

RABBIT: EXTERNAL CHARACTERS UPTO DIGESTIVE SYSTEM



Oryctolagus cuniculus



(Openings of burrows)



(warren (net work))

VERY SHORT ANSWER TYPE QUESTIONS

1. What is meant by Warren?

Intricate net formed among spacious tunnel like burrows of rabbits due to interconnections is known as warren. It has many openings to outside.

2. Why rabbits are crepuscular?

Rabbits are active during dawn and dusk. So they are described as crepuscular.

3. What is meant by polygamy?

Rabbits are polygamous where one male mates with many females.

4. What is rhinarium ?

Moist skin that surrounds each nostril in rabbit is known as rhinarium.

5. What is meant by caecophagous ?

Habit of feeding on their own faeces is known as coprophagous or caecophagous.

6. What is harelip in rabbit?

Upper lip in rabbit has cleft and known as hare lip. Through the cleft incisors are visible.

7. Which partition separates thorax and abdomen in rabbit?

A dome shaped muscular membrane 'Diaphragm' separates thorax and abdomen internally.

8. Which part of the body in rabbit is used as a warning signal?

Rabbit uses its tail as warning signal to the other members of the group. It lifts tail to display its white hair as warning signal.

Rabbit thumps its hind limbs on the ground to produce an alarming sound

9. What are hallux and pollex?

Pollex is the thumb of forelimb. It is present in rabbit also.

Hallux is the thumb of hindlimb. But it is absent in rabbit.

10. What is clitoris?

Clitoris is a rod like structure present in the anterior wall of vestibule in vulva in female rabbit. It is homologous to penis of male.

11. What are vibrissae or whiskers?

Vibrissae are long, stiff, tactile hairs present on either side of upper lip.

12. What are buck, doe and bunny in rabbits?

i) Male rabbit is buck. ii) Female rabbit is doe iii) Young rabbit is bunny.

13. What is nictitating membrane ?

Nictitating membrane is third eye lid which present in the anterior corner of each eye of rabbit. It can be drawn across the cornea to protect the eye from dust particles.



14. What is external auditory meatus?

External auditory meatus or external ear opening present at the basal part of each pinna (external ear) in rabbit.

15. What is vulva?

Slit like urinogenital aperture in female rabbit is known as vulva.

16. What are different types of teeth present in rabbit?

Both the jaws in rabbit have 3 types of teeth only. They are

A)Incisors B)Premolars c) Molars. (Canines are absent.)

17. What is meant by Distema ?

Diastema a large gap present between incisors and premolars due to the absence of Canines in Rabbit.

18. What is Vulva?

Vulva is the freely hanging part of soft palate into the pharynx.

19. Write the dental formula of rabbit.

Incisors 2/1 , Canines 0/0, Premolars 3/2, Molars 3/3.

20. Name four types of papillae present on tongue of rabbit.

Four types of papillae present on tongue are

- i)Fungiform papillae -- Margin of tongue
- ii)Filiform papillae -- Upper surface of tongue
- iii)Circumvallate papillae --- Base of tongue
- iv)Foliate papillae ---- Sides of the base of tongue.

21. What are cardia and pylorus?

Cardia is opening of oesophagus into cardiac stomach.

Pylorus is the opening of pyloric stomach into duodenum of intestine.

22. Name the substances secreted by the oxyntic cells of gastric glands.

Oxyntic cells or parietal cells secrete HCl, Castle's intrinsic factor.

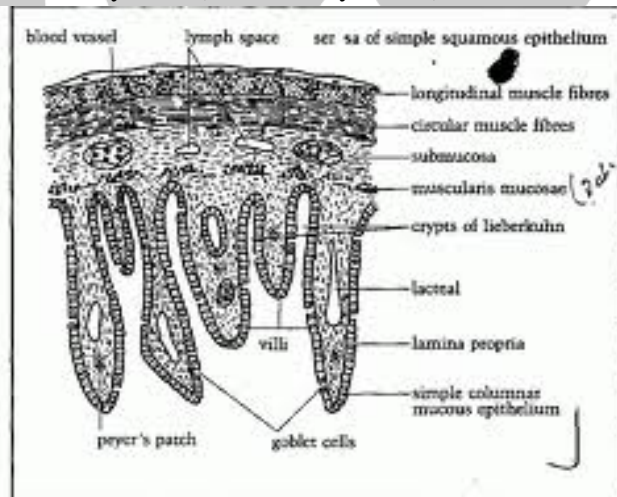
23. What is the nature of gastric juice? Name the constituents in that juice.

Gastric juice is acidic in nature with p^H is 1.5-2.0.

It consists HCl, mucin, pepsinogen, prorenin, and Castle's intrinsic factor.

24. Name the four layers of gastrointestinal tract.

i) outer serous layer ii) Muscle layer iii)Submucosa iv)Mucosa layer.



T.S. OF INTESTINE

25. Where is caecum is present? What is its function?

- Caecum attaches with sacculus rotundus present at the tip of ileum.
- Caecum contains symbiotic bacteria that help in cellulose digestion.

26. Name the four types of salivary glands present in rabbit.

Four types of salivary glands present in rabbit are

- a)Parotid glands b)Submaxillary glands c)Sublingual glands d)Infraorbital

27. How does a small intestine provides large surface area for absorption of digested nutrients? What are lacteals?

Finger like elevations known as Villi increase the area of absorption in intestine. Lacteals are lymph capillaries present in villi.

28. Where are Crypts of Lieberkuhn are present? Name the juice secreted by them.

- Crypts of Lieberkuhn are intestinal glands present among villi of ileum.
- Their juice along with brunner's glands of duodenum form intestinal juice or succus entericus.

29. Name the juice secreted by liver? How it helps in digestion of fats?

BILE is secreted by liver. It emulsifies fats with the help of bile salts.

30. What is chime?

Partially digested, acidic, fluid-food formed in stomach is known as chime.

31. What are the major functions of large intestine?

- Large intestine absorbs water from undigested matter and helps in the formation and elimination of faecal matter.
- Caecum lodges symbiotic bacteria which help in cellulose digestion.

32. What is autocoprophagy ?

- Feeding of its own faeces is known as autocoprophagy.
- Rabbit ingests the faeces expelled at night because that faeces contains the nutrients and metabolites needed for cellulose digestion.

33. Name the macronutrient required for proper formation bones and teeth.

Calcium and Phosphorus

34. What are fat soluble vitamins and water soluble vitamins?

Fat soluble vitamins	Water soluble vitamins
Vitamins A, D, E, K	Vitamins B & C
Need bile juice for absorption	Directly absorbed by intestine
Lymph transports them to all parts	Blood transports them to all parts

35. Which vitamin is called sunshine vitamin? Name the diseases occur due to deficiency of it?

- Vitamin D or Calciferol or Antirachitic vitamin is sunshine vitamin.
- Deficiency of Vitamin D causes a) Rickets in children b) Osteomalacia in adults

36. Name the chemical name of vitamin C. Which disease occurs in its absence?

- Vitamin C or Ascorbic acid or Antiscorbutic vitamin.

- Its deficiency leads to Scurvy.

37. Name the five lobes of liver in rabbit.

- Liver in rabbit has five lobes. Two on right side and three on left side.
- Right lobes are ---- a) Right central lobe b) Right caudate lobe
- Left lobes are ---- a) Central lobe b) Lateral lobe c) Spigelian lobe

38. Name the only digestive juice without enzymes.

Bile juice

39. Name the components of pancreatic juice.

Pancreatic juice contains trypsinogen, chymotrypsinogen, amylase, carboxypeptidase, lipase (steapsin), nucleases like DNase and RNase.

40. Why is caecum is longer in herbivores like rabbit?

As the caecum lodges symbiotic bacteria for the digestion of cellulose, caecum is longer in herbivores like rabbit. It provides efficient digestion of cellulose.

41. What are kwashiorkor and marasmus ?

A) Kwashiorkor is a disorder in which protein intake is deficient despite normal caloric intake.
B) Marasmus is a disorder occurs due to protein-calorie under nutrition.

42. How intestinal juice or succus entericus is formed?

- Brunner's glands are present in submucosa of duodenum
- Crypts of Lieberkuhn are present in mucosa of ileum.
- Secretions of both glands constitute to form intestinal juice.
- Intestinal juice contains enzymes like aminopeptidase, tripeptidase, dipeptidase, maltase, sucrose, lactase, phosphatases and nucleosidases.
- It has enzyme activator like enterokinase.

SHORT ANSWER TYPE QUESTIONS::

1. Describe the Buccal cavity of Rabbit.

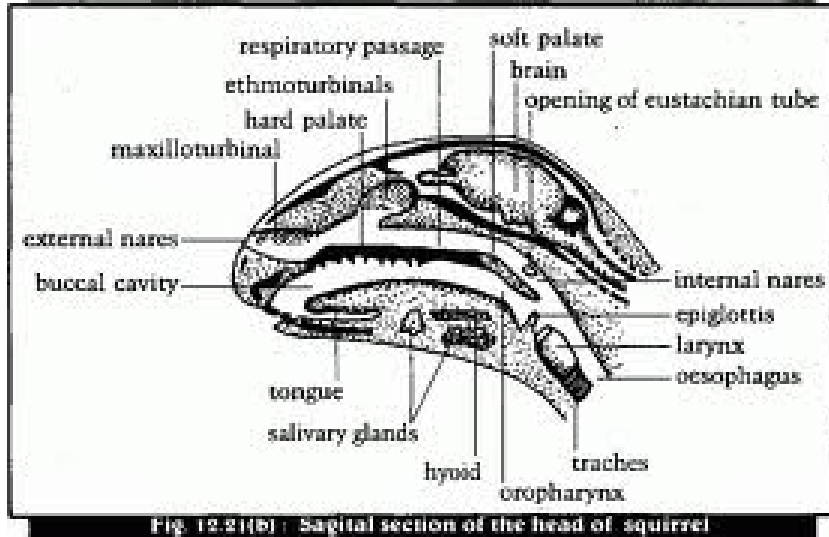


Fig. 12.21(b) - Sagittal section of the head of squirrel

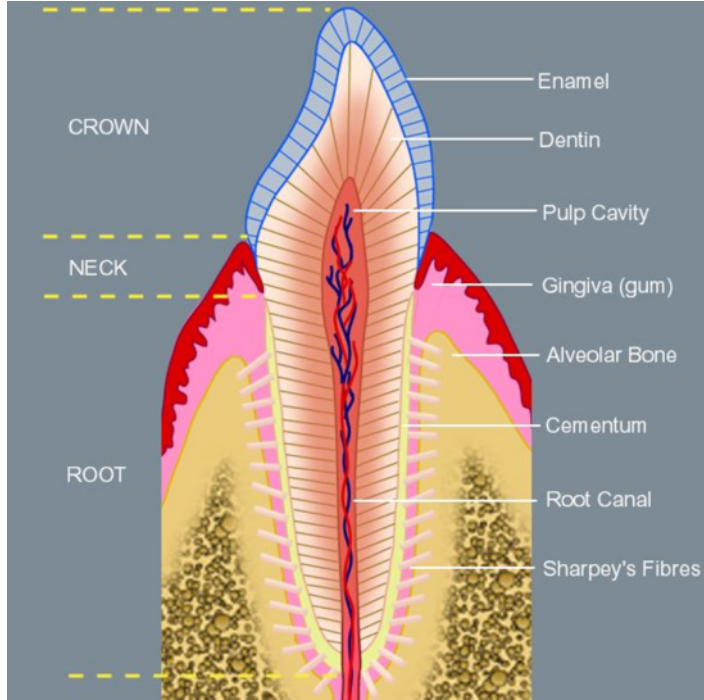
- Mouth leads into buccal cavity through vestibule.
- Roof of buccal cavity is formed by bony secondary palate or pseudopalate or hard palate. It continues as soft palate which hangs in pharynx as Uvula.
- Hard Palate separates buccal cavity into dorsal respiratory (nasal passage) and ventral oral cavity (food passage).
- Animal can breathe while the food is masticated in oral cavity.
- Lower surface of hard palate is lined by an ectodermal membrane, which forms transverse ridges known as Palatine rugae to provide grip over food.
- Buccal cavity contains teeth and tongue.
- A pair of openings of nasopalatine ducts is present in the anterior part of hard palate. They lead into nasal chambers or olfactory chambers.
- Jacobson’s organ opens into each nasopalatine duct to recognize different kinds of food.

2. Describe the gastric glands.

Gastric glands are present in the wall of Stomach. They are

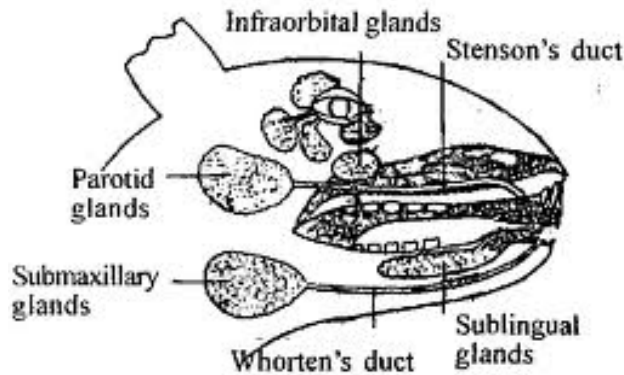
Glands	Cells	Secretions	Role
1. Cardiac glands	Mucous cells	Mucus	Protection to stomach
2. Fundic glands	a)Oxyntic/Parietal b)Neck cells c)Chief / Zymogen d) Endocrinal cells	HCl Castle’s intrinsic factor Mucus Pepsinogen, Prorennin Hormones	Conversion of pepsinogen into pepsin Absorption of Vit.B ₁₂ Protection to stomach Digestion of proteins
3. Pyloric glands	a)Mucous cells b)G cells	Mucus Secrete hormone Gastrin.	Protection to stomach Stimulates gastric glands to secrete juice

2. Draw a labeled diagram of L.S. of tooth of rabbit.



3. Describe the salivary glands of rabbit.?

Salivary glands	Location	Opens into buccal cavity	
		AT	THROUGH
1) PAROTID	Base of pinnae	Behind upper incisors	Stenson's duct
2) SUBMAXILLARY	Inner side of angles of lower jaws	Near lower incisors	Wharton's duct
3) SUBLINGUAL	Below tongue	Below free part of tongue	Small ducts
4) INFRAORBITAL	Below orbits	Near upper molars	Ducts



**** In man, infra orbital salivary glands are absent.

4. Describe the process of digestion in Stomach in rabbit.

- Stomach receives the swallowed food.
- Gastric juice has HCl, mucin, pepsinogen, prorennin, lipase and castle's intrinsic factor. Its pH value is 1.5 – 2.0.

- HCl kills bacteria and other microbes present in food. HCl activates pepsinogen into pepsin and prorennin into rennin.
- Calcium – paracaseinate is formed from Casein in milk.
- Pepsin hydrolyses Calcium-paracaseinate into peptones.
- Rennin changes the milk protein casein into paracasein and proteoses.
- Paracasein precipitates into calcium-paracaseinate and then digested by pepsin.
- Castle’s intrinsic factor helps in the absorption of vitamin B₁₂ (Cyanocobalamin).
- Mucin protects the lining of stomach from the action of acid and enzymes.
- Small chain triglycerides are digested by gastric lipase.
- Partially digested, acidic, fluid-food formed in stomach is known as Chyme.
- Due to churning movements chyme passes into duodenum through pylorus.

5. Describe the process of absorption of digested food.

- Major part of the digested food is absorbed in ileum.
- Villi increase the area of absorption. Each villus contains an arteriole, a venule and a lymph capillary known as lacteal.
- Microvilli which are formed from the surface of intestinal epithelial cells further increase the efficiency of absorption.
- End products of digestion are absorbed into the blood in the following manner...

END PRODUCTS	ENTER INTO EPITHELIAL CELLS BY	ENTER INTO BLOOD BY
1. Glucose & Galactose	Secondary Active transport With Na	Facilitated diffusion
2. Fructose	Facilitated diffusion	Facilitated diffusion
3. Amino acids	Secondary Active transport with Na or by Primary Active transport	Diffusion
4. Short chain fatty acids	Diffusion	Diffusion

Absorption of fatty acids:

- Micelles are formed by the combination bile salts with the long chain fatty acids and monoglycerides.
- Micelles absorb the epithelial cell. Long chain fatty acids and monoglycerides diffuse into the intestinal epithelial cells and triglycerides.
- Triglycerides and long chain fatty acids react with phospholipids and cholesterol and are coated with proteins and form Chylomicrons.
- Chylomicrons pass out into the lacteals by exocytosis.
- They transport into left subclavian vein through lymphatic vessels.
- Lipoprotein lipase of endothelia cells breaks down triglycerides in chylomicrons into fatty acids and glycerol. They diffuse into adipose cells and form triglycerides.

6. Describe about Fat soluble vitamins.

VITAMIN	CHEMICAL NAME	COMMON NAME	SOURCES	ROLE	DEFICIENCY LEADS TO
1.A	Retinol	Antixerophthalmic vitamin	Fish liver oils, milk etc., Beta-carotene in Plants.	Health & vigour of epithelial tissues. Resynthesis of rhodopsin in retina	Nyctalopia (night blindness) Xerophthalmia (dryness of conjunctiva) ; Keratomalacia (dry cornea)
2. D	Calciferol	Antirachitic / Sunshine	Fish liver oils, Milk, Mammalian skin synthesise it from sunlight	Calcium metabolism. Formation of healthy bones and teeth.	Rickets in children. Osteomalacia in adults.
3. E	Tocopherol	Anti-sterility	Wheat germ oil, nut, wheat, maize	Antioxidant and inactivates Oxygen free Radicals. Functioning of gonads	Sterility in males Abortion in females. Muscular dystrophy.
4. K	Naphthoquinone	Anti haemorrhagic	Green leafy vegetables, Tomato, cheese, eggs, liver	Formation of Prothrombin For blood clotting	Delay in blood clotting.

7. Describe the flow of bile juice from liver into duodenum?

HEPATOCTES BILE CANALICULI → BILE DUCTS → HEPATIC DUCTS
 → COMMON HEPATIC DUCT → CYSTIC DUCT → COMMON GALL BLADDER
 → DUODENUM.

8. Describe the functions of liver?

- Liver secretes bile which helps in emulsification of fats.
- Liver helps in events like gluconeogenesis, glycogenolysis, glycogenesis in carbohydrate metabolism. Liver acts as detoxifying organ.
- Liver helps in cholesterol synthesis and the production of triglycerides.
- Liver produces coagulation factors like I, II, V, VII, IX, X AND XI.
- Liver breaks down haemoglobin and form bile pigments.
- Liver converts ammonia to urea in ornithine cycle.
- Liver stores glycogen, vitamin B₁₂, iron, copper. It activates vitamin D.
- Liver is haemopoietic organ in foetus stage. In adults, it is erythroblastic organ.

9. Describe the vitamin B complex & vitamin C?

Vitamin	Chemical name	Common name	Role	Deficiency leads
1.B ₁	Thiamine	Antiberiberi factor	Functioning of nervous system, Co factor for enzymes in Cho and amino acid metabolism	Beriberi Polyneuritis (degeneration of myelin sheath)

2.B ₂	Riboflavin		Component of FMN and FAD for intermediary metabolism.	Cheilosis Glossitis, Seboric dermatitis
3.B ₆	Pyridoxine		Coenzyme for enzymes for protein metabolism. Helps in utilization of Fe in haemoglobin synthesis, production of antibodies	Hypochromic microcytic anaemia
4.B ₁₂	Cyanocobalamin		Coenzyme for maturation of RBC, formation methionine ;helps in synthesis of DNA	Pernicious anaemia, degenerative changes in spinal cord
5.Niacin or Nicotinic acid		Antipellagra vitamin	Part of coenzymes like NAD and NADP Which are essential for the formation of ATP.	Pellagra (diarrhea,dermatitis and dementia
6.Folacin	Folic acid		Synthesis of Adenine,guanine and thymine for DNA and RNA. Helps in formation of RBC and WBC	Macrocytic anaemia, delay in replication of DNA, Leucopenia
7.Panto – thenic acid			Part of coenzyme A.	Poor growth, early aging, premature graying of hair.
8.Biotin			Coenzyme for carboxylases.	Present in person who consume raw eggs with avidin.
9.VITAMIN 'C'	Ascorbic acid	Antiscorbutic Vitamin	Maintains the matrix of cartilage, bone and dentine, integrity of endothelium. Provides resistance, dissolve cholesterol in blood, wound repair, increases iron absorption.	SCURVY Skin eruptions, swollen and bleeding gums of teeth, haemorrhage, poor healing of wounds

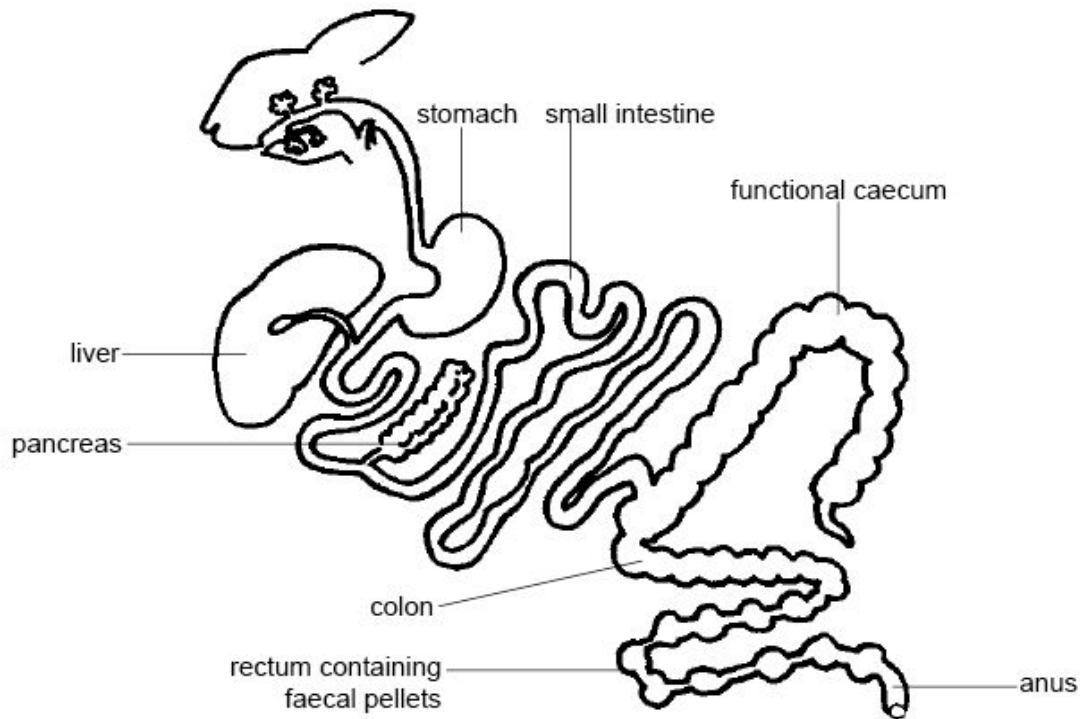
11. Describe the various digestive juices?

DIGESTIVE JUICE	pH& NATURE	COMPONENTS
1.Saliva	6.9 , slightly acidic	Mineral salts, mucin,Ptyalin or salivary amylase
2.Gastric juice	1.5 – 2.0 ; Acidic	HCl, mucin, pepsinogen, prorennin, castle's intrinsic factor
3. Bile juice	7.0 – 7.6	Bile salts,
4.Pancreatic juice	8.0 Alkaline	Trypsinogen, Chymotrypsinogen,Carboxypeptidase

		Mylase, lipase (steapsin), lipase, Nucleases like DNase and RNase.
5.Intestinal juice (succus entericus)	7.6 alkaline	Aminopeptidases, tripeptidase, Dipeptidase, maltase, sucrose, lactase, phosphatases and nucleosidases.

LONG ANSWER TYPE QUESTIONS:

- 1. Draw a labeled diagram of digestive system of rabbit and describe the process of digestion in intestine.**



- When the acidic chyme enters the duodenum, bile juice, pancreatic juice and intestinal juice are mixed with it.
- Bile juice is without any enzymes but performs the following functions.
 - i) Emulsification of fats
 - ii) absorption of digested fats
 - iii) Conversion of acidic food of stomach into alkaline food.

I) **DIGESTION OF PROTEINS IN INTESTINE :**

- Enterokinase of intestinal juice activates trypsinogen into trypsin.
- Trypsin converts chymotrypsinogen into chymotrypsin.
- Trypsin and chymotrypsin digest native proteins, proteases and peptones into polypeptides.
- Carboxypeptidases break the terminal amino acid at the carboxylic end of polypeptides and expose the carboxyl group and thus digest the polypeptides into small peptides and amino acids.
- Aminopeptidases cleave terminal amino acid at amino end of polypeptides and expose amino group. They hydrolyse the polypeptide into free amino acid and tripeptide.
- Tripeptidases convert tripeptides into dipeptides and amino acids.
- Dipeptidases digest the dipeptides into amino acids.

II) **DIGESTION OF FATS IN INTESTINE :**

- Digestion of fats includes three phases like preparatory, transport and transportation phases.

- Preparatory phase includes the digestion of fats in intestine and stomach.
- Transport phase includes the transport of fatty acids and glycerol into epithelia cells and intestinal villi.
- Transportation phase includes the entry of fats into lacteals from epithelial cells.
- Bile salts emulsify the fats present in chyme.
- Lipase of pancreatic juice (Steapsin) and intestinal lipase digest the emulsified simple fats into fatty acids and glycerol.

III) **DIGESTION OF CARBOHYDRATES IN INTESTINE :**

- Amylase of pancreatic juice converts carbohydrates into disaccharides like maltose, sucrose, lactose etc.
- Disaccharidases of intestinal juice digest them into monosaccharides like glucose, fructose and galactose.
- Maltase converts maltose into glucose molecules.
- Sucrase acts on sucrose and convert them into glucose and fructose.
- Lactase converts lactose into glucose and galactose.

IV) **DIGESTION OF NUCLEIC ACIDS ;**

- RNase and DNase of pancreatic juice digest RNA and DNA into nucleotides.
- Phosphatases of intestinal juice hydrolyse ester bond to release the phosphate from nucleotides.
- Nucleosidases of intestinal juice hydrolyse the glycosidic bond to digest nucleosides into pentose sugars and nitrogen bases.