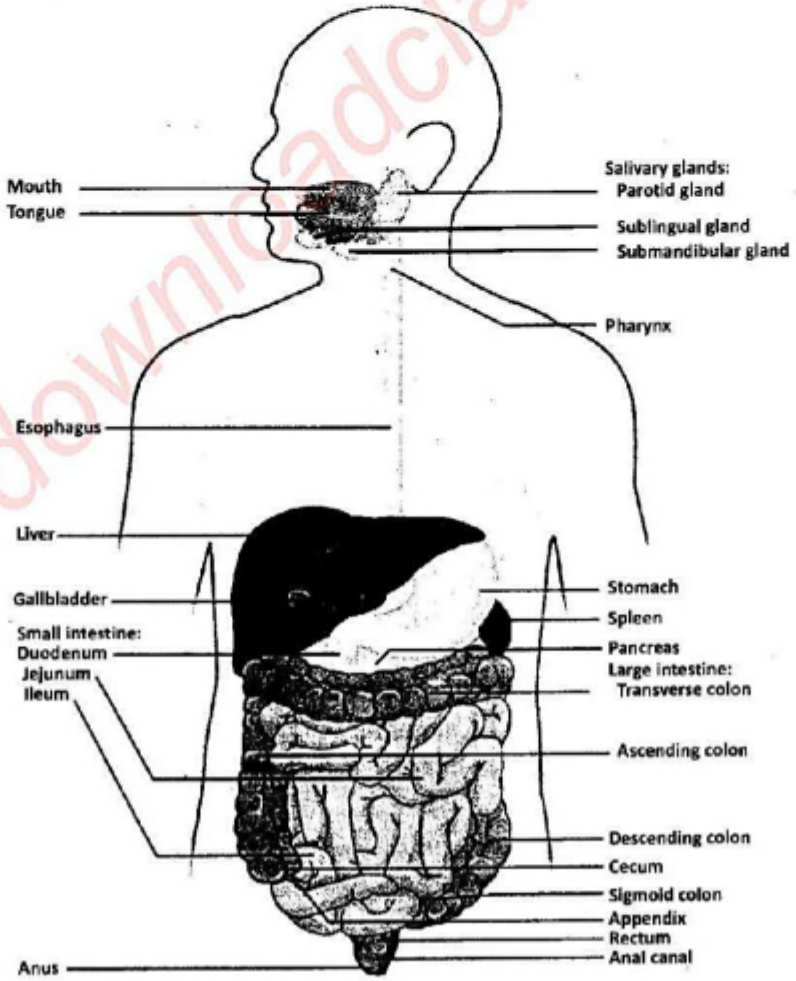
*Functions:* Pepsin breaks down proteins into peptones, renin curdles milk in infants and HCl kills germs.

**(v) Small Intestine:** The small intestine is made up of three parts:

(a) duodenum (b) jejunum (c) ileum

**(a) The Duodenum:** It is the first part of small intestine which is about 25cm (10 inches) long. It is C-shaped part of small intestine.

*Functions:* The duodenum receives chyme from the stomach and it is a part of alimentary canal where most of the digestive process occurs. Dusts that empty into the duodenum deliver pancreatic juice and bile from the pancreas and liver,



**(b) The Jejunum:** It is the coiled shaped mid-section of small intestine.

**(c) The Ileum:** It is the final section of small intestine which leads into the large intestine. Its inner surface bears numerous finger-like projections called villi, which has numerous blood capillaries and a lymph vessel.

*Functions:* Ileum absorbs completely digested food.

**(vi) Large Intestine:** It consists of three parts: Colon, Caecum and Rectum.

**(a) Colon:** It consists of three portions, an ascending, a transverse and a descending portion.

*Function:* It reabsorbs water and salts from the undigested food.

**(b) Caecum:** At the junction of the small and large intestine is a sac like structure the caecum and has a small finger like projection called appendix.

*Function:* It has no specific function is food digestion, but in human the appendix may get infected with germs and foreign bodies. This causes severe inflammation and pain in the appendix and leads to appendicitis.

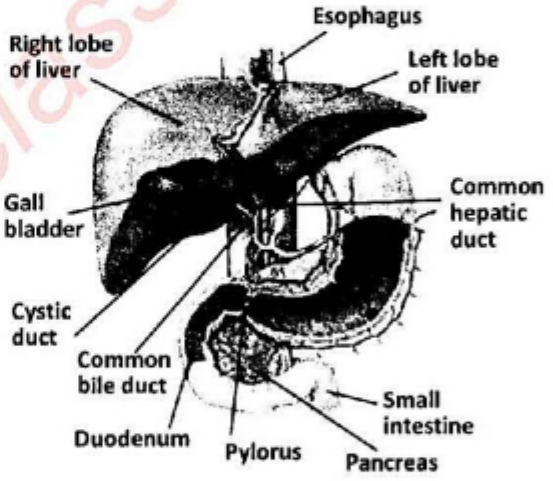
**(c) Rectum:** It is the last part of large intestine. It opens to the outside by anus.

*Function:* It stores undigested food.

**Liver and its Functions:** The liver produces bile, which helps the body to digest and absorb fat. Bile is stored in the gallbladder until is needed. Bile travels through special channel (bile duct) directly into the small intestine.

It also makes a substance that neutralizes stomach acid. The liver also plays a major role in the handling and processing of nutrients, which are carried to the liver in the blood from the small intestine.

The liver is a metabolically active organ responsible for many vital life functions.




**Q.30** ***Name and define the steps involved in digestion.***

***Ans:*** The digestion consists of following steps:

**Ingestion:** In this process, food is taken in.

**Propulsion:** Peristalsis-alternate waves of muscular contraction and relaxation in the primary digestive organs. The end result is to squeeze food from one part of the system to the next.

**Peristalsis:** The movement of food from oesophagus and onward up to anus takes place by means of an automatic movement. This automatic movement is termed as peristalsis.

**Mechanical Digestion:** The process of breaking the food mechanically into smaller pieces is called mechanical digestion. It is physical preparation of food for digestion.

**Segmentation:** It is mixing of food in the intestines with digestive juices.

**Chemical Digestion:** The chemical breakdown of food into smaller chemical molecules with the help of enzymes is called chemical digestion. Carbohydrates, fat and Proteins are broken

down by enzymes.

**Absorption:** In this process, the simple particles of food are absorbed by the cell. In this process, transfer of the digested portion of food into the blood from the digestive canal occurs.

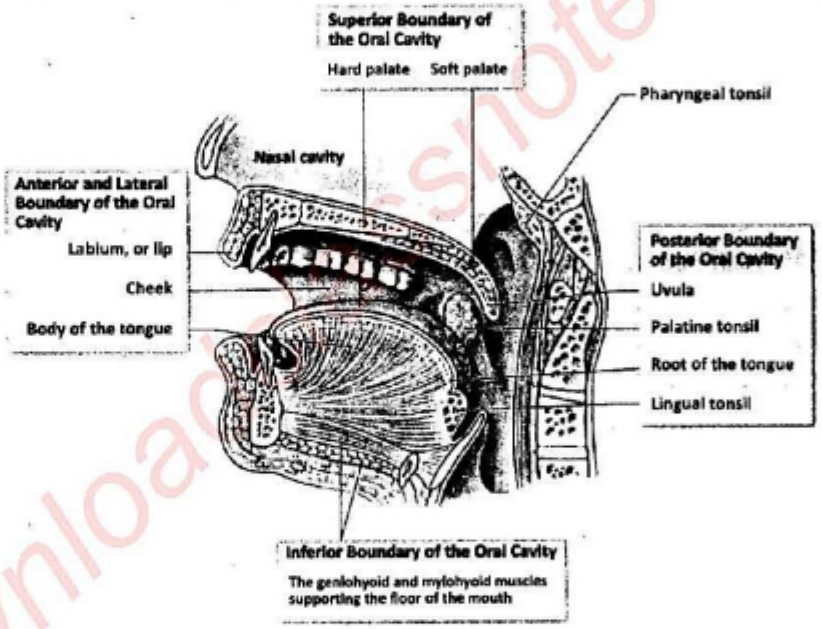
**Assimilations:** In this process, the simple substances are again converted into complex ones by the cells for its various processes like growth, reproduction etc.

**Egestion (Defecation):** Removal or elimination of the waste products from the body is called egestion.

**Q.31** ***What is oral cavity? Describe its functions.***

***Ans:*** ***Oral Cavity:*** Oral cavity is the space behind mouth in-between upper and lower jaw. Digestion begins in the oral cavity, well before food reaches the stomach. When we see, smell, taste, or even imagine a tasty snack, our three pairs of salivary glands, which are located under the tongue and near the lower jaw, begin producing saliva. This flow saliva is coordinated with a brain reflex that triggered when we sense food or think about eating. In response to this sensory stimulation, the brain sends impulses through the nerves that control the salivary glands, telling them to prepare for a meal.

A sagittal section showing the major components forming the boundaries of the oral cavity




**Functions of Oral Cavity:** Oral cavity has many important functions:

**(i) Food Selection:** When food enters the oral cavity it tasted and felt. Here food is selected or rejected due to the taste, hard object or dirt. Smell and vision also help in selection.

**(ii) Grinding of Food:** The second function of oral cavity is the grinding of food by teeth. It is known as chewing or mastication. It is useful because esophagus can pass only small piece through it as well as enzymes cannot act on large pieces of food.

**(iii) Lubrication of Food:** The third function of the oral cavity is lubrication of food by mixing saliva secreted by salivary glands. It has two main functions.

**(a)** Adds water and mucus to the food.

**(b)** Partial digestion of starch by saliva which contains an enzyme salivary amylase.

**(iv) Chemical Digestion:** Saliva contains an enzyme salivary amylase which helps in the digestion of starch partially. Than the pieces of food are rolled up by the tongue into small, slippery, spherical mass called bolus.

**(v)** Swallowing of the Bolus: Swallowing is accomplished by muscle movements by the tongue and mouth, food moves into the throat, or pharynx.

**Q.32** ***Describe the functions of salivary glands.***

***Ans:*** **Salivary Glands:** When we see, smell, taste, or even imagine a tasty snack, our three pairs of salivary glands, which are located under the tongue and near the lower jaw, begin producing saliva. This flow saliva is coordinated with a brain reflex that triggered when we sense food or think about eating. In response to this sensory stimulation, the brain sends impulses through the nerves that control the salivary glands, telling them to prepare for a meal.

**Functions of Salivary Glands:** The main function of salivary glands is lubrication of food by mixing saliva secreted by salivary glands. It has two main functions.

**(a)** Adds water and mucus to the food.

**(b)** Partial digestion of starch by saliva which contains an enzyme salivary amylase.

**Q.33** ***Why grinding and lubrication are necessary for swallowing?***

***Ans:*** **Grinding:** The grinding of food by teeth is known as chewing or mastication. It is useful because esophagus can pass only small piece through it as well as enzymes cannot act on large pieces of food.

**Lubrication:** Lubrication of food by mixing saliva secreted by salivary glands, has two main functions.

**(a)** Adds water and mucus to the food.

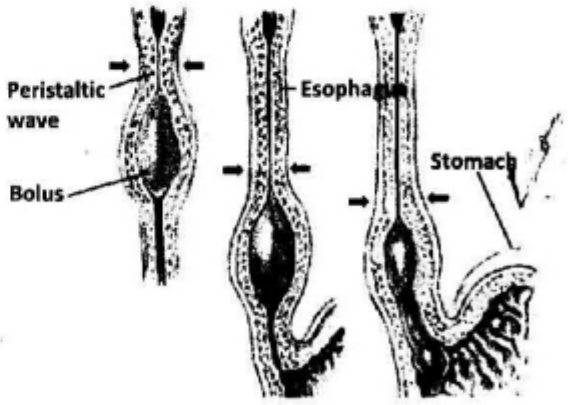
**(b)** Partial digestion of starch by saliva which contains an enzyme salivary amylase.

Than the pieces of food are rolled up by the tongue into small, slippery, spherical mass called bolus.

As chewing continues, the food is made softer and warmer, and the enzymes in saliva begin to break down carbohydrates in the food. After chewing, the food (now called a bolus) is swallowed easily.

**Q.34** ***What is peristalsis?***

***Ans:*** **Peristalsis:** Waves of rtythmic movements of muscle contractions and relaxation called peristalsis which force down food through the oesophagus to the stomach. A person normally isn't aware of the movements of the esophagus, stomach and intestine that take place as food passes through the digestive tract.




**Q.35** ***Briefly describe the structure and function of stomach.***

***Ans:*** **Structure of Stomach:** Stomach is j-shaped thick walled, expandable bag, located in the left of abdomen just beneath the diaphragm. The stomach has three regions:

**(i)** cardiac, just after the oesophagus,

**(ii)** fundus, the largest part of stomach, and

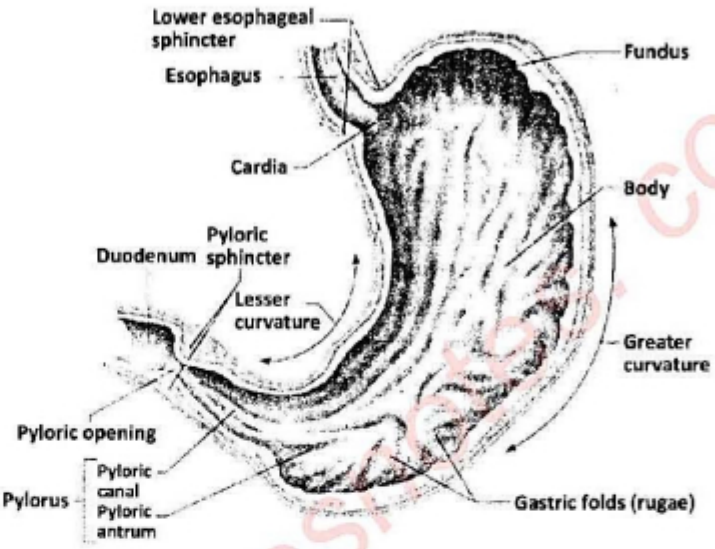
**(iii)** pyloric, part located at the other end of stomach and opens into small intestine.

Stomach has two sphincters (opening which are guarded by muscles). The cardiac sphincter

lies in between stomach and oesophagus. Pyloric sphincter is between stomach and small intestine.

**Functions of Stomach:**

**(i)** The stomach muscles churn and mix the food with acids and enzymes, breaking it into much smaller, digestible pieces. An acidic environment is needed for the digestion that takes place in the stomach.




**(ii) Gastric Juices:** Glands in the stomach lining produce about 3 quarts (2.8 liters) of these digestive juices each day. When food enters into the stomach the gastric juice is secreted by gastric glands found in the stomach wall. It is composed of mucous, hydrochloric acid and protein digesting enzyme pepsinogen. Hydrochloric acid converts the inactive enzyme pepsinogen into active form called pepsin. HCl also kills micro-organisms present in food. Stomach is protected against the action of acid by mucus.

Pepsin partially digests the protein portion of the food into polypeptides and shorter peptide chains. In stomach food is further broken apart through a process called churning. The walls of stomach contract and relax and these movements help in mixing of the gastric juice and food. The churning action also produces heat which helps to melt the lipid contents of the food.

By the time food is ready to leave the stomach, it has been processed into a thick paste like liquid called chyme. The pylorus keeps chyme in the stomach until it reaches the right consistency to pass into the small intestine. Chyme is then squirted down into the small intestine, where digestion of food continues.

**Q.36** ***Describe the actions of bile salts, pancreatic juice and intestinal juice.***

*Ans:* **Bile Salts:** They have detergent action on particles of dietary fat which causes fat globules to break down or be emulsified into minute, microscopic droplets.

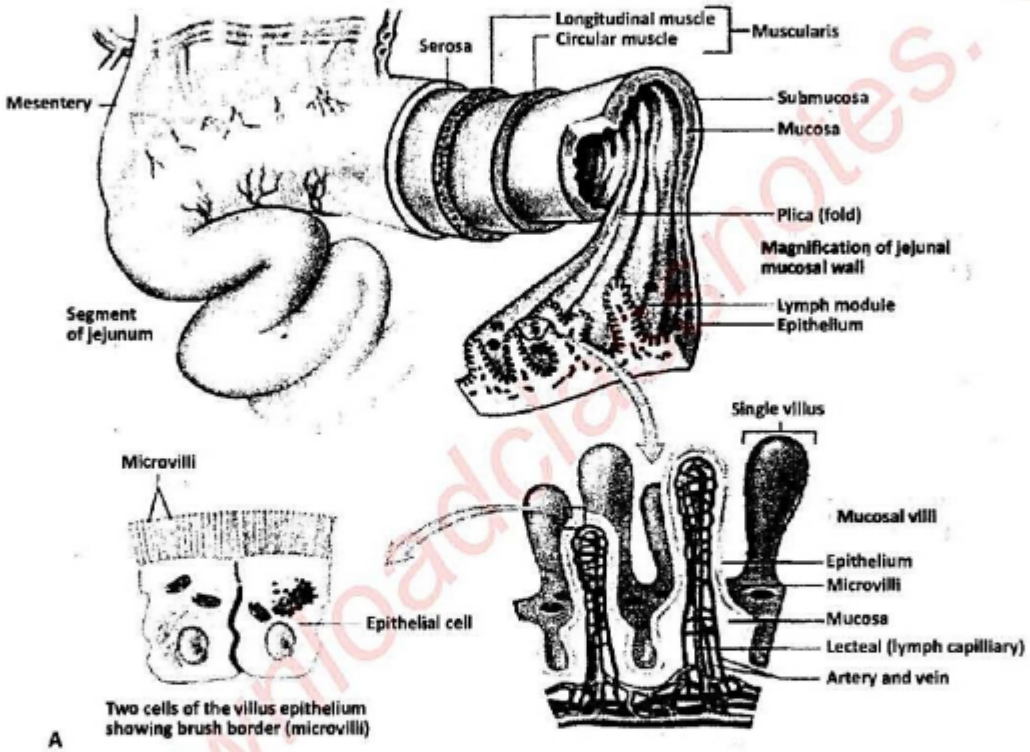
**Pancreatic Juice:** Itis a liquid secreted by the pancreas, which contains a variety of enzymes, including protease like trypsinogen, pancreatic lipase and amylase, which digest protein, lipids and carbohydrates respectively.

**Intestinal Juice:** It is produced from the small intestine contain enzymes and pancreatic juice break down all four groups of molecules found in food (polysaccharides, proteins, fats and nucleic acids) into their component molecules.

**Q.37** ***What are villi? Explain the role of villi in increasing the absorptive surface of intestine.***

*Ans:* **Villi:** The inner wall of the small intestine is covered with millions of microscopic, finger-like projections called villi (singular, villus). Each villus is connected and richly supplied with blood capillaries and lymphatic vessel, i.e. lacteal. The walls of villus are made up of only

one layer of cells, in thickness. The villi are the vehicles through which nutrients can be absorbed into the body. They increase the surface area over which absorption and digestion occur. These specialized cells help absorbed materials cross the intestinal lining into the bloodstream. The bloodstream carries simple sugars, amino acids and nucleosides to the liver via hepatic portal vein for storage or further chemical changes. From liver, the required food molecules go towards the heart via the hepatic vein. The lymphatic system, a network of vessels that carry white blood cells and a fluid called lymph throughout the body, absorbs glycerol, fatty acids and vitamins.




A

| *Polymers* | *Monomers* | *Roles* |
|---|---|---|
| Complex Carbohydrates (i.e. starch) | Glucose and other simple sugars | Broken apart to get energy to make ATP. |
| Proteins | Amino acids | Used to make our own enzymes and other body proteins |
| Lipids (Fats, waxes, oils And steroids) | Fatty acid chains, glycerine (except steroid) | Used for cellular energy and energy storage, used to make cell membranes, steroid hormones |

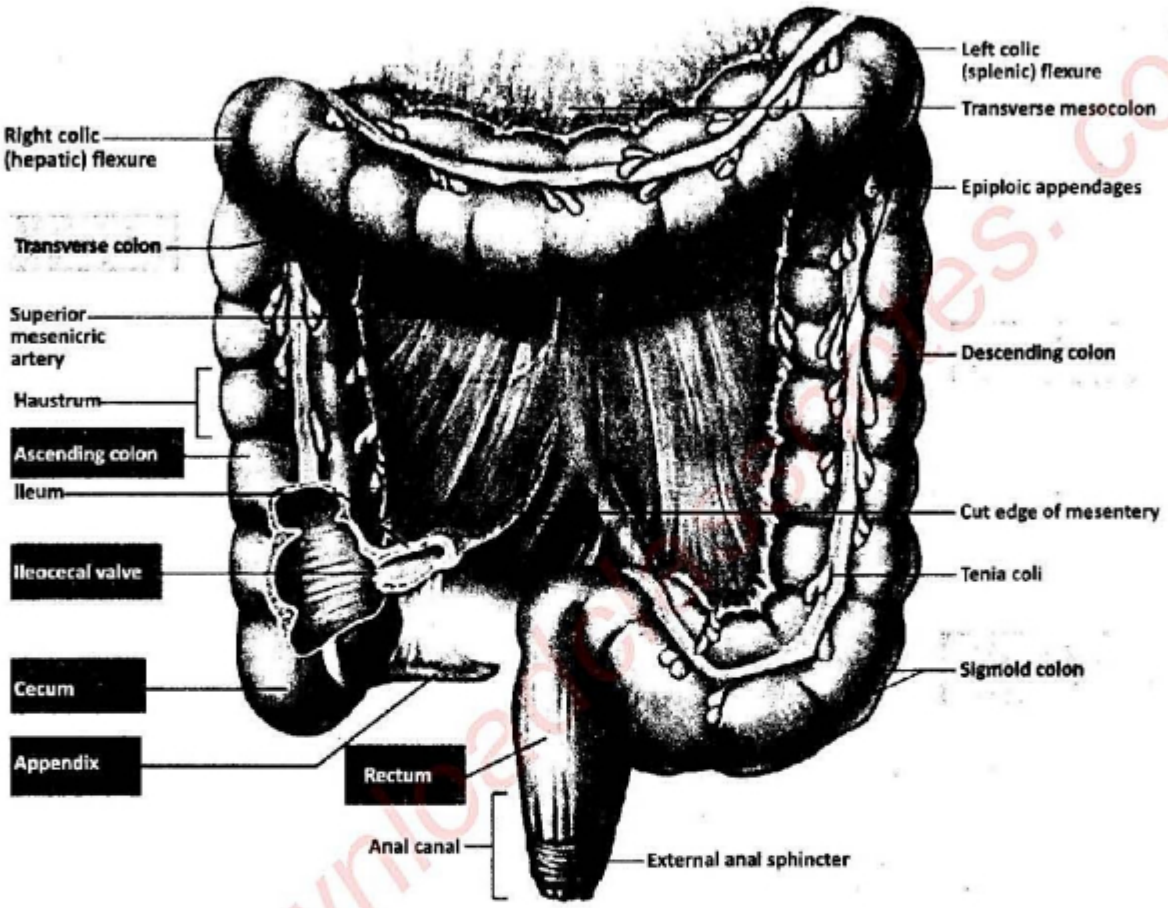
**Q.38** ***Describe the structure and functions of large intestine.***

***Ans:*** **Structure of Large Intestine:** From the small intestine, food that has not been digested (and some water) travels to the large intestine through a muscular ring that prevents food from returning to the small intestine. By the time food reaches the large intestine, the work of

absorbing nutrients is nearly finished.

The large intestine is made up of three parts:

(i) caecum (ii) colon (iii) rectum




**(i) Caecum:** The caecum is a pouch at the beginning of the large intestine that joins the small intestine to the large intestine. This transition area expands in diameter, allowing food to travel from the small intestine to the large. The appendix, a small, hollow, finger-like pouch, hangs at the end of the cecum. It no longer appears to the useful to the digestive process.

**(ii) Colon:** The colon extends from the caecum up the right side of the abdomen, across the upper abdomen, and then down the left side of the abdomen, finally connecting to the rectum. The colon has three parts: the ascending colon and transverse colon.

**(iii) Rectum:** It is the last part of large intestine. It opens to the outside by anus.

**Functions of Large Intestine:** The large intestine's main function is to remove water from the undigested matter and form solid waste that can be egested. The ascending colon absorbs fluids and salts and the descending colon holds the resulting waste (faeces). Faeces mainly consist of undigested material, large number of bacteria, sloughed off gastrointestinal cells, bile pigments and water. Bacteria in the colon help to digest the remaining food products.The rectum is where faeces are stored until they leave the digestive system through the anus as a bowel movement.

**Q.39** ***Explain the disorders of gut.***

***Ans:*** **Diarrhea:** It is a condition in which the sufferer has frequent watery, loose bowel movements due to fast peristaltic movement. This condition may be accompanied by painful abdominal cramps, nusea, fever and generalized weakness. It occurs when required water is not absorbed in blood from colon. The main cause of diarrhea includes lack of adequate safe water, virus and bacteria. In malnourished individuals, diarrhea leads to severe dehydration and can be life threatening. To control diarrhea consume adequate amounts of water of replace loss, preferably mixed with essential salts and some amount of nutrients.

**Constipation:** Constipation is a condition, where a person experiences hard faeces that are difficult to eliminate. The main causes of constipation are hardening of faeces due to excessive absorption of water through colon, insufficient intake of dietary fibre, dehydration, use of medicine (e.g. those containing iron, calcium and aluminum) and tumors in rectum or anus. The treatment of constipation is change in diet and exercise habits, use of laxative (e.g. paraffin) may be in some cases. To prevent constipation is easier than treatment.

**Ulcer (Peptic Ulcer):** It is a sore in gut lining and can be different organs such as; ulcer of stomach is called "gastric ulcer", Ulcer of duodenum is called "duodenal ulcer", ulcer of oesophagus is called "esophageal ulcer" and breakdown of tissues by acidic gastric juice. It can be due to the long term use of anti-inflammatory medicine (e.g. aspirin), smoking, drinking coffee, colas and eating spicy food. Few of the signs are as under: abdominal burning after meals, abdominal pain, rush of saliva after an episode of regurgitation, nausea and loss of appetite and weight.

Ulcer can be treated with medicine, containing (alkaline composition) and avoiding spicy food.

**Q.40** ***How stomach linings are protected from acidic environment?***

***Ans:*** Our stomach protects itself from being digested by its own enzymes, or burnt by the corrosive hydrochloric acid, by secreting sticky, neutralising mucus that clings to the stomach walls. If this layer becomes damaged in any way it can result in painful and unpleasant stomach ulcers.

The stomach is protected by the epithelial cells, which produce and secrete a bicarbonate rich solution that coats the mucosa. Bicarbonate is alkaline, a base, and neutralizes the acid secreted by the parietal cells, producing water in the process. This continuous supply of bicarbonate is the main way that your stomach protects itself from auto-digestion (the stomach digesting itself) and the overall acidic environment.

**Q.41** ***Why fats are called most efficient from of food?***

***Ans:*** Fats are the slowest source of energy but the most energy-efficient form of food. Each gram of fat supplies the body with about 9 calories, more than twice that supplied by proteins or carbohydrates. Because fats are such an efficient form of energy, the body stores any excess energy as fat. The body deposits excess fat in the abdomen (omental fat) and under the skin (subcutaneous fat) to use when it needs more energy.

**Q.42** ***Distinguish between the following in tabulated form:***

***(i) Fat-soluble vitamins and water soluble vitamins***

***(ii) Marasmus and kwashiorkor***
***(iii) Chemical digestion and mechanical digestion***
***(iv) Autotrophic nutrition and heterotrophic nutrition***
***(v) Inorganic fertilizers and organic fertilizers***
***(vi) Carnivores and Herbivores***
***(vii) Digestion in stomach and digestion in intestine***

**Ans:** ***(i) Fat-soluble vitamins and water soluble vitamins***

| | *Water soluble vitamins* | *Fat-soluble vitamins* |
|---|---|---|
| Vitamins | B, C | A, D, E, K |
| Site of Absorption | Small intestines | Small intestine |
| Dietary intake | Excess intake usually detected and excreted by the kidneys | Excess intake tends to be stored in fact storage sites |
| Solubility | Hydrophilic | Hydrophobic |
| Capitalize | Easily absorbed the blood, travels freely in the blood stream | Absorbed into the lymphatic system, many require protein carriers to travel in the blood |
| Body storage | Not generally | Yes |
| Deficiency | Deficiency symptoms appear relatively quickly | Deficiency symptoms are slow to develop |
| Toxicity | Low risk | Higher risk |
| Need for daily consumption | Yes | No |

***(ii) Difference between Marasmus and Kwashiorkor***

| *Kwashiorkor* | *Marasmus* |
|---|---|
| The deficiency of protein in the body of children upto three years leads to the kwashiorkor. | The deficiency of calories and other nutrition in the children of upto one year leads to marasmus |
| It occurs due to deficiency of proteins. | It occurs due to deficiency of calories, proteins and other nutrients. |
| Acute illness, trauma, infections, measles, sepsis are some of the causes of the kwashiorkor. | Chronic infections, prolonged starvation, recurring infections are some of the significant causes of marasmus. |
| Muscles and limbs get thin. | Limbs get thin. |
| Oedema (when an excess of watery fluid is accumulated in the tissues or cavity of the body) is present. | Oedema is absent. |
| Subcutaneous fat (harmless fat present under the skin and protect against some pathogens and disease) is present. | Subcutaneous fat is absent. |
| Typical weight loss is observed. | There is severe weight loss. |

| | |
|---|---|
| Enlargement in fatty liver cells. | No such enlargement is observed. |
| Appetite is prodigious. | Appetite is poor. |
| Cracky skin appears. | Wrinkled and dry skin appears. |
| No prominent ribs. | Prominent ribs. |
| High mortality. | Low mortality, until the condition, is severe. |

***(iii) Difference between Chemical Digestion and Mechanical Digestion***

| *Mechanical Digestion* | *Chemical Digestion* |
|---|---|
| Mechanical digestion refers to the breakdown of food into digestible particles, mainly by teeth. | Chemical digestion refers to the process by which compounds with a high molecular weight in the food are broken down into small substances that can be absorbed by the body. |
| It occurs from the mouth to the stomach. | It occurs from the mouth to the intestine. |
| A major part of mechanical digestion occurs in the mouth. | A major part of chemical digestion occurs in the stomach. |
| It is driven by teeth. | It is driven by enzymes. |
| It increases the surface area for the enzymatic reactions in the chemical digestion. | It enhances the absorption of the nutrients by breaking down them into small molecules. |

***(iv) Difference between Autotrophic Nutrition and Heterotrophic Nutrition***

| *Autotrophic Nutrition* | *Heterotrophic Nutrition* |
|---|---|
| Autotrophic nutrition is a mode of nutrition in which an organism prepares its own food with the help of simple inorganic materials like water and carbon dioxide from the surrounding. | Heterotrophic nutrition is a mode of nutrition in which an organism cannot prepare its own food and depend upon other organisms for its food. |
| For autotrophic nutrition, presence of chlorophyll (green pigment) and sunlight are necessary. Autotrophic nutrition takes place during day time. | No green pigment and sunlight is required for heterotrophic nutrition. |
| All green plants synthesizing their own food through the biological process are referred to as photosynthesis are examples of autotrophs. | Animals including herbivores, omnivores and carnivores are examples of heterotrophs. |
| In the food chain, autotrophs are the primary producers. | Heterotrophs are consumers; they are place at secondary or tertiary level. |
| Types of autotrophic mode of nutrition include: phototrophic and chemotrophic. | Types of heterotrophic mode of nutrition include: holozoic, saprophytic, parasitic and symbiotic association. |
| Autotrophs are independent of any organisms. | Heterotrophs rely on other organisms for their food. |
| Autotrophs are capable of storing sunlight and chemical energy. | Heterotrophs are not capable of storing energy. |

| | |
|---|---|
| Heterotrophs can move from one place to another in search of food. | Autotrophs cannot move from one place to another. |
| In autotrophs, the process of digestion is absent. | Heterotrophs, the process of digestion is required to convert complex molecules into simpler molecules. |

***(v) Difference Between Inorganic Fertilizers and Organic Fertilizers***

| *Chemical Fertilizers* | *Organic Fertilizers* |
|---|---|
| Chemical fertilizers are rich equally in three essential nutrients that are needed for crops and always ready for immediate supply of nutrients to plants if situation demands. | Adds natural nutrients to soil, increases soil organic matter, improves soil structure and tilth, improves water holding capacity, reduces soil crusting problems, reduces erosion from wind and water, Slow and consistent release of nutrients. |
| Several chemical fertilizers have high acid content. They have the ability to burn the skin. Changes soil fertility. | Have slow release capability; distribution of nutrients in organic fertilizers is not equal. |
| Immediate supply or fast release | Slow release |
| Chemical fertilizers are manufactured from synthetic material | Organic fertilizers are made from materials derived from living things. |
| Artificially prepared. | Prepared naturally. |
| Chemical fertilizer has an equal distribution of three essential nutrients: phosphorous, nitrogen, potassium. | Have unequal distribution of essential nutrients. |

***(vi) Difference Between Carnivores and Herbivores***

| *Carnivores* | *Herbivores* |
|---|---|
| Those animals which feed upon other animals are called carnivores. | Those animals which use plants for their food are called herbivores. |
| They have sharp, long strong and pointed canine teeth. | They do not have strong, and pointed canines. |
| Cat, dog, lion are carnivores. | Horse, deer, cattle are harbivores. |

***(vii) Difference Between Digestion in Stomach and Digestion in Intestine***

| *Digestion in Stomach* | *Digestion in Intestine* |
|---|---|
| Gastric glands are present in stomach. | Intestinal glands are present in small intestine. |
| Gastric glands secrete gastric juice. | Intestinal glands secrete intestinal juice. |
| Food becomes acidic due to the presence of HCl in stomach. | Food is neutralized due to bile and pancreatic juices. |

## Solution of Review Questions

**1.** ***Encircle the correct answer:***

See "Multiple Choice Questions (MCQs)" - Q.1 to Q.10

**2.** ***Fill in the blanks:***

(i) Sea food is an excellent source of protein because it's usually low in _____.

(ii) Iron deficiency is associated with decreased cognitive abilities and resistance to _____.

(iii) Wave of rhythmic movements of muscle contrition and relaxation called _____.

(iv) Liquid secreted by the pancreas, which contains a variety of _____.

(v) Living organisms which derive their food from dead and decaying organic materials called _____.

(vi) Nutrients that are needed in the highest concentration called _____.

(vii) Fertilizers are substances containing chemical elements such as manure or mixture of _____.

(viii) High solubility of fertilizers also degrades ecosystem through _____.

(ix) Carbohydrates which digested quickly are called _____.

(x) Each gram fat supplies the body with about _____.

### Answers

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *i.* | fat | *iv.* | enzymes | *vii.* | nitrates | *x.* | 9 calories |
| *ii.* | infections | *v.* | saprotrophs | *viii.* | eutrophication | | |
| *iii.* | resistance of disease | *vi.* | macronutrients | *ix.* | simple carbohydrates | | |

**3.** ***Define the following terms:***

***(i) Vitamin*** ***(ii) Malnutrition*** ***(iii) Golter*** ***(iv) Anemia***
***(v) Constipation*** ***(vi) Obesity*** ***(vii) Starvation*** ***(viii) Ingestion***
***(ix) Chyme*** ***(x) Ulcer***

***Ans:*** (i) See "Short/Detailed Answer Questions" – Q.17

(ii) See "Short/Detailed Answer Questions" – Q.21

(iii) See "Short/Detailed Answer Questions" – Q.24 (i)

(iv) See "Short/Detailed Answer Questions" – Q.24 (ii)

(v) See "Short/Detailed Answer Questions" – Q.26 (iii)

(vi) See "Short/Detailed Answer Questions" – Q.26 (iv)

(vii) See "Short/Detailed Answer Questions" – Q.26 (i)

(viii) See "Short/Detailed Answer Questions" – Q.30 (I)

(ix) See "Short/Detailed Answer Questions" – Q.35 (ii – 3rdparagraph)

(x) See "Short/Detailed Answer Questions" – Q.39 (iii)

**4.** ***Distinguish between the following in tabulated form***

***(i) Fat-soluble vitamins and water soluble vitamins***

***(ii) Marasmus and kwashiorkor***

***(iii) Chemical digestion and mechanical digestion***

***(iv) Autotrophic nutrition and heterotrophic nutrition***

***(v) Inorganic fertilizers and organic fertilizers***

***Ans:*** See "Short / Detailed Answer Questions" – Q.42 (i), (ii), (iii) &(iv)

**5.** ***Write short answers of following questions.***

***(i) Why fertilizers are necessary for plant?***

***Ans:*** See "Short / Detailed Answer Questions" – Q.12

***(ii) How stomach linings are protect from acidic environment?***

***Ans:*** See "Short / Detailed Answer Questions" – Q.40

***(iii) Why nitrogen is essential for plants?***

***Ans:*** See "Short / Detailed Answer Questions" – Q.9

***(iv) Why fats are called most efficient from of food?***

***Ans:*** See "Short / Detailed Answer Questions" – Q.41

***(v) Why grinding and lubrication are necessary for swallowing?***

***Ans:*** See "Short / Detailed Answer Questions" – Q.33

**6.** ***Write detailed answers of the following questions.***

***(i) Describe environmental hazards related to chemical fertilizers.***

***Ans:*** See "Short / Detailed Answer Questions" – Q 13

***(ii) Describe function of stomach and intestine with suitable diagram of human digestive system.***

***Ans:*** See "Short / Detailed Answer Questions" – Q.35, Q.29 (v) & Q.38

***(iii) What are vitamins? Describe types of vitamins.***

***Ans:*** See "Short / Detailed Answer Questions" – Q.17

***(iv) Describe mineral deficiency diseases in human.***

***Ans:*** See "Short / Detailed Answer Questions" – Q.24

***(v) Describe effect of malnutrition of human.***

***Ans:*** See "Short / Detailed Answer Questions" – Q.21