REVISION QUESTIONS STD - XI

Select and write the correct answer for the following multiple choice type of questions:

1. Which is not a property of living beings ?

a) Metabolism

b) Decay

c) Growth

d) Reproduction

2. Causative agent of red tide is _____

a) Dinoflagellates

b) Euglenoid

c) Chrysophyte

d) Lichen

3. Fungi like protist are also called as_____

a) Myxomycetes

b) Mycomycetes

c) Mycoplasm

d) Yeast

4. The bacteria that can withstand high salinities are called _____

a) Saltophiles

b) Thermophiles.

c) Halophiles.

d) Psychrophiles.

5. Plasma membrane is _____

a) Selectively permeable

b) Permeable

c) Impermeable

d) Semi permeable

6. F1 particles are present in _____

a) Plasmids

b) Mitochondria

c) Vacoules

d) Ribosomes

7. Synapsis is pairing of _____

a) Any two chromosomes

b) Non homologous chromosomes

c) Sister chromatids

d) Homologous chromosomes

8. Crossing over of chromosomes during meiosis leads to_____

a) Mutation

b) Sex determination

c) New gene combination

d) Loss of chromosomes

9. Collenchyma is a type of _____ tissue.

a) Living

b) Dead

c) Living & dead

d) None of the above

10. Meristematic tissue are found

a) Only in stems of the plant

b) In both roots and stem

c) In all growing tips of the plant body

d) Only in roots of the plants

11. _____ is a gland which is both exocrine and endocrine.

a) Sebaceous

b) Mammary

c) Pancreas

d) Pituitary

12. Nissl's granules are found in _____

a) Cartilage cells

b) Nerve cells

c) Muscle cells

d) Osteoblasts

13. _____ is also called brain of cockroach

a) Supra-oesophageal ganglion

b) Sub-oesophageal ganglion

c) Hypo-cerebral ganglion

d) Thoracic ganglion

14. Foregut of cockroach is also known as _____

a) Stomodaeum

b) Mesentreron

c) Proctodaeum

d) Tergum

15. How many ATP molecules are required for synthesis of one glucose molecule using C_4 pathway ?

a) 30

b) 18

c) 6

d) 2

16. Which of the following is not an accessory pigment?

a) Chlorophyll - b

b) Xanthophyll

c) chlorophyll - a

d) Carotene

17. Electron carriers of oxidative phosphorylation are present on _____

a) Outer membrane of mitochondria

b) Inner membrane of mitochondria

c) Thylakoid membrane of chloroplast

d) Matrix of mitochondria

18. The reactions of TCA cycle occur in _____

a) Ribosomes

b) Grana

c) Mitochondria

d) Endoplasmic reticulum

19. Bowman's capsule is located in the kidney in the _____

a) Cortex

b) Medulla

c) Pelvis

d) Pyramids

20. The total number of vertebrae in human is_____

a) 22

b) 33

c) 24

d) 12

21. _____ is a part of hind limb.

a) Radius

b) Ulna

c) Humerus

d) Fibula

One Mark Questions :

1. Why are archaebacteria called Extremophiles ?

Ans : These bacteria are mostly found in the extreme enviornments, hence called Extremophiles.

2. What is Mycoplasma ?

Ans : These are smallest of the living forms. They do not have cell wall.

3. What are plastids ?

Ans : Plastids are double walled organelles containing DNA, RNA and 70S ribosomes.

4. What are lysosomes commonly known as ?

Ans : Autophagic vesicles / Suicide bags.

5. What is necrosis ?

Ans : Necrosis is a form of cell injury which leads to the premature death of cells.

6. What is apoptosis ?

Ans : Programmed cell death where cells undergo cellular suicide.

7. Define flower.

Ans : Flower is highly modified and condensed shoot meant for sexual reproduction.

8. Explain the term Epicalyx.

Ans : It is an additional whorl of sepal like structures formed by bractiolewhich occures on the outside of calyx.

9. What is the function of germinal epithelium ?

Ans : The cells of germinal epithelium divide meiotically to produce haploid gametes.

10. What is histology ?

Ans : The study of structure and arrangement of tissue is called histology.

11. Which is the most abundant enzyme in the world ?

Ans : RuBisCo

12. Name the first compound formed during C_3 pathway.

Ans : 3-Phosphoglyceric acid

13. What is the normal content of urea in blood ?

Ans : 0.01 – 0.03 %

14. What is uremia ?

Ans : If the level of urea in blood rises above 0.05% the condition is known as Uremia.

15. Name the bone which is known as knee cap.

Ans : Patella

16. Name the first cervical vertebra ?

Ans : Atlas vertebra

Two mark questions :

1. What is the structure of virus ?

Ans : i) Viruses are acellular. ii) Genetic material in viruses is either single stranded RNA or single or double stranded RNA or double stranded DNA. iii) Their genetic material is protected by a protein coat called capsid. iv) Capsid is made up of smaller units, the capsomeres.

v) Capsomeres are arranged in polyhedral or helical forms.

2. Match the following :

Kingdom	**Examples**	***Answer***
i. Monera	a. Riccia	***b. Cyanobacteria***
ii. protista	b. Cyanobacteria	***d. Diatoms***
iii. Plantae	c. Rhizopus	***a. Riccia***
iv. Fungi	d. Diatoms	***c. Rhizopus***

3. Write a short note on viroids.

Ans : i) Viroids are very small, single stranded infectious RNA strands which lack protein coat.

ii) They are low molecular weight RNA and smaller in size than viruses.

iii) The first viroid discovered was Potato spindle tuber viroid which causes disease in potato.

iv) Discovered by T.O. Diener in 1971.

4. Explain in detail the blind sac body plan in animals.

Ans : i) In this body plan the body is sac-like with a single opening. Digestion is carried out in this sac-like structure.

ii) The food is ingested and egested through the same opening.

iii) Members of phylum Cnidaria show a blind sac body plan. Eg. Hydra.

5. What is endo-enzyme ? Give example.

Ans : The enzymes which act within the cell in which they are synthesized are known as endo-enzymes. Example : Enzymes produced in the chloroplast and mitochondria.

6. Enlist the characteristics of meristematic tissue.

Ans : i) It is a group of young immature cells.

ii) These are living cells with ability to divide in the regions where they are present.

iii) These are polyhedral or isodiametric in shape without intercellular spaces.

iv) Cell wall is thin, elastic and mainly composed of cellulose.

v) Protoplasm is dense with distinct nucleus at the centre and vacoules if present, are very small.

vi) Cells show high rate of metabolism.

7. Write a note on parenchyma.

Ans : i) Its a type of simple permanent tissue.

ii) Cells in this tissue are thin walled, isodiametric, round, oval to polygonalor elongated in shape.

iii) Cell wall is composed of cellulose.

iv) Cells are living, with prominent nucleus and cytoplasm with large vacoule.

v) Parenchyma has distinct intercellular spaces. Sometimes cells may show compact arrangement.

vi) The cytoplasm of adjacent cells is interconnected through plasmodesmeta and thus forms a continuous tissue.

8. Explain the following terminologies related to flower :

a) Complete flower *Ans : Presence of all floral whorls.*

b) Neuter flower *Ans : Both reproductive whorls are absent.*

9. How are neurons classified depending on the presence or absence of myelin sheath ?

Ans : Depending on the presence or absence of myelin sheath neurons are classified into two types :

i) Myelinated /medullated nerve fibres : They have an insulating fatty layer called myelin sheath around the axon. This makes the fibre appear white in colour.

ii) Non-myelinated / non-medullated nerve fibres : these fibres lack myelin sheath. They appear grey due to absence of mylein sheath.

10. Match the following :

Column I	**Column II**
i. Tight junctions	a. Allow the cell to strongly adhere to the underlying basement membrane.
ii. Hemidesmosomes	b. Involved in various signalling pathways and transcriptional regulations.
iii. Adherens junctions	c. Maintain cell polarity and prevent lateral diffusion of proteins and ions.
iv. Gap junctions	d. Allows passage of ions and small molecules between cells.

Ans : (i – c), (ii – a), (iii – b), (iv – d)

11. Match the column I with Column II

Column I	**Column II**	***Answer***
i. Cuboidal epithelium	a. Fallopian tube	***b. Kidney***
ii. Squamous epithelium	b. Kidney	***d. Endothelium***
iii. Ciliated epithelium	c. Intestine	***a. Fallopian tube***
iv. Columnar epithelium	d. Endothelium	***c. Intestine***

12. Write a note on gizzard of cockroach.

Ans : Gizzard (Proverntriculus) is small, spherical organ. Internally it is provided with a circlet of six chitinous teeth and backwardly directed bristles. Teeth are responsible for crushing the food. Bristles help in filtering the food. Foregut ends with gizzard.

13. Enlist the four ganglia of autonomous nervous system of cockroach.

Ans : a) Frontal ganglia b) Hypocerebral ganglion c) Ingluvial ganglion d) Ventricular ganglion

14. Differentiate between C3 and C4 plants.

Ans :

No.	*C3 Plants*	*C4 plants*

1	*These plants are mostly temperate plants.*	*These are mostly tropical and subtropical plants.*
2	*Leaves do not show Kranz anatomy.*	*Leaves shoe Kranz anatomy.*
3	*Mesophyll tissue is made up of pallisade and spongy tissue.*	*Mesophyll tissue is made up of only spongy tissue.*
4	*Chloroplast is of one type only.*	*Chloroplast are of two types (dimorphic)*
5	*Plants absorb CO2 at high concentration only (more than 50ppm).*	*Plants absorb CO2 even at low concentration(1-2 ppm)*
6	*Excess of atmospheric O2 inhibits photosynthetic activity.*	*Excess of atmospheric O2 has no effect on photosynthetic activity.*
7.	*Ex : Hibiscus*	*Ex : Sugarcane*

15. Distinguish between cyclic and non-cyclic photophosphorylation.

Ans :

No.	*Cyclic photophosphorylation*	*Non- Cyclic photophosphorylation*
1	*Electrons emitted by chlorophyll return back to the same chlorophyll.*	*Electrons emitted by chlorophyll do not return back to the same chlorophyll.*
2	*First electron acceptor is FRS*	*First electron acceptor is CO-Q*
3	*It forms only ATP*	*NADPH2 and ATP are formed.*
4	*Does not involve photolysis of water.*	*Involves photolysis of water.*
5	*No evolution of O2*	*There is evolution of O2.*
6	*Only photosystem-I is involved in this cycle.*	*Both photosystems are involved.*

16. What are the products of cleavage in glycolysis ?

Ans : Dihydroxyacetone phosphate (DHAP) and 3-phosphoglyceraldehyde are the products of cleavage in glycolysis.

17. Write a short note on Ammonotelism.

Ans : Target page No. 350 Q. No. 9 (i)

18. State the functions of bones.

Ans : Target page No. 392 Q. No. 38 (iii)

Three mark questions :

1. What are the basic principles of life ? / State and explain any three basic principles of life.

Ans : Target page no. 2 Q.no. 3

2. Differentiate between Dicotyledonae and Monocotyledonae based on the following characters :

i. Types of roots.

ii. Venations in the leaves.

iii. Symmetry of flowers.

Ans : Target page no. 53 Q. No. 57

3. Distinguish between Dicotyledonae and Monocotyledonae.

Ans : Target page no. 53 Q. No. 58

4. Enlist the salient features of class Aves.

Ans : Target page No. 81 Q. No. 67

5. Give important features of class Mammalia.

Ans : Target page No. 82 Q. No. 72

6. Sketch and label : Chloroplast.

Ans : Target page No.105 Q. No. 53

7. Sketch and label : Ultrastructure of nucleus.

Ans : Target page No.106 Q. No. 58

8. Distinguish between DNA and RNA.

Ans : Target page No. 132 Q. No. 55

9. Classify merestematic tissue on the basis of its position.

Ans : Target page No. 169 Q. No. 6

10. Draw and label : Typical flower.

Ans : Target page No. 206 Q. No. 62

11. Write a note on salivary glands of cockroach.

Ans : Target page No. 251 Q. No. 19

12. Give the significance of photosynthesis.

Ans : Target page No. 288 Q. No. 80

13. Name the following :

i. First product of CO_2 fixation in Hatch-Slack pathway.

Ans : Oxaloacetic acid.

ii. C_4 plant leaf shows which type of anatomy.

Ans : Kranz anatomy.

iii. Example of a C_4 plant.

Ans : Maize, Sugarcane.

14. What is RQ ? What is its value for carbohydrates, fats and proteins ?

Ans : Target page No 314 Q. No. 65

15. Explain why human dentition is considered as thecodont, diphydont and heterodont.

Ans : Target page No 324 Q. No. 12

16. Enlist the human excretory organs and their excretory products.

Ans : Target page No 368 Q. No. 86

17. Explain the structure of sternum.

Ans : Target page No 401 Q. No. 71 (ii)

18. Explain the the three types of ribs.

Ans : Target page No 401 Q. No. 71

Four mark questions :

1. Give general characters of Angiosperms.

Ans : Target page no. 51 Question 49 (ii)

2. What is cell cycle ? Describe the cell cycle (Explain the different phases of cell cycle.)

Ans : Target page No. 149 Q. No. 2 & 3

3. What is cell division ? Mention (Explain) different types of cell divisions.

Ans : Target page No. 150 Q. No. 10

4. Name the following :

i. Flower with pedicel.

Ans : Pedicellate flower

ii. Flower which can be cut in any plane passing through the centre in order to obtain two identical halves.

Ans : Actinomorphic flower

iii. Flower without bract.

Ans : Ebracteate flower

iv. Plant in which male and female reproductive flowers borne on same plant.

Ans : Monoecious plant

5. Define placentation. Explain any three types of placentation.

Ans : Target page No.208 Q. No. 71

6. Give the significance of respiration.

Ans : Target page No. 314 Q. No. 67

7. Describe the structure of small intestine.

Ans : Target page No. 327 Q. No. 18

8. Explain anatomy of different parts of large intestine.

Ans : Target page No. 327 Q. No. 19

i. **Ammonotelism:**

a. Elimination of nitrogenous wastes in the form of ammonia is called as ammonotelism.

b. Ammonia is basic in nature and hence it can disturb the pH of the body, if not eliminated immediately.

c. Any change in pH would disturb all enzyme catalyzed reactions in the body and would also make the plasma membrane unstable.

d. Ammonia is readily soluble in water and needs large quantity of water to dilute and reduce its toxicity.

e. This is however an energy saving mechanism of excretion and hence all animals that have plenty of water available for dilution of ammonia, excrete nitrogenous wastes in the form of ammonia.

f. Animals that follow this mode of excretion are known as ammonotelic animals.

g. 1 gm ammonia needs about 300 – 500 ml of water for elimination.

h. Ammonotelic animals excrete ammonia through general body surface (skin), gills and kidneys.

e.g. Ammonotelism is found in aquatic invertebrates, bony fishes, and aquatic / larval amphibians. Animals without excretory system (Protozoa) are also ammonotelic.

iii. How do bones help in various ways?

Ans:

a. Bones form the framework of our body and thus provide shape to the body.

b. They protect vital organs thus help in the smooth functioning of body.

c. The joints between the bones help in movement and locomotion.

d. They provide firm surface for attachment of muscles.

e. They are reservoirs of calcium and form important site for hemopoiesis.

1.1 BASIC PRINCIPLES OF LIFE

Q.3. What are the basic principles of life?

Ans: The basic principles of life are as follows:

i. **Metabolism:** Metabolism consists of catabolism (breaking of molecules) and anabolism (making of new molecules). An organism performs metabolism in order to obtain energy and various chemical molecules essential for survival.

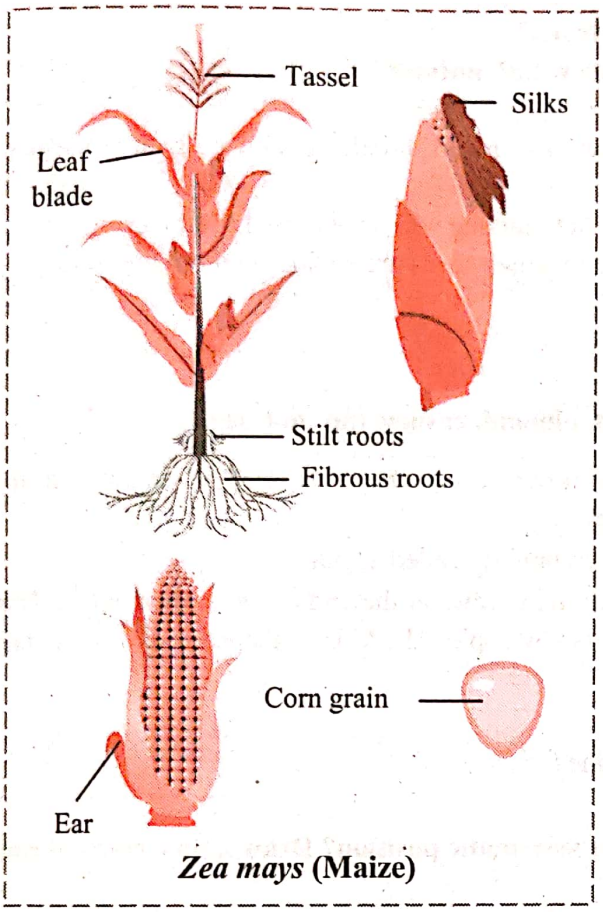
ii. **Growth and development:** Growth and developments in an organism occurs for a limited period of time.

iii. **Ageing:** It is the process during which molecules, organs and systems begin to lose their effective working and become old.

iv. **Reproduction:** Organisms reproduce asexually or sexually and give rise to young ones like themselves for the continuity of their race (species). However, sterile organisms like mules and worker bees do not reproduce, yet they are living.

v. **Death:** As the body loses its capacity to perform metabolism, an organism dies.

vi. **Responsiveness:** Living organisms respond to thermal, chemical or biological changes in their surroundings.



***Zea mays* (Maize)**

Q.56. Try This *(Textbook page no. 24)*

Study the leaves of *Hibiscus*, Peepal, *Canna*, Grass and Tulsi. Classify them as Monocot and Dicot.

Ans:

Monocot leaves	Dicot leaves
Canna, Grass (Parallel venation)	*Hibiscus*, Peepal, Tulsi (Reticulate venation)

***Q.57. Differentiate between Dicotyledonae and Monocotyledonae based on the following characters:**

i. Type of roots

ii. Venation in the leaves

iii. Symmetry of flower

Ans:

	Characters	Dicotyledonae	Monocotyledonae
i.	Type of roots	Tap roots	Fibrous roots
ii.	Venation in the leaves	Reticulate venation	Parallel venation
iii.	Symmetry of flower	Tetramerous or Pentamerous symmetry	Trimerous symmetry

Q.58. Can you tell? *(Textbook page no. 25)*

i. Distinguish between Dicotyledonae and Monocotyledonae.

Ans: *Refer Q.55. (iii)*

ii. Why do Dicots show secondary growth while Monocots don't?

Ans:

a. In dicots, vascular bundles are conjoint, collateral and open type. Cambium is present between xylem and phloem for secondary growth.

b. Whereas in monocots, vascular bundles are conjoint, collateral and closed type. Thus, due to absence of cambium, secondary growth does not occur in majority of monocots.

⚠ CAUTION

Open vascular bundles: Cambium is present, secondary growth is present.

Close vascular bundles: Cambium is absent, secondary growth is absent.

***Q.59. Girth of a maize plant does not increase over a period of time. Justify.**

Ans:

i. Maize plant belongs to class monocotyledonae.

ii. In monocotyledonous plants, vascular bundles are closed type.

iii. Thus, cambium is absent between xylem and phloem, due to which secondary growth does not occur in these plants.

iv. Increase in girth of a stem occurs by secondary growth.

Thus, girth of a maize plant does not increase over a period of time.

Q.60. Observe and Discuss *(Textbook page no. 23)*

Which differences did you notice between Gymnosperms and Angiosperms?

Ans:

No.	Gymnosperms	Angiosperms
i.	In gymnosperms, the seeds are naked.	In angiosperms, the seeds are enclosed within the fruit.
ii.	Plants are evergreen, shrubs or woody trees.	Plants are annual, biennial or perennial herbs, shrubs or trees, either woody or herbaceous.
iii.	Xylem is made up of tracheids only.	Xylem is made up of vessels and tracheids.
iv.	Phloem is with sieve cells only.	Phloem is with sieve tubes and companion cells.
v.	Usually two types of leaves are present, i.e. green foliage leaves and scale leaves.	Leaves are of usually one type only, such as green foliage leaves.
vi.	Double fertilization absent.	Double fertilization occurs.

Q.63. Give the diagnostic characters of Reptilia.

Ans: Diagnostic characters of Reptilia:

i. **Habitat:** They are crawling animals. They are the first true terrestrial vertebrates. Few may be aquatic or semi- aquatic and are also found in marshy areas.

ii. **Locomotion:** Locomotion occurs by limbs in most animals. The limbs are pentadactyl with clawed digits, which help the animal to walk, creep or crawl. Snakes are limbless and crawl on their belly.

iii. **Body temperature:** They are poikilotherms.

iv. **Exoskeleton:** Skin is dry, non-glandular and covered by an exoskeleton of epidermal scales or scutes, shields or plates. Lizards and snake shed their skin periodically.

v. **Ear:** Tympanum is present

vi. **Circulatory system:** It has two complete auricles but the ventricles are incompletely partitioned. Therefore, the heart of reptiles is not perfectly four chambered (except in crocodile the heart is four chambered).

vii. **Nervous system:** The brain is well developed. The olfactory lobes and cerebellum are better developed as compared to amphibians.

viii. **Reproduction:** Sexes are separate and exhibit prominent sexual dimorphism. Fertilization is internal and the animals are oviparous (exception - viper, it is viviparous). They show little parental care.

e.g. *Naja naja* (Cobra), *Hemidactylus* (Wall lizard), *Chelonia* (Turtle), *Crocodilus* (Crocodile), *Testudo* (Tortoise), Chameleon (Tree lizard), *Bangarus* (Krait), *Vipera* (Viper).

⚠ CAUTION

i. Reptiles are oviparous except, viper which is viviparous.

ii. Reptiles usually have three chambered heart except crocodiles which have four chambered heart.

***Q.64. Reptiles are known for having three chambered heart. Which animal shows a near four chambered condition in reptiles?**

Ans: Crocodiles have a four chambered heart.

***Q.65. Fish and snake both have scales. How do these scales differ from each other?**

Ans: Fishes have dermal scales covering the body surface whereas snakes have epidermal scales or scutes.

READING BETWEEN THE LINES

Dermal scales: They are made up of enamel and dentine. They can be detached independently from the skin. They are bony plates that fit closely

Epidermal scales: They are made up of keratin. They are found in an overlapping arrangement and cannot be plucked out individually. They are horny, tough extensions of the stratum corneum. They are periodically molted or shed.

Q.66. Can you tell? *(Textbook page no. 40)*
Why are amphibians and reptilians called poikilotherms?

Ans: Amphibians and reptilians are called poikilotherms as they cannot maintain a constant body temperature. Their body temperature changes according to the change in surrounding temperature.

Q.67. Enlist the salient features of class Aves.
The salient features of class Aves:

i. **Habitat:** These animals are aerial in habitat.

ii. **Locomotion:** Forelimbs are modified into wings for flying. Hind limbs are used for walking, clasping tree branches and running. Aquatic birds have webbed toes. This helps in swimming. e.g. Duck.

iii. **Body division:** Body is differentiated into head, neck, trunk and tail.

iv. **Body shape:** Body is streamlined (boat shaped) to reduce resistance during flight.

v. **Body temperature:** These are warm - blooded animals (homeotherms) i.e., keep the body temperature constant irrespective of fluctuations in environmental temperature.

vi. **Exoskeleton:** Exoskeleton is made up of feathers. Scales are present on hind-limbs. Skin is thin, dry and non-glandular except oil gland at the base of tail (uropygial gland).

vii. **Endoskeleton:** Bones are hollow (pneumatic) with air cavities to reduce body weight.

viii. **Digestion:** Jaws are modified into beaks. Teeth are absent. Special structures such as crop and gizzard are present.

ix. **Circulatory system:** They show double circulation. Blood is red in colour due to presence of biconvex and nucleated RBCs. Heart is perfectly four chambered, with two auricles and two ventricles.

x. **Respiration:** Respiration occurs by lungs. Presence of air sacs increases the buoyancy.

xi. **Nervous system:** Brain is enlarged with a well-developed cerebellum for equilibrium.

xii. **Reproduction:** Sexes are separate and the animals exhibit prominent sexual dimorphism. The female shows presence of only left ovary and left oviduct. This helps to reduce body weight during flying. Fertilization is internal. Avians are oviparous. Parental care is very well developed.

e.g. *Columba* (Pigeon), *Psittacula* (Parrot), *Struthio* (Ostrich), Kiwi, *Aptenodytes* (Penguin), *Corvus* (Crow), *Neophron* (Vulture), *Passer* (Sparrow), *Pavo* (Peacock), etc.

Q.68. Name the flightless bird.

Ans: Ostrich

Q.69. Can you tell? *(Textbook page no. 41).*
Give adaptations in Aves for flying.

Ans:

i. In birds, the forelimbs are modified into wings for flying.

ii. They possess stream-lined body to reduce resistance during flight.

iii. Bones are hollow or pneumatic to reduce body weight.

iv. In order to reduce body weight, urinary bladder is absent. Also, females possess only left ovary and oviduct.

v. Body is covered by feathers to facilitate flying.

***Q.70. Birds need to keep their body light to help in flying. Hence, they show presence of some organs only on one side. How their skeleton helps in reducing their weight?**

Ans: *Refer Q.69.*

***Q.71. Pinna is part of external ear and it is found in mammals. Do Aves and Reptiles show external ear in any form?**

Ans: No, Aves and Reptiles do not show external ear in any form. They possess tympanum which represents the ear.

Q.72. Give important features of class Mammalia.

Ans: Features of class Mammalia (mammae: breasts, nipple):

i. **Special feature:** Presence of mammary glands (milk producing glands) for the nourishment of young ones. Mammary glands are modified sweat glands.

ii. **Habitat:** Mammals are omnipresent (present everywhere). These are mostly terrestrial, some are aquatic and few are aerial and arboreal (living on trees).

iii. **Locomotion:** Limbs are the organs of locomotion and are modified for walking, climbing, burrowing, swimming, etc.

iv. **Body division:** Body is differentiated into head, neck, trunk and tail. They have external ear (pinna).

v. **Body temperature:** Mammals are homeotherms or warm-blooded animals.

vi. **Exoskeleton:** It is in the form of hair, fur, nails, hooves, horns, etc.

vii. **Skin:** Skin is glandular and has sweat glands and sebaceous (oil) glands.

viii. **Mouth cavity:** Mammals show heterodont dentition (various types of teeth like incisors, canines, premolars and molars).

ix. **Circulation:** Heart is ventral in position, four chambered with two auricles and two ventricles. RBCs are biconcave and enucleated (except camel). Blood is red in colour.

x. **Respiration:** Respiration takes place by lungs.

xi. **Nervous system:** Brain is highly developed. Cerebrum shows a transverse band called corpus callosum.

xii. **Reproduction and development:** Only few mammals are oviparous. e.g. Duck billed platypus. Some have pouches for development of immature young ones. These are called marsupials. e.g. Kangaroo. Most of the mammals are placental and viviparous.

Q.73. Give examples of animals belonging to class Mammalia.

Ans: Bat, *Rattus*(rat), *Macaca* (monkey), *Camelus* (camel), Whale, Human being, *Canis* (dog), *Elephas* (elephant), *Equus* (horse), *Pteropus* (flying fox), *Ornithorhynchus* (platypus), *Macropus* (kangaroo), *Trachypithecus*.

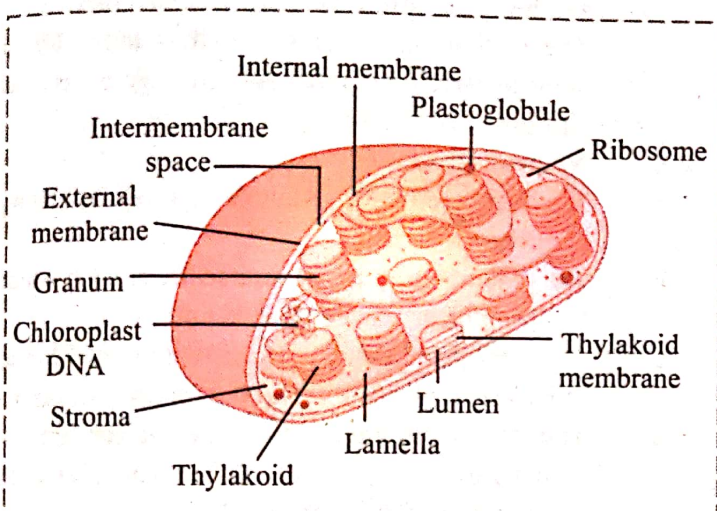
Q.74. Distinguish between Reptilia, Amphibia and Aves.

Ans:

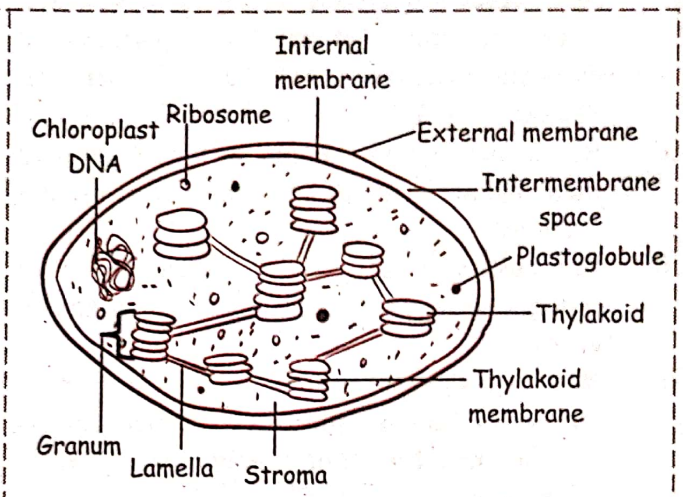
	Reptilia	Amphibia	Aves
i.	Members of Reptilia are terrestrial, with few exceptions.	Members of Amphibia live on land as well as in water.	Aves are terrestrial and aquatic.
ii.	They are poikilothermic.	They are poikilothermic.	They are homeothermic.
iii.	All reptiles have three chambered heart, except for crocodiles.	They have three chambered heart.	They have four chambered heart.
iv.	Olfactory lobes and cerebellum are better developed than those of amphibians.	Olfactory lobes and cerebellum are less developed as compared to reptiles.	Cerebellum is well developed for equilibrium.

Q.53. Draw a labelled diagram of the organelle which plays a significant role in synthesis of starch in plants. Write a note on its structure.

Ans: Chloroplast plays a significant role in synthesis of starch in plants.



Chloroplast



Chloroplast

Structure of chloroplast:

i. In plants, chloroplast is found mainly in mesophyll of leaf.
ii. Chloroplast is lens shaped but it can also be oval, spherical, discoid, ribbon like, etc.
iii. A cell may contain single large chloroplast as in *Chlamydomonas* or there can be 20 to 40 chloroplasts per cell as seen in mesophyll cells.
iv. Chloroplasts contain green pigment called chlorophyll along with other enzymes that help in production of sugar by photosynthesis.
v. Inner membrane of double membraned chloroplast is comparatively less permeable.
vi. Inside the cavity of inner membrane, there is another set of membranous sacs called **thylakoids**.
vii. Thylakoids are arranged in the form of stacks called **grana** (singular: granum).
viii. The grana are connected to each other by means of membranous tubules called **stromal lamellae**.
ix. Space outside thylakoids is filled with stroma.
x. The stroma and the space inside thylakoids contain various enzymes essential for photosynthesis.
xi. Stroma of chloroplast contains DNA and ribosomes (70S).

Q.58. Describe the structure of nucleus.

Ans: **Nucleus** is known as the master cell organelle as it regulates various metabolic activities through synthesis of various proteins and enzymes.

The nucleus in eukaryotic cell is made up of nuclear envelope, nucleoplasm, nucleolus and chromatin network.

i. Nuclear envelope:

a. Nuclear envelope is a double layered delimiting membrane of nucleus.

b. Two membranes are separated from each other by perinuclear space (10 to 50nm).

c. Outer membrane is connected with endoplasmic reticulum at places and harbours ribosomes on it.

d. The inner membrane is lined by nuclear lamina- a network of protein fibres that helps in maintaining shape of the nucleus.

e. The two membranes along with perinuclear space help in separating nucleoplasm from cytoplasm. However, nuclear membrane is not continuous.

f. There are small openings called nucleopores on the nuclear membrane.

g. The nucleopores are guarded by pore complexes which regulate flow of substances from nucleus to cytoplasm and in reverse direction.

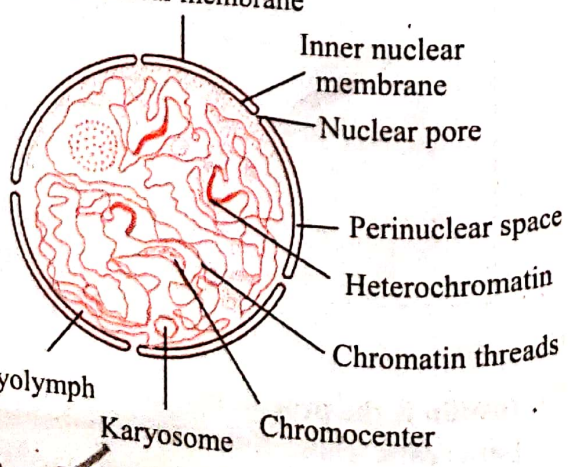
ii. Nucleoplasm or karyolymph:

a. The nucleoplasm or karyolymph contains various substances like nucleic acids, protein molecules, minerals and salts.

b. It contains chromatin network and nucleolus.

iii. Nucleolus:

a. Nucleolus is made up of rRNA and ribosomal proteins and it is known as the site of ribosome biogenesis.



Ultrastructure of nucleus

b. The rRNA and ribosomal proteins are transported to cytoplasm and are assembled together to form ribosomes.

c. Depending on synthetic activity of a cell, there are one or more nucleoli present in the nucleoplasm. For e.g. cells of oocyte contain large nucleolus whereas sperm cells contain small inconspicuous one.

d. Nucleolus appear as dense spherical body present near chromatin network.

READING BETWEEN THE LINES

Nucleolus

i. Nucleolus look like irregular mass of small fibers and granules. These structures form around the genes coding for the rRNA (ribosomal RNA) molecules. Within the nucleolus, the information in rRNA genes is copied into rRNA molecules, which combine with proteins to form ribosomal subunits.

ii. The ribosomal subunits then leave the nucleoli and exit the nucleus through the nuclear pore complexes to enter the cytoplasm, where they join to form complete ribosomes on mRNAs.

Q.60. Can You Recall? *(Textbook page no. 54)*

i. Consider the following cells and comment abo eukaryotic cell. Add more examples from your pr Cuboidal epithelial cell, different types of blood co

Ans:

Type of cells	Position of nuc
Cuboidal epithelial cell	Central
Neutrophils	Central
Basophils	Central
Eosinophils	Central
Monocytes	Central
Lymphocytes	Central
Skeletal Muscle Fibre	Peripheral
Adipocytes	Shifted towards per
Simple squamous epithelium	Central
Ciliated simple columnar epithelium	Near base

[Students can use above table for reference and are expecte

ii. Why nucleus is considered as control unit of a cell

Ans:

a. Nucleus contains the genetic material of an organism.

b. This genetic material is present in the form of De synthesis of various proteins and enzymes.

c. These proteins and enzymes in turn regulate metaboli Therefore, nucleus is considered as control unit of a c

iii. Can cells like Xylem or mature human RBCs calle

Ans:

a. Xylem is a complex tissue consists of tracheids, ves

b. components of xylem, tracheids are dead cells and xyl RBCs do not possess nuclei once they reach maturit They do not require a nucleus to function as they transport of oxygen and carbon dioxide in the blood.

Q.55. Can you tell? *(Textbook page no. 67)*

Differentiate between DNA and RNA.

Ans:

No.	DNA	RNA
i.	It is a genetic material of majority of the organisms.	It is a genetic material only of some viruses.
ii.	It is double stranded.	It is single stranded.
iii.	Deoxyribose sugar is present.	Ribose sugar is present.
iv.	Nitrogen bases like Adenine, Guanine, Cytosine, Thymine are present.	Nitrogen bases like Adenine, Guanine, Cytosine, Uracil are present.
v.	Specific base pairing is observed.	Nitrogen bases do not form pair.
vi.	Total number of purines is equal to total number of pyrimidine. Thus, purine to pyrimidine ratio is 1:1.	Amount of purine and pyrimidine may or may not be equal.
vii.	It is present in nucleus.	It is present in nucleus and cytoplasm.
viii.	It is responsible for determining hereditary characters and for formation of RNA.	It takes part in protein synthesis.

Q.6. With the help of neat and labelled diagram explain the classification of meristematic tissue based on its position.

Ans: Classification of meristematic tissue based on its position:

i. **Apical meristem:**

a. It is produced from promeristem and forms growing point of apices of root, shoot and their lateral branches.

b. It brings about increase in length of plant body and is called as apical initials.

c. Shoot apical meristem is terminal in position whereas in root it is subterminal i.e. located above the root cap.

ii. **Intercalary meristem:**

a. Intercalary meristematic tissue is present in the top or base area of node.

b. Their activity is mainly seen in monocots.

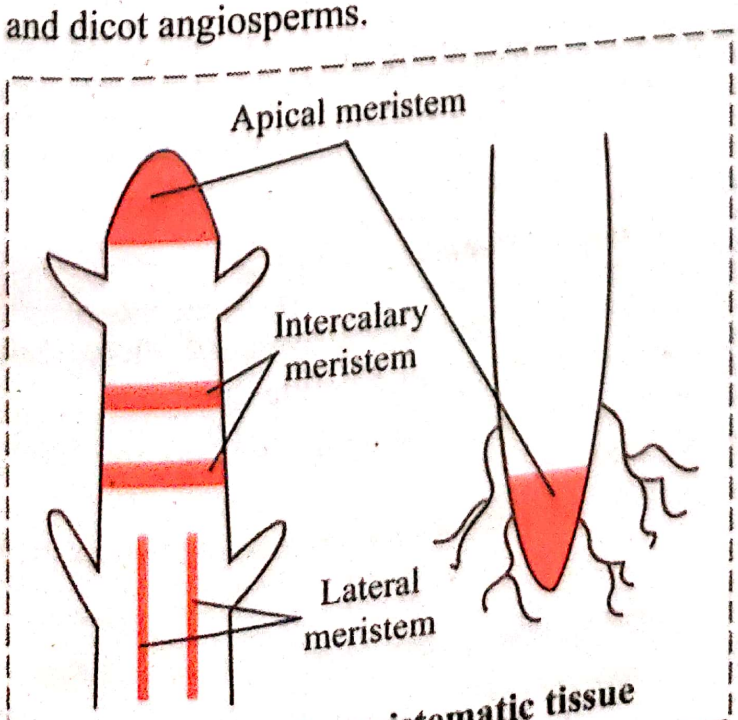
c. These are short lived.

iii. **Lateral meristem:**

a. It is present along the sides of central axis of organs.

b. It takes part in increasing girth of stem or root. e.g. Intrafascicular cambium.

c. It is found in vascular bundles of gymnosperms and dicot angiosperms.



Location of meristematic tissue

ii. **Perigynous flower:** When cup shaped or saucer shaped thalamus is present in a flower, ovary and other floral parts occupy about same position. Such an ovary is said to be semi- superior or semi-inferior. All floral whorls are at the rim of thalamus. Flower is called as perigynous.
e.g. Rose, etc.
It is denoted as G– in floral formula.

iii. **Epigynous flower:** When closed cup like thalamus completely encloses ovary and may show fusion with wall of ovary; the other floral parts occupy superior position and ovary becomes inferior. Such flower is called as epigynous flower.
e.g. Ray florets of Sunflower, Guava, Cucumber etc.
It is denoted as $\overline{G}$ in floral formula.

Q.61. What is thalamus?

Ans: Thalamus:

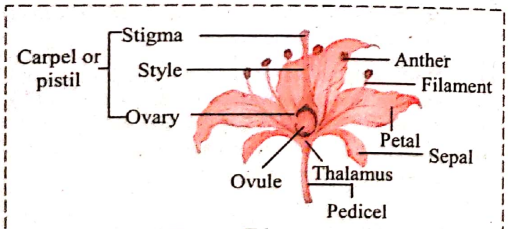
i. The upper, swollen, condensed, knob-like part of the pedicel is called thalamus. It is also called receptacle or torus.

ii. In a typical flower, the thalamus consists of four compactly arranged nodes and three highly condensed internodes.

iii. From each node of thalamus, whorl of modified leaves is produced.

Q.62. With the help of a diagram explain the floral parts of a typical flower.

Ans: Floral parts of a typical flower:



Typical Flower (Diagrammatic)

i. **Calyx (K):**

a. It is outermost floral whorl and individual members are known as **sepals.**

b. Sepals are usually green in colour and perform photosynthesis.

c. If all the **sepals** are **united**, the condition is **gamosepalous** and if they are **free**, the condition is called as **polysepalous**.

d. Gamosepalous calyx is found in China rose and polysepalous calyx is found in *Brassica*.

e. The main function of sepals is to protect inner floral parts in bud condition.

f. Sometimes sepals become brightly coloured (petaloid sepals) and attract insects for pollination. e.g. *Mussaenda* etc.

g. Sepals modify into hairy structures called as pappus. Such calyx helps in dispersal of fruit. e.g. *Tridex*.

ii. **Corolla (C):**

a. It is second floral whorl from outer side and variously coloured.

b. The individual member is called as **petal.**

c. Petals may be sweet to taste, possess scent, odour, aroma or fragrance etc.

d. The condition in which petals are free is said to be **polypetalous** (e.g. Rose) and if they are fused it is called as **gamopetalous** (e.g. *Datura*).

e. The main function of corolla is to attract different agencies for pollination.

iii. **Perianth (P):**

a. Many times, calyx and corolla remain undifferentiated. Such member is known as **tepal.**

b. The whorl of tepals is known as Perianth.

c. It protects other floral whorls.

d. If all the tepals are free the condition is called as **polyphyllous** and if they are fused the condition is called as **gamophyllous.**

e. Sepaloid perianth shows green tepals, while petaloid perianth shows brightly coloured tepals. e.g. *Lily*, *Amaranthus*, *Celosia*, etc.

f. Petaloid tepal helps in pollination and sepaloid tepals can perform photosynthesis.

iv. **Androecium (A):**

a. It is third floral whorl from outer side.

b. Androecium is male reproductive part of a flower.

c. The individual member is known as **stamen.**

d. If all the stamens are free the condition is polyandrous and synandrous if they are fused.

e. **Typical stamen shows three different parts:**

1. **Anther:** It is terminal in position. Anther produces pollen grains. It is usually dithecous (two anther lobes), tetralocular/tetra sporangiate (four pollen sacs) structure. e.g. *Datura*.
In some plants it is monothecous (single lobed), bilocular or bisporangiate structure e.g. *Hibiscus*.

2. **Filament:** It is a stalk of stamen and bears anther at its tip. It raises anther to a proper height for easy dispersal of pollen grains.

3. **Connective:** It is in continuation with the filament. It is similar to mid rib and connects two anther lobes together and also the anther with the filament.

v. **Gynoecium (G):**

a. It is the female reproductive part of a flower and innermost in position.

b. It is also known as pistil.

c. The individual member of gynoecium is known as **carpel.**

d. The number of carpels may be one to many.

e. If all the carpels are fused the condition is described as **syncarpous** and if they are free the condition is described as **apocarpous.**

f. The polycarpellary gynoecium can be bicarpellary (two carpels e.g. *Datura*), tricarpellary three carpels e.g. *Cucurbita*), pentacarpellery (five carpels e.g. *Hibiscus*) and so on.

g. A typical carpel consists of three parts stigma, style and ovary.

1. **Stigma** is a terminal part of carpel which receives pollen grains during pollination.

Q.64. Match the columns.

	Column I (Type of calyx)		Col (Nature
i.	Caducous	a.	Sepals remain even after
ii.	Deciduous	b.	Sepals fall off as soon as
iii	Persistent	c.	Sepals survive till (w formation

Ans: (i-b-3), (ii-c-2), (iii-a-1)

***Q.65. Write a short note on Perianth.**

Ans: *Refer Q.62. (iii)*

Q.66. Define aestivation and explain its different types.

Ans: Aestivation:

i. The mode of arrangement of sepals, petals or tepals in a flower with respect to the members of same whorl is known as aestivation.

ii. **Different types of aestivation are as follows:**

a. **Valvate:** Margins of sepals or petals remain either in contact or lie close to each other but do not overlap. e.g. Calyx of *Datura*, *Calotropis*.

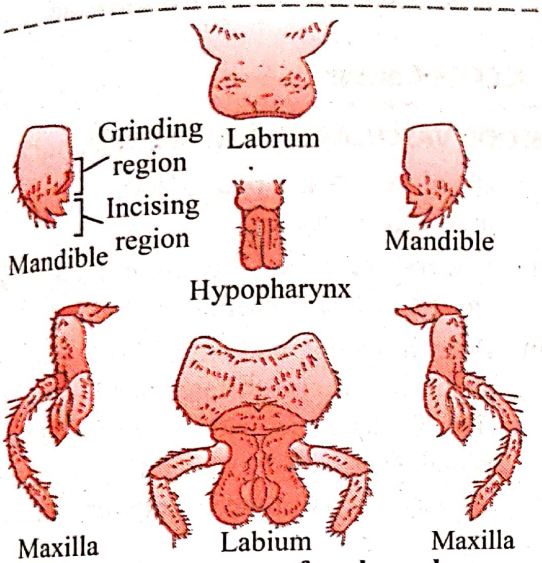
b. **Twisted:** Margins of each sepal or petal is directed inwards and is overlapped. While the other margin is directed outwards and overlap the margin of adjacent. e.g. Corolla of China rose, Cotton etc.

c. **Imbricate:** One of the sepals or petals is internal and is overlapped at both the margins. One is external i.e. both of its margin overlap adjacent member. Rest of the sepals / petals have one inner or overlapped margin and outer or overlapping margin. e.g. *Cassia*, *Bauhinia*, etc.

Q.19. Sketch a neat and labelled diagram of the following along with its description:
i. Mouthparts of cockroach
ii. Salivary glands of cockroach
iii. Gizzard of cockroach.

Ans:

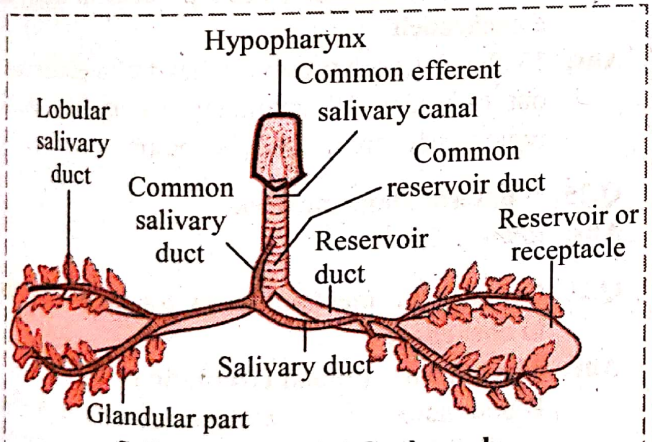
i.



Mouthparts of cockroach

For description: Refer Q.16 (ii)

ii.



Salivary glands of Cockroach

Salivary glands:

a. Cockroach has a pair of salivary glands which secrete saliva.

b. Each salivary gland has two glandular lobes and a receptacle or reservoir.

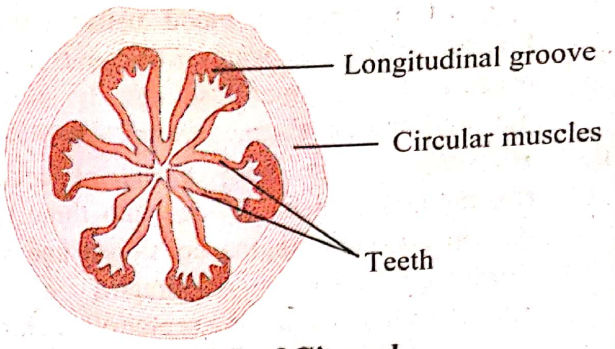
c. The glandular lobes consists of several irregular-shaped white coloured lobules which secrete saliva.

d. Each gland has a salivary duct. Both the ducts unite to form a common salivary duct.

e. Receptacle of each salivary gland is thin-walled, elongated, sac-like structure. Each receptacle has a duct. These ducts unite to form common reservoir duct.

f. Common salivary duct and common reservoir duct unite together to form a common efferent salivary duct. The efferent salivary duct opens at the base of tongue or hypopharynx.

iii.



T.S. of Gizzard

For description: Refer Q.16. (iv-a-4)

***Q.20. What would have happened if cockroach did not have gizzard?**

Ans:

i. The gizzard in cockroach is a spherical organ which has chitinous teeth and bristles.

ii. The chitinous teeth present in gizzard are responsible for crushing the food and the bristles help to filter the food.

iii. If the cockroach did not have gizzard, the food will not be crushed into small particles and unfiltered food will enter the hindgut. Thus, digestion will be affected in the absence of gizzard.

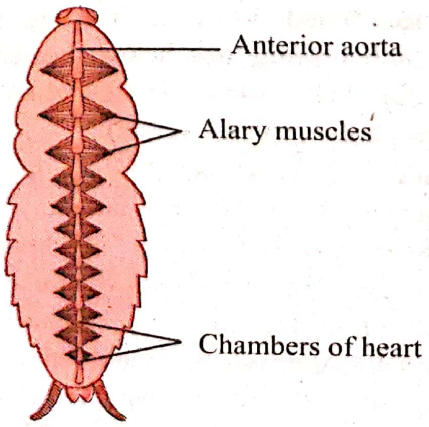
***Q.21. Explain the following in short: What is mesenteron?**

Ans: *Refer Q.16. (iv-b)*

11.6 CIRCULATORY SYSTEM OR BLOOD VASCULAR SYSTEM

***Q.22. Describe the circulatory system of cockroach.**

Ans:



Circulatory System

Q.80. Give the significance of Photosynthesis.

Ans:

i. Photosynthesis is anabolic process which uses inorganic substances and produces food for all life directly or indirectly.

ii. This process transforms solar energy into chemical energy.

iii. The released by product O_2 is necessary not only for aerobic respiration in living organisms but also used in forming protective ozone layer around earth.

iv. It also helps us in providing fossil fuels, coals, petroleum and natural gas.

ENRICH YOUR KNOWLEDGE

Removal of Hydrogen from respiratory substrate is the primary process in respiration:
The fact that during respiration oxygen is taken in and carbon dioxide is given out may give a false impression that respiratory substrates directly unite with oxygen. It must be remembered that oxygen does not play such a primary role in the process of respiration. The primary process in respiration involves removal of hydrogen from the respiratory substrate. The reactions in which hydrogen is removed are catalyzed by enzymes called dehydrogenases. Free hydrogen formed after dehydrogenation cannot exists in the cell and is removed as soon as it is formed. It is taken up by substances known as acceptors. In aerobic respiration this hydrogen is ultimately handed over to oxygen. These two combines with each other and form water.

***Q.63. What are respiratory substrates? Name the most common respiratory substrate.**

Ans: Respiratory substrates are the molecules that are oxidized during respiration to release energy which can be used for ATP synthesis. Carbohydrates, fats and proteins are the common respiratory substrate. Glucose is the most common respiratory substrate.

Q.64. Can you recall? *(Textbook page no. 151)*
Which is most preferred nutrient among carbohydrate, protein and fat for energy production? Why?

Ans:

i. The preferred nutrient is carbohydrate because it quickly supplies energy as compared to other nutrients.

ii. Carbohydrates are easy to digest as compared to fats.

iii. The RQ of carbohydrate is 1. Hence allows complete oxidation of food.

Thus, the preferred nutrient is carbohydrate.

***Q.65. What is RQ.? What is its value for fats?**

Ans:

i. Respiratory quotient (R.Q.) or respiratory ratio is the ratio of volume of CO_2 released to the volume of O_2 consumed in respiration.

ii. $$R.Q. = \frac{\text{Volume of } CO_2 \text{ released}}{\text{Volume of } O_2 \text{ consumed}}$$

iii. The RQ value for Fats is 0.7.

Q.66. Internet my friend *(Textbook page no. 158)*
Calculate the RQ for different respiratory substrates using appropriate formula.

Ans: The RQ for different respiratory substrates are:

i. **Carbohydrates (R.Q. is 1)**
When carbohydrates are used as substrate, equal volumes of CO_2 and O_2 are released and consumed respectively, thus its R.Q. is 1.

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$$

$$R.Q. = \frac{6CO_2}{6O_2} = 1.0$$

ii. **Fats (R.Q. is less than 1)**
Substrates like fats are poorer in oxygen than carbohydrates. Thus, more oxygen is utilized for its complete oxidation.

$$2(C_{51}H_{98}O_6) + 145O_2 \longrightarrow 102CO_2 + 98H_2O + \text{Energy}$$

$$R.Q. = \frac{CO_2}{O_2} = \frac{102}{145} = 0.7$$

iii. **Protein respiration (R.Q. is less than 1)**
When proteins serve as respiratory substrate, they are first degraded to amino acids.
Then, amino acids are converted into various intermediates of carbohydrates.
However, amino acids have low proportion of O_2 as compared to carbohydrates.
Thus, they require more O_2 during their complete oxidation and value of R.Q. becomes less than 1.
In case of proteins, the R.Q. is approximately 0.9.

Q.67. Give the significance of respiration.

OR

Write a short note on significance of respiration.

Ans:

i. Respiration provides energy for biosynthesis of biomolecules.

ii. It is also a source of energy for cell division, growth, repairs and replacement of worn out parts, movements, locomotion etc.

iii. Various intermediates of Krebs cycle are used as building blocks for synthesis of other complex compounds.

iv. Coupled with photosynthesis, it helps to maintain the balance between CO_2 and O_2 in the atmosphere.

v. Anaerobic respiration (fermentation) is used in various industries such as dairies, bakeries, distilleries, leather industries, paper industries etc. It is used in the commercial production of alcohol, organic acids, vitamins, antibiotics etc.

b. Dental technicians are the ones which improve patients' appearance, ability to chew and speech. They make dentures, crowns, bridges and dental braces.

ii. What is a root canal treatment?

Ans:

a. Root canal treatment is also known as endodontic treatment.

b. It is a dental treatment of removing infection from inside of a tooth.

c. Root canal is hollow section of tooth which contains the nerve tissue, blood vessels and other cells, this is also known as pulps.

d. Crown and root are a part of tooth. Crown is present above the gum while root is embedded in the gum.

e. Pulp which is present inside the root canal nourishes the tooth and provides moisture to the surrounding material.

f. The nerves present inside the pulp sense hot and cold temperatures as pain.

g. First step of a root canal treatment is removal of dead pulp tissues by making a hole on the surface of tooth.

h. In second step, the dentist cleans and decontaminates the area and fills the hollow area with adhesive cement in order to seal the canal completely.

i. The tooth is dead after the therapy and the patient no longer feel any pain but the tooth becomes more fragile than ever.

j. The last step of root canal is adding a crown or filling. Until the crown or filling is complete, patient is not supposed to chew or bite using that tooth. After the crown or filling, patient can use that tooth as before.

***Q.12. Explain the structure of tooth. Explain why human dentition is considered as thecodont, diphydont and heterodont.**

Ans:

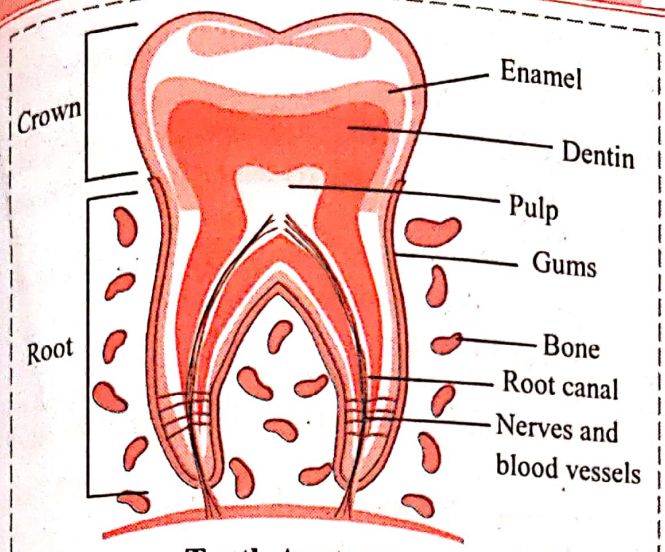
i. **Structure of tooth:**

a. A tooth consists of the portion that projects above the gum called crown and the root that is made up of two or three projections which are embedded in gum.

b. A short neck connects the crown with the root.

c. The crown is covered by the hardest substance of the body called enamel which is made up of calcium phosphate and calcium carbonate.

d. Basic shape of tooth is derived from dentin which is a calcified connective tissue.



Tooth Anatomy

e. The dentin encloses the pulp cavity. It is filled with connective tissue pulp. It contains blood vessels and nerves.

f. Pulp cavity has extension in the root of the tooth called root canal.

g. The dentin of the root of tooth is covered by cementum which is a bone like substance that attaches the root to the surrounding socket in the gum.

ii. Human dentition is described as thecodont, diphyodont and heterodont.

iii. It is called thecodont type because each tooth is fixed in a separate socket present in the jaw bones by gomphosis type of joint.

iv. It is called diphyodont type because we get only two sets of teeth, milk teeth and permanent teeth.

v. It is called heterodont type because humans have four different type of teeth like incisors, canines, premolars and molars.

Q.13. What is dentition?

Ans: The study of teeth with respect to their number, arrangement, development etc. is known as dentition.

Q.14. Describe the structure and functions of the various parts of the alimentary canal.

Ans: Human Digestive system:

Human digestive system consists of alimentary canal and associated digestive glands.

Alimentary canal:

Alimentary canal is a long tube-like structure of varying diameter starting from mouth and ending with anus.

It is about 8-10m long.

Alimentary canal consists of mouth, buccal cavity, pharynx, oesophagus, stomach, small intestine, large intestine and anus.

Q.86. Enlist the human excretory organs and their excretory products.

Ans: Excretory Organs:

i. **Lungs:** Remove CO_2 and also water vapour to a considerable extent. Volatile substances present in spices and other food stuff are excreted through lungs

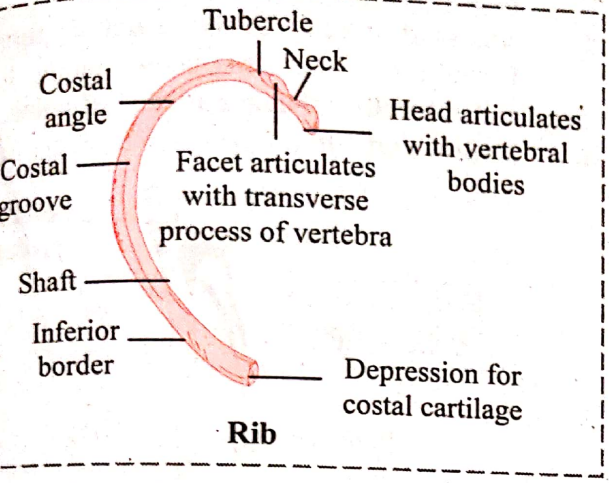
ii. **Kidneys:** Remove nitrogenous waste products like ammonia, urea and uric acid, creatinine. They also remove excessive amount of water, salts and certain minerals.

iii. **Skin:** Remove water, NaCl, lactic acid and urea by through of sweat.

Q.71. Describe in brief the structure of thoracic cage.

Ans: Thoracic cage consists of 12 pairs of ribs, breast bone or sternum.

i. **Ribs:**



Rib

a. A rib is a 'C' shaped bone. It is attached to respective thoracic vertebrae on **dorsal** side.

b. Twelve pairs of ribs are attached to twelve thoracic vertebrae. For attachment to the vertebrae the posterior ends of ribs have two protuberances namely the **head** and **tubercle.**

c. The head of rib attaches to facet formed by demifacets of adjacent thoracic vertebrae at the base of **transverse processes.**

d. The tip of transverse processes of these vertebrae also have **facets** for attachment of ribs where tubercles of ribs are attached.

e. Ribs provide space for attachment of intercostal muscles.

f. On ventral side, the ribs may or may not attach the sternum. Depending on their attachment, the ribs are classified into three types:

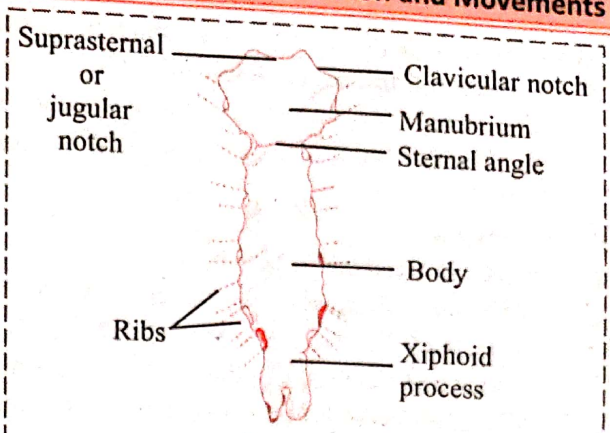
1. **True ribs:** First seven pairs of ribs are attached directly to the sternum by means of their costal cartilages.
2. **False ribs:** Costal cartilages of rib numbers 8, 9 and 10 are attached to rib number 7 on either side and not directly to the sternum. Hence, these are called false ribs.
3. **Floating ribs:** Last two pairs of ribs have no ventral connection. Hence, they are called floating ribs.

ii. **Sternum:**

a. It is a flat, narrow bone, around 15 cms in length.

b. It is placed medially in anterior thoracic wall (chest region).

c. It consists of three distinct parts - manubrium, body and xiphoid processes.



Sternum

d. **Manubrium** shows two notches on anterio-lateral side for attachment with clavicle of each side. It also shows two notches on each of the lateral side for attachment of first two pairs of ribs.

e. Body of sternum is a flat bone that shows five notches on lateral aspect which are meant for direct or indirect attachment of ribs.

f. **Xiphoid process** is lowermost part of sternum which is initially cartilaginous and gets ossified in adults. It provides space for the attachment of diaphragm and abdominal muscles.

g. Ribs are attached to sternum by means of cartilaginous extensions called costal cartilages.

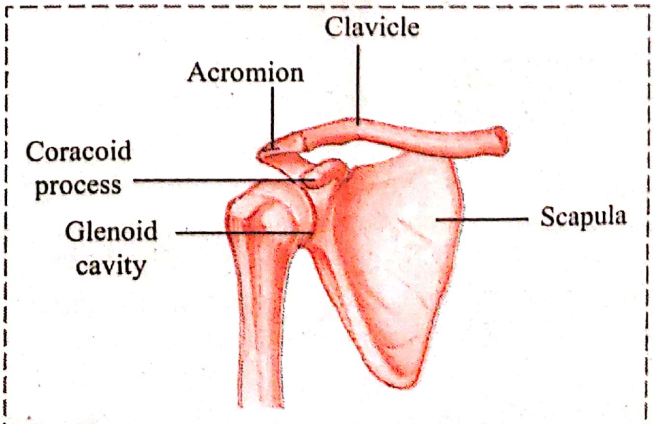
ENRICH YOUR KNOWLEDGE

Something Interesting *(Textbook page no.205)*
Around 8% of humans have an extra pair of ribs attached to the lumbar vertebrae. Such a rib is found in some types of gorillas. Therefore, the 13th pair of ribs is called gorilla rib.

Q.72. What is intercostal space?

Ans: The space between the ribs is called as intercostal space.

Q.73. Describe the bones of pectoral girdle.



Pectoral girdle

READING BETWEEN THE LINES

Besides the given salient features of gymnosperms, following are also the features of gymnosperms:

i. ***Vegetative reproduction:*** *Vegetative reproduction takes place with the help of bulbils.*

ii. ***Spores:*** *Gymnosperms are heterosporous. The microsporophylls and megasporophylls are usually arranged in compact structures called cones or strobili.*
The microsporangium (pollen sac) produces large number of spores (microspores or pollen grains) which are light in weight.
Each megasporangium (ovule) is surrounded by integuments. The ovule is orthotropous, i.e. upright.

iii. ***Sexual reproduction:*** *The pollination in Gymnosperms is anemophilous (wind pollination) and direct as the pollen grains are received directly in the pollen chamber of the ovule.*
Fertilization occurs through a pollen tube. This process is called siphonogamy.

iv. ***Alternation of generation:*** *Gymnosperms show a distinct heteromorphic alternation of generations.*
The sporophyte is diploid, dominant, autotrophic, independent; while gametophyte is haploid, recessive and dependent.

ii. General characters of angiosperms:

a. **Habitat:** Angiosperms is a group of highly evolved plants, primarily adapted to terrestrial habitat.

b. **Alternation of generations:** Angiosperms show heteromorphic alternation of generation in which the sporophyte is diploid, dominant, autotrophic and independent. The gametophytes (male or female) are haploid, reduced and concealed.

c. **Spores and Sporophylls:** Angiosperms are heterosporous. Microspores (commonly called pollens) are formed in microsporangia (or anthers). They develop in highly specialized microsporophyll or stamens while megaspores are formed in megasporangia (or ovules) borne on highly specialized megasporophyll called carpel.

d. **Flower:** Besides the essential whorls of microsporophylls (androecium) and megasporophylls (gynoecium), there are accessory whorls namely, calyx (sepals) and corolla (petals) arranged together to form flowers.

READING BETWEEN THE LINES

Besides the given salient features of angiosperms, following are also the features of angiosperms:

i. ***Body:*** *The body of sporophyte is divisible into root, stem and leaves. It has flowers, fruits and seeds.*

ii. ***Vascular tissues:*** *Vascular tissues are well differentiated. Xylem shows vessels or tracheids, while phloem shows sieve tubes and companion cells.*

iii. ***Pollination:*** *The pollination is indirect and maybe self or cross.*

iv. ***Sexual reproduction:*** *There is typically double fertilization, one male gamete fuses with egg cell to form embryo and another fuses with secondary nucleus to form endosperm.*
The zygote continues to develop within the ovule until seed is developed. The ovary simultaneously ripens into a fruit.

Q.50. Explain the given figure.

Ans:

i. The given figure represents megasporophyll of *Cycas*.

ii. *Refer: Practical / Project Q.78. (iii)*

Q.51. Give the economic importance of *Cycas* and *Pinus*.

Ans:

i. *Cycas* is grown as an ornamental plant.

ii. *Pinus* is used as source of pine wood, turpentine oil and pine resin.

GG - Gyan Guru

Skin damage initiates a sequence of events that helps in repairing the skin to its normal or near-normal structure and function. Two types of wound-healing processes can occur, depending on the depth of the injury.

a. Epidermal wound healing occurs in wounds that affect only the epidermis

b. Deep wound healing occurs in wounds that penetrate the dermis.

ii. **What is the difference between growth of non-living material and living organism?**

Ans: Living things show growth from within. Non-living things show growth by accumulation of materials on their surface.

Q.2. Can you tell? *(Textbook page no. 79)*

What is cell cycle?

Ans:

i. Sequential events occurring in the life of a dividing cell is called cell cycle.

ii. Interphase and M - phase are the two phases of cell cycle.

iii. Cell undergoes growth during interphase and divides during M – phase.

Q.3. With the help of suitable diagram, describe the cell cycle.

Ans:

i. Series of events occurring in the life of a cell is called cell cycle. Interphase and M – phase are the two phases of cell cycle.

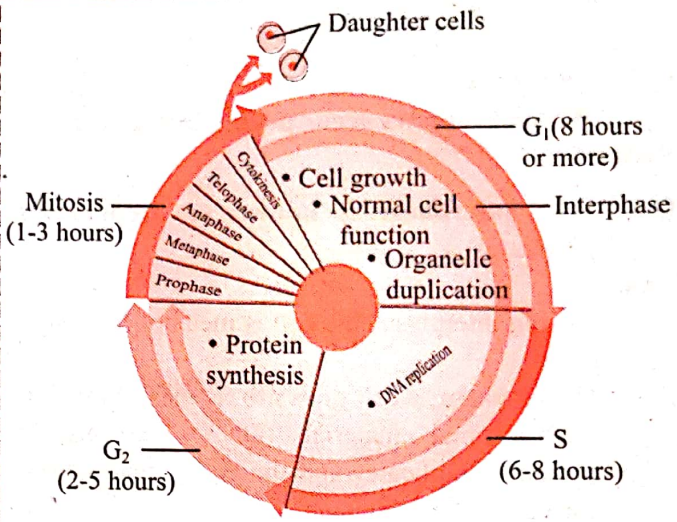
ii. **Interphase:** It is the stage between two successive cell divisions. It is the longest phase of a cell cycle during which the cell is highly active and prepares itself for cell division.

The interphase is subdivided into three sub-phases as G_1-phase, S-phase and G_2-phase.

a. **G_1 – phase (First gap period/First Gap Phase):**
It begins immediately after cell division.
RNA (mRNA, rRNA and tRNA) synthesis, protein synthesis and synthesis of membranes take place during this phase.

b. **S – phase (Synthesis phase):**
In this phase DNA is synthesized (replicated), so that amount of DNA per cell doubles.
Synthesis of histone proteins takes place in this phase.

c. **G_2 – phase (Second growth phase/Second Gap Phase):**
Metabolic activities essential for cell division occur during this phase.
Various proteins which are necessary for the cell division are also synthesized in this phase.
Apart from this, RNA synthesis also occurs during this phase.
In animal cells, a daughter pair of centrioles appears near the pre-existing pair.



Cell cycle

READING BETWEEN THE LINES

As the cells appeared inactive in the G phases they were misnamed as "gaps" when they were first observed.

Due to development in the field now we know that metabolic activity and growth occur throughout interphase.

During all three phases of interphase, a cell grows by producing proteins and cytoplasmic organelles such as mitochondria and endoplasmic reticulum.

Q.4. Discuss with teacher *(Textbook page no. 76)*

Some cells do not have gap phase in their cell cycle whereas some cells spend maximum part of their life in gap phase. Search for such cells. Some cells are said to be in G_0 phase. What is this G_0 phase?

Ans:

i. G_0 is the phase of the cell cycle in eukaryotes in which many cell types stop dividing. It is also called a quiescent stage.

ii. If cells are deprived of appropriate growth factors, they stop at the G_1 checkpoint of the cell cycle. Their growth and division are arrested and they remain in G_0 phase.

iii. Mature neurons and muscle cells remain in G_0 phase.

READING BETWEEN THE LINES

G_0 phase is considered as either an extended G_1 phase in which the cell is neither dividing nor preparing to divide or a distinct quiescent stage which occurs outside the cell cycle. Cells in G_0 are in non-dividing phase.

Q.5. Can you tell? *(Textbook page no. 79)*
Which processes occur during interphase?

Ans: *Refer Q.3.*

Q.6. Why interphase is known as preparatory phase.

Ans:

i. During interphase, the cell is metabolically very active.

ii. In this phase, a cell grows to its maximum size, chromosomal material (DNA and histone proteins) duplicates and the cell prepares itself for next mitotic division.

Hence, interphase is known as preparatory phase.

***Q.7. Students were shown some slides of cancerous cells. Teacher made a comment as if there would have been a control at one of its cell cycle phase, there wouldn't have been a condition like this. Which phase the teacher was referring to?**

Ans: The phase teacher was referring would be G_1 phase.

*[**Note:** Cells actively control only three checkpoints in the cycle. These checkpoints (G_1/S, G_2/M, the spindle checkpoint) allow the cell cycle to be delayed or halted when necessary.]*

Q.8. Name the following.

i. In which phase the amount of DNA per cell doubles?

ii. Which types of RNA are synthesized during first growth phase?

Ans:

i. S-phase.

ii. m-RNA, t-RNA and r-RNA

Q.9. Match the Column I (Phases of Cell cycle) with Column II (Approximate time for completion).

	Column I		Column II
i.	G_2 Phase	a.	1–3 Hours
ii.	G_1 Phase	b.	2–5 Hours
iii.	M Phase	c.	6–8 Hours
iv.	S Phase	d.	8 Hours

Ans: (i–b), (ii–d), (iii–a), (iv–c)

NCERT Corner

CELL CYCLE

i. Human cells divide once in approximately every 24 hours.

ii. The duration of cell cycle varies from organism to organism and from cell type to cell type.

iii. For e.g. yeast cell progress through cell cycle only about 90 minutes.

iv. In the 24 hour average duration of cell cycle of a human cell, cell division proper lasts for only about an hour. The interphase lasts more than 95% of the duration of cell cycle.

SYNTHESIS PHASE

i. During synthesis phase the amount of DNA per cell doubles.

ii. If the initial amount of DNA is denoted as 2C then it increases to 4C. However, there is no increase in the chromosome number; if the cell had diploid or 2n number of chromosomes at G_1, even after S phase the number of chromosomes remains the same, i.e., 2n.

iii. DNA replication begins in the nucleus, and the centriole duplicates in the cytoplasm.

7.2 TYPES OF CELL DIVISION

Q.10. What is cell division? Mention the types of cell division.

Ans: The division of cells into two (or more) daughter cells with same (or different) genetic material is called cell division. There are three types of cell divisions:

i. Amitosis:

a. It is the simplest form of cell division. The nucleus elongates and a constriction appears along its length.

b. This constriction deepens and divides nucleus into two daughter nuclei followed by division of cytoplasm resulting in formation of two daughter cells.

c. This type of division is observed in unicellular organisms, abnormal cells, old cells and in foetal membrane cells.

ii. Mitosis:

a. In this type of cell division, the cell divides and forms two similar daughter cells which are identical to the parent cell.

b. It is completed in two steps as karyokinesis and cytokinesis.

iii. Meiosis:

a. In this type of cell division, the number of chromosomes is reduced to half. Hence, this type of cell division is also called reductional division.

b. Meiosis produces four haploid daughter cells from a diploid parent cell.

Q.71. Define placentation. Explain its types.

Ans:

i. **Placentation:** The mode of arrangement of ovules on the placenta within the ovary is called placentation.

ii. **Types of placentation:**

a. **Marginal:** Ovules are placed on the fused margins of unilocular ovary. e.g. Pea, Bean etc.

b. **Axile:** Ovules are placed on the central axis of a multilocular ovary. e.g. China rose, Cotton, etc.

c. **Parietal:** Ovules are placed on the inner wall of unilocular ovary of multicarpellary syncarpus ovary. e.g. Papaya, Cucumber, etc.

d. **Basal:** Single ovule is present at the base of unilocular ovary. e.g. Sunflower, Rice, Wheat.

e. **Free central:** Ovules are borne on central axis which is not attached to ovary wall. e.g. *Argemone*, *Dianthus*.

Q.72. Write

ENRICH YOUR KNOWLEDGE

Removal of Hydrogen from respiratory substrate is the primary process in respiration:
The fact that during respiration oxygen is taken in and carbon dioxide is given out may give a false impression that respiratory substrates directly unite with oxygen. It must be remembered that oxygen does not play such a primary role in the process of respiration. The primary process in respiration involves removal of hydrogen from the respiratory substrate. The reactions in which hydrogen is removed are catalyzed by enzymes called dehydrogenases. Free hydrogen formed after dehydrogenation cannot exists in the cell and is removed as soon as it is formed. It is taken up by substances known as acceptors. In aerobic respiration this hydrogen is ultimately handed over to oxygen. These two combines with each other and form water.

***Q.63. What are respiratory substrates? Name the most common respiratory substrate.**

Ans: Respiratory substrates are the molecules that are oxidized during respiration to release energy which can be used for ATP synthesis. Carbohydrates, fats and proteins are the common respiratory substrate. Glucose is the most common respiratory substrate.

Q.64. Can you recall? *(Textbook page no. 151)*
Which is most preferred nutrient among carbohydrate, protein and fat for energy production? Why?

Ans:

i. The preferred nutrient is carbohydrate because it quickly supplies energy as compared to other nutrients.

ii. Carbohydrates are easy to digest as compared to fats.

iii. The RQ of carbohydrate is 1. Hence allows complete oxidation of food.

Thus, the preferred nutrient is carbohydrate.

***Q.65. What is RQ.? What is its value for fats?**

Ans:

i. Respiratory quotient (R.Q.) or respiratory ratio is the ratio of volume of CO_2 released to the volume of O_2 consumed in respiration.

ii. $$R.Q. = \frac{\text{Volume of } CO_2 \text{ released}}{\text{Volume of } O_2 \text{ consumed}}$$

iii. The RQ value for Fats is 0.7.

Q.66. Internet my friend *(Textbook page no. 158)*
Calculate the RQ for different respiratory substrates using appropriate formula.

Ans: The RQ for different respiratory substrates are:

i. **Carbohydrates (R.Q. is 1)**
When carbohydrates are used as substrate, equal volumes of CO_2 and O_2 are released and consumed respectively, thus its R.Q. is 1.

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$$

$$R.Q. = \frac{6CO_2}{6O_2} = 1.0$$

ii. **Fats (R.Q. is less than 1)**
Substrates like fats are poorer in oxygen than carbohydrates. Thus, more oxygen is utilized for its complete oxidation.

$$2(C_{51}H_{98}O_6) + 145O_2 \longrightarrow 102CO_2 + 98H_2O + \text{Energy}$$

$$R.Q. = \frac{CO_2}{O_2} = \frac{102}{145} = 0.7$$

iii. **Protein respiration (R.Q. is less than 1)**
When proteins serve as respiratory substrate, they are first degraded to amino acids.
Then, amino acids are converted into various intermediates of carbohydrates.
However, amino acids have low proportion of O_2 as compared to carbohydrates.
Thus, they require more O_2 during their complete oxidation and value of R.Q. becomes less than 1.
In case of proteins, the R.Q. is approximately 0.9.

Q.67. Give the significance of respiration.
OR
Write a short note on significance of respiration.

Ans:

i. Respiration provides energy for biosynthesis of biomolecules.

ii. It is also a source of energy for cell division, growth, repairs and replacement of worn out parts, movements, locomotion etc.

iii. Various intermediates of Krebs cycle are used as building blocks for synthesis of other complex compounds.

iv. Coupled with photosynthesis, it helps to maintain the balance between CO_2 and O_2 in the atmosphere.

v. Anaerobic respiration (fermentation) is used in various industries such as dairies, bakeries, distilleries, leather industries, paper industries etc. It is used in the commercial production of alcohol, organic acids, vitamins, antibiotics etc.

ii. Is deglutition voluntary or involuntary?

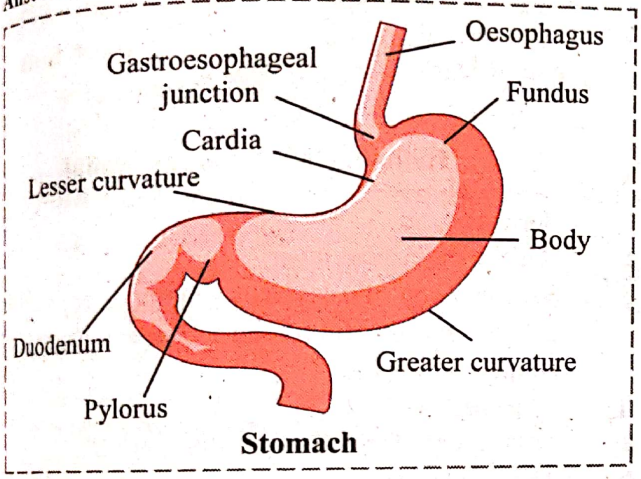
Ans:

a. Deglutition consists of three phases: oral phase, pharyngeal phase and oesophagal phase.

b. The oral phase is voluntary whereas the pharyngeal and oesophagal phases are involuntary. *[Source: Goyal, R. K., & Mashimo, H. (2006). Physiology of oral, pharyngeal, and esophageal motility. GI Motility online.]*

Q.17. Draw a neat and labelled diagram of stomach and write a short note on it.

Ans: For short note *Refer Q.14. (iv)*



Stomach

Q.18. Describe the structure of Small Intestine.

Ans: It is about 6 meters long and 2.5 cm broad tube coiled within abdominal cavity.

The coils are held together by mesenteries, supporting the blood vessels, lymph vessels and nerves.

It is divided into three parts.

i. **Duodenum:**

a. It is about 26 cm long 'U' shaped structure.

b. The duodenum turns towards left side of abdominal cavity below the stomach.

ii. **Jejunum:**

a. It is about 2.5 meters long, coiled middle portion of small intestine.

b. It is narrower than the duodenum.

iii. **Ileum:**

a. It is about 3.5 meters long.

b. It is highly coiled and little broader than jejunum.

c. The ileum opens into the caecum of large intestine at ileocaecal junction.

Q.19. Explain anatomy of different parts of Large Intestine.

Ans: Ileum opens into large intestine.

It is 1.5 meters in length.

It is wider in diameter and shorter than small intestine.

It consists of caecum, colon and rectum.

i. **Caecum:**

a. Caecum is a small, blind sac present at the junction of ileum and colon.

b. It is 6cm in length.

c. It hosts some symbiotic microorganisms.

d. An elongated worm like vermiform appendix arises from the caecum.

e. Appendix is vestigial organ in human beings and functional in herbivorous animals for the digestion of cellulose.

ii. **Colon:**

a. Caecum opens into colon.

b. Colon is tube like-organ consist of three parts, ascending colon, transverse colon and descending colon.

c. The colon is internally lined by mucosal cells.

iii. **Rectum:**

a. It is posterior region of large intestine.

b. It temporarily stores the undigested waste material called faeces till it is egested out through anus.

GG - Gyan Guru

The medical specialty that deals with the diagnosis and treatment of disorders of the rectum and anus is called ***proctology****.*

Q.20. Find out *(Textbook page no. 163)*

You must have heard about appendicitis. It is inflammation of appendix. Find more information about this disorder.

Ans:

i. Appendicitis is a condition where there is inflammation of appendix.

ii. Appendix is a vestigial organ. It is a finger shaped pouch that projects from colon on the lower right side of the abdomen.

iii. Appendicitis pain is very severe. It initially starts from the navel and then moves.

iv. It occurs in the people of age group between 10 to30.

v. Surgical removal is the standard treatment for appendicitis.

vi. Symptoms: Nausea and vomiting, loss of appetite, low grade fever, constipation, abdominal bloating, severe pain in the right side of the abdomen.

vii. Appendicitis is caused when there is blockage in the lining of the appendix that results in infection. The bacteria multiply rapidly and causes inflammation and it is then filled with pus.

viii. If not treated properly appendix can rupture which can lead to further complications.

[Students can use above answer for reference and find more information about appendicitis.]