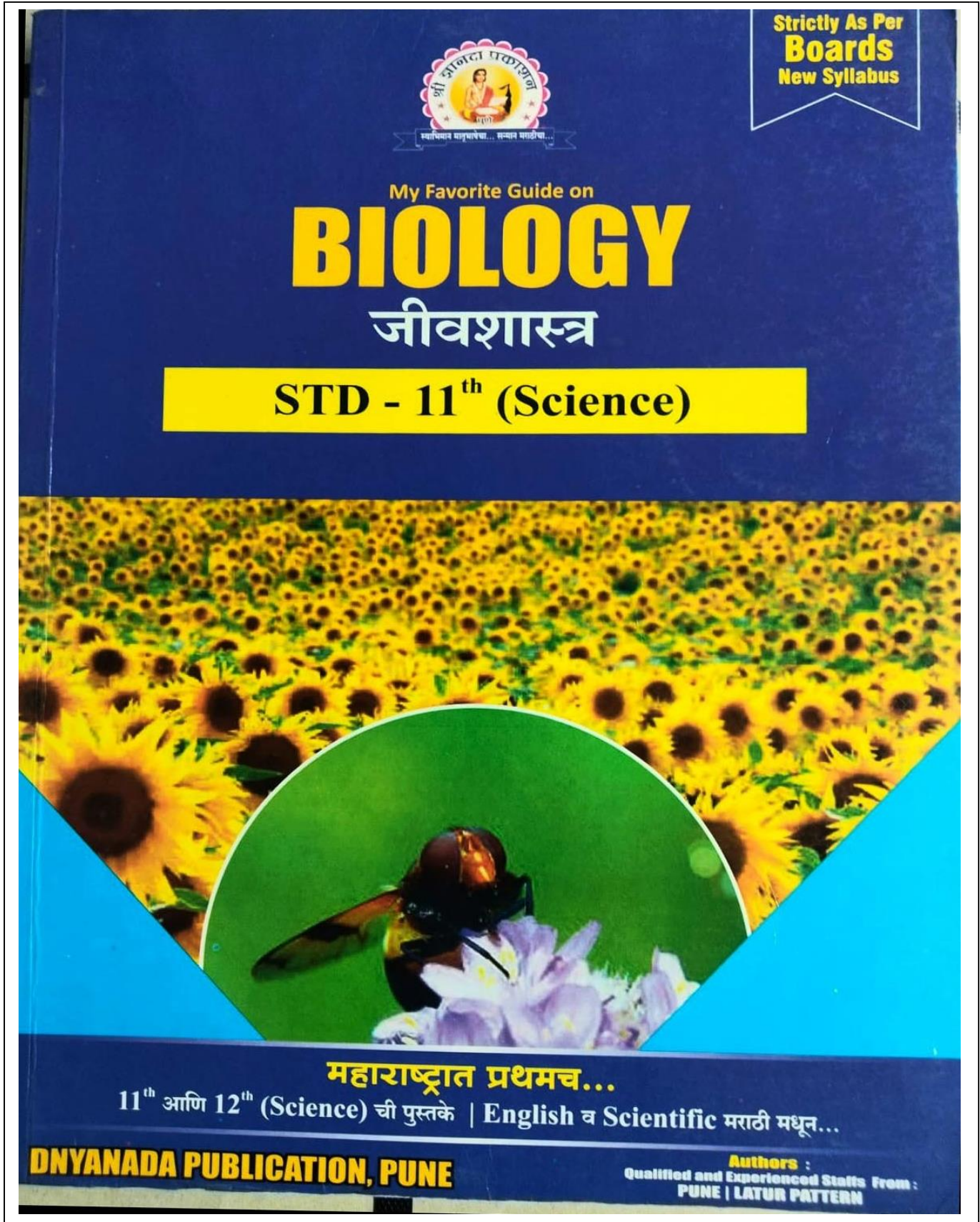




TOPIC - 01 LIVING WORLD

1.0 Introduction

Planet earth is made up of abiotic and biotic components. The biotic components are obviously the living beings present around us. The question is why do we call them living and how do they differ from non-living?

Q.1 Whether all organism are similar? Justify your answer.

Ans: No, all organisms are not similar.

- i) Organisms on the earth exhibit great diversity.
- ii) Organisms are grouped as microbes, plants (autotrophs), animals (heterotrophs) and decomposers.
- iii) Different microbes and decomposers have various shapes and sizes.
- iv) Plants can be further classified on their shape, size, structure, mode of reproduction, etc. Plants also differ greatly based on the locations in which they are found. e.g. Snowy, desert, forest, aquatic, etc.
- v) Even animals show a high degree of variation. They are classified as unicellular, multicellular, invertebrates, vertebrates, etc. Also, based on the environment in which they live, they are classified as terrestrial, aerial, aquatic and amphibians.

Q.2 Give difference between living and non-living things.

Ans: Living and Non-living things:

No.	Living Things	Non-living Things
i	Living things show growth from within.	Non-living things show growth by accumulation of materials on their surface.
ii	They reproduce asexually or sexually, except mules, sterile worker bees, infertile males.	They do not reproduce.
iii	They perform metabolism in order to obtain energy.	No metabolic changes occur in non-living things.
iv	They show irritability and respond to	They do not show irritability.

	changes in their surroundings.	
v	They undergo ageing and eventually die.	Non-living things do not have a finite life span.

1.1 Basic Principles of Life

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

OR

Q.3 Enlist the characters of living organisms.

Ans: The basic principles of life are as follows:

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

ii) Growth and development: Organisms tend to grow and develop in a well-orchestrated process from birth onwards.

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

iv) Reproduction: For continuity of race (species), organisms reproduce (asexually or sexually) to produce young ones like themselves. However, mules and worker bees do not reproduce, yet are living.

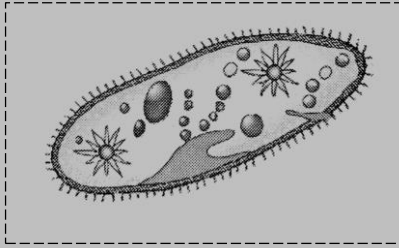
v) Death: As the body loses its capacity to perform metabolism, an organism dies.

vi) Response to change in surrounding: Living organisms respond to thermal, chemical or biological changes in their surroundings.

Q.4 What are taxonomical aids? Give examples.

Ans: Taxonomical aids are used to study biodiversity. e.g. Herbaria, botanical gardens, museums, biodiversity parks, etc.

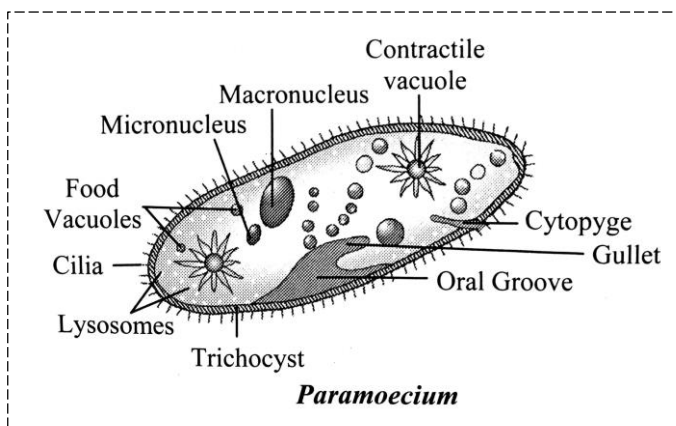
Q.37 Identify the following diagram, label it and write detail information in your words.



OR

Q.37 Draw neat and labelled diagram of paramoecium.

Ans: The given figure represents Paramoecium.



Characteristics:

- It belongs to kingdom Protista. It is further classified as animal like protist.
- It lacks cell wall.
- It shows heterotrophic and holozoic nutrition.
- It is a ciliated protozoan where locomotion is due to cilia.
- It has gullet (a cavity) which opens on the cell surface.

Q.38 Give different types of Protists with examples.

Ans: Protists are of different types:

a) Plant like Protista (Photosynthetic Protists):

- They are termed as phytoplanktons, also known as Chrysophytes.
- They are autotrophic (photosynthetic) in nature and form major producers of ocean ecosystem.
- Most of them are referred as Diatoms because they have body wall made up of two soap-box like fitting silica covers. e.g. Diatoms.

b) Animal like protists (Consumer protists):

- They are the primitive animal forms.
- They are also termed as protozoans.
- These are heterotrophic and lack cell wall.
- Amoeboid protozoans have pseudopodia as locomotory organs.
e.g. Amoeba, Entamoeba. Amoeba is free living form, but Entamoeba is endoparasite and causes amoebic dysentery.
- Flagellated protozoans have flagella as locomotory organ. e.g. Trypanosoma.
- Ciliate protozoans have cilia for locomotion. E.g. Paramecium.
- Plasmodium is a Sporozoan protozoa. It causes malaria. It forms spores in one of its life stages.

c) Dinoflagellates:

- They are aquatic (mostly marine) and autotrophic (photosynthetic).
- They have wide range of photosynthetic pigments which can be yellow, green, brown, blue and red.
- The cell wall is made up of cellulosic stiff plates.
- A pair of flagella is present, hence they are motile.
- They are responsible for famous 'red tide'. E.g. Gonyaulax. It makes sea appear red.

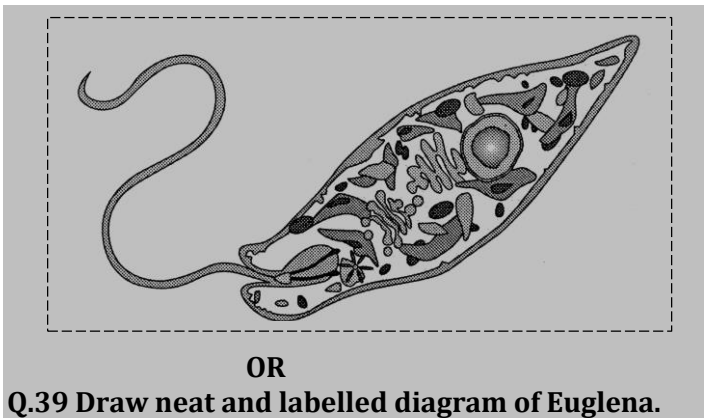
d) Fungi like protists (Consumer decomposer protists):

- They form a group called Myxomycetes.
- They are saprophytic in nature, found on decaying leaves.
- Their cells aggregate to form a large cell mass called plasmodium.
- The spores of plasmodium are very tough and survive extreme conditions. e.g. Slime molds.

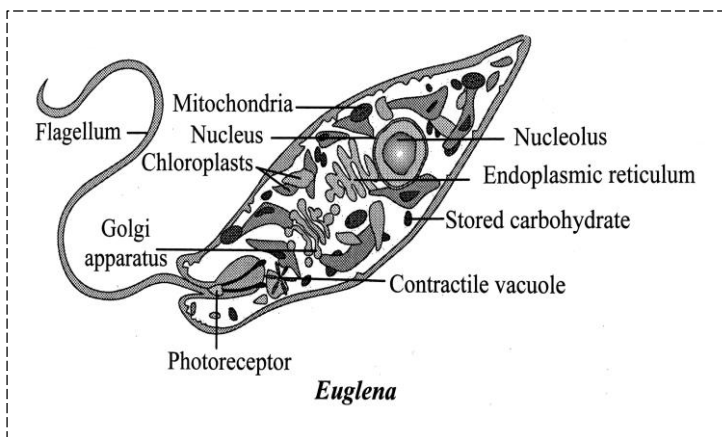
e) Euglenoids:

- They lack cell wall but have a tough covering of proteinaceous pellicle.
- Pellicle covering provides flexibility and contractibility to Euglena.
- They possess two flagella, one short and other long.
- They behave as heterotrophs in absence of light but possess pigments, similar to that of higher plants, for photosynthesis.

Q.39 Identify the following diagram, label it and write detail information in formation in your words.



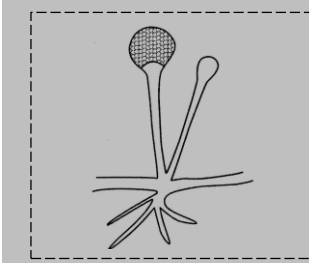
Ans: The given figure represents Euglena.



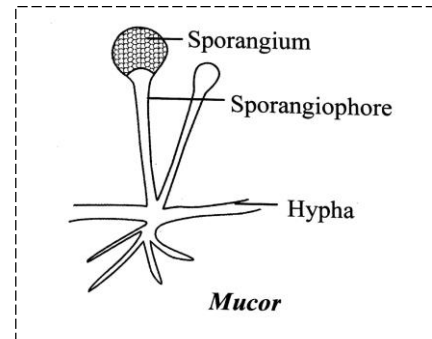
Characteristics:

- i) It belongs to kingdom Protista. It is further classified into euglenoids.
- ii) They lack cell wall but have a tough covering of proteinaceous pellicle.
- iii) Pellicle covering provides flexibility and contractibility to Euglena.
- iv) They possess two flagella, one short and other long.
- v) They behave as heterotrophs in absence of light but possess pigments, similar to that of higher plants, for photosynthesis.

Q.43 Identify the following diagram, label it and write detail information in your words.



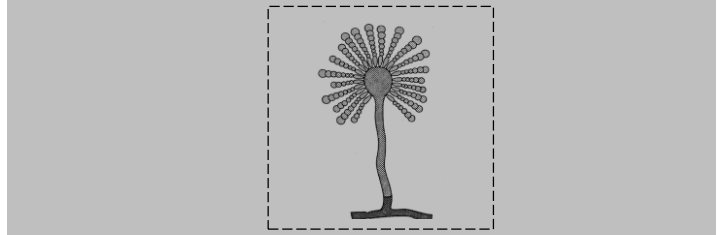
Ans: The given figure represents **Mucor**.



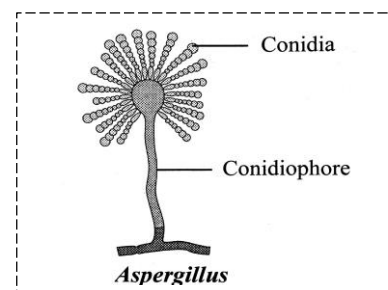
Characteristics:

- i) It belongs to class phycomycetes of kingdom fungi.
- ii) Mycelium is made up of aseptate coenocytic hyphae.
- iii) It commonly grows on decaying fruits, vegetables, in soil, on various food-stuff-like bread, jellies, jams, etc.
- iv) In favourable conditions mucor reproduces asexually by formation of spores within sporangia. It can also reproduce by sexual means.

Q.44 Identify the following diagram, label it and write detail information in your words.



Ans: The given figure represents **Aspergillus**.



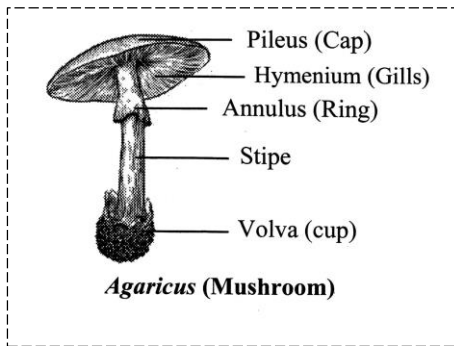
Characteristics:

- i) It belongs to class ascomycetes of kingdom Fungi.
- ii) It is multicellular.
- iii) The hyphae are branched and septate.
- iv) Aspergillus grows well in soil, decaying vegetation, hay, dung, on plants, etc.
- v) Asexual reproduction takes place by spores called conidia which are produced at the tip of hyphae called conidiophores.

Q.45 Identify the following diagram, label it and write detail information in your words.



Ans: The given figure represents Agaricus (Mushroom).



Characteristics:

- i) It belongs to class basidiomycetes of kingdom Fungi.
- ii) It has branched septate hyphae.
- iii) It grows in soil, on rotten wood, etc.
- iv) It is edible and rich in proteins.
- v) Vegetative reproduction takes place by fragmentation.

Scientific मराठी स्पष्टीकरण:

Introduction: पृथ्वीवर प्राणी सर्वत्र आढळतात. सर्व प्राण्यांमध्ये विविधता आढळते. त्यांच्यामध्ये साम्य नसते. प्राणी दृश्यकेंद्रकी, बहुपेशीय आणि परपोषी असतात. प्राणिपेशित पेशी-भित्तिका नसते. प्राण्यांमध्ये प्रचलनाची किंवा हालचालीची क्षमता असते. प्राण्यांमध्ये चेतासंस्था असते. प्राण्यांमध्ये विविध systems (संस्थांच्या) समन्वयासाठी sense organs (ज्ञानेंद्रिये) असतात. बहुतेक प्राण्यांमध्ये gametes (युग्मके) तयार होऊन sexual reproduction (प्रजनन) होते. पारंपारिक पद्धतीनुसार प्राणी सृष्टीचे दोन प्रमुख विभागात वर्गीकरण केले जाते.

- i) Chordates (समपृष्ठज्जू प्राणी)
- ii) Non-chordates (असमपृष्ठज्जू प्राणी)

Kingdom- Animelia या प्रजातीमध्ये आपल्याला निरनिराळी features पहायला मिळतात, यामध्ये बहुतेक प्राणी हालचाल करणारे, काही स्पंज तर काही स्थिर असतात. cell wall, plastids व vacuole नसते. या प्रवर्गातील प्राण्यांमध्ये ज्ञानेंद्रिये, मज्जासंस्था असते, तसेच सादाला प्रतिसाद देणारे असतात. त्यांचे प्रजनन युग्मकांद्वारे होते. या प्रवर्गामध्ये सुमारे १.२ million प्राण्यांच्या प्रजाती आढळतात. या प्रवर्गाचे ३० phyla (१० major व २० minor) मध्ये विभाजन होते. यानुसार प्राण्यांचे वर्गीकरण chordates व Non-chordates असे होते.

Animals classification साठी वापरण्यात येणारे वेगवेगळे criteria:

i) No. germ layers (जनन स्तरांची संख्या): प्रत्येक बहुपेशीय सजीवांच्या जीवनाची सुरुवात एका cell (पेशी) पासून होते, या cell मध्ये fertilization ने zygote (male व female gametes चे एकत्रिकरण) तयार होतो, व नंतर zygote पासून embryo (भ्रूण) तयार होतो. पुढे embryo असलेल्या cells एकत्र येतात, व त्यापासून germ layers तयार होतो. Germ layers वरून प्राण्यांचे २ स्तरांमध्ये वर्गीकरण केले जाते.

a) Diploblastic animals (द्विस्तरीय प्राणी): ज्या animals ची body पेशीच्या outer ectoderm (बाह्यस्तर) व inner endoderm (अंतःस्तर) यांनी बनलेले असते, व हे स्तर non-cellular mesogloea (मध्यश्लेमस्तराने) वेगळे झालेले असतात, म्हणजेच त्यांची body द्विस्तरीय असते. त्यांना Diploblastic animals म्हणतात.

b) Triploblastic animals (त्रिस्तरीय प्राणी): ज्या animals च्या शरिरामध्ये (outer ectoderm, middle mesoderm व inner endoderm) हे तीन स्तर असतात, त्यांना triploblastic (त्रिस्तरीय) म्हणतात.

ii) Animal body plan (प्राणी शरीर योजना): यामध्ये प्रामुख्याने तीन plans चा समावेश होतो.

A) Cell aggregate plan (पेशी पुंजन योजना)- यामध्ये animals ची body हि सर्वात simple असते, यामध्ये पेशीचे किमान विभाजन होऊन loosely arranged cells (पेशींचा पुंज) तयार झालेला दिसतो. याप्रकारच्या body plan मध्ये पेशी tissue (ऊती) किंवा organs (अवयव) निर्माण करत नाहीत. त्यांच्यामध्ये nervous co-ordination (चेता-समन्वय) नसतो.

B) Blind sac pattern (बंद कोश शरीर योजना): या प्रकारच्या pattern मध्ये प्राण्यांच्या शरीरामध्ये digestive system (पचन संस्था), mouth ते annus अशी असते व तोंडाकडून उघडी असते, annus (गुद्द्वार) कडून बंद असते. म्हणजेच पचन संस्था अपूर्ण असते.

C) Tube within tube plan (नळीत नळी plan): या प्रकारच्या plan मध्ये प्राण्यांची body हि उच्च विकसीत असते. तसेच digestive system पूर्ण विकसीत असते, एका बाजूला mouth व दुसऱ्या बाजूला annus असते. पचन संस्था दोन्ही बाजूंनी उघडी असते. म्हणजेच पचनसंस्था पूर्ण असते. Body tube च्या आत digestive tube असते.

iii) Body symmetry (शरीर सममिती): कोणत्याही animals ची symmetry म्हणजे त्या animals च्या body च्या median line पासून दोन्ही बाजूला shape, size व no. of parts मध्ये similarities असणे होय. Symmetry नुसार प्राण्यांचे प्रामुख्याने तीन प्रकार पडतात.

A) Asymmetrical animals: (असममित प्राणी)- या symmetry मध्ये प्राण्यांची body, vertical plane पासून दोन्ही बाजूला दोन equal half parts मध्ये divide करता येत नाही. म्हणजेच प्राण्यांच्या शरीराचे दोन समान भाग होत नाहीत.

B) Radial symmetry (अरीय सममित): या प्रकारच्या symmetry मध्ये animals ची body, vertical plane पासून दोन equal half parts मध्ये divide करता येते.

C) Bilateral symmetry (व्दिपार्श्व सममित): या प्रकारच्या symmetry मध्ये animals ची body, vertical plane पासून दोन equal half parts मध्ये divide करता येते.

iv) Body cavity / Coelom (देहगुहा / उदर गुहा): यामध्ये body wall (शरीर भिती) व alimentary canal (अन्ननलिका) यांच्यामध्ये mesoderm च्या splitting मुळे coelom (देहगुहा) तयार होते. देहगुहेवरून प्राण्यांचे तीन प्रकार पडतात.

A) Acoelomate animals (देहगुहाहीन प्राणी): या प्रकारच्या प्राण्यांमध्ये देहगुहा नसते. व body wall व alimentary canal यांच्यामधली पोकळी parenchymatous tissue (मुलऊती) नी भरलेली असते.

B) Pseudocoelomate animals (आभासी देहगुहायुक्त प्राणी): या प्रकारच्या प्राण्यांमध्ये आभासी देहगुहा असते व body wall व alimentary canal यांच्यामध्ये mesoderm ची patches असतात.

C) Coelomate animals (देहगुहा असणारे प्राणी): या प्रकारच्या प्राण्यांमध्ये coelom असते. triploblastic animals (त्रिस्तरीय

Q.7 Write a short note on Chlorophyceae.

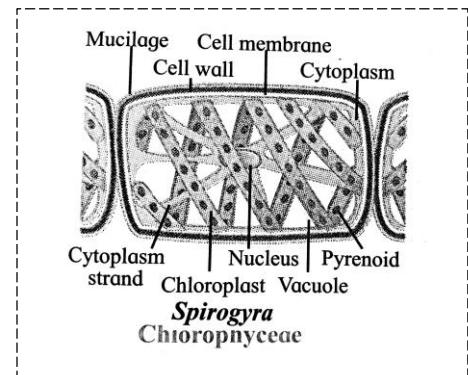
Ans: Chlorophyceae (green algae):

- Chlorophyceae includes green algae.
- These are mostly fresh water (few brackish water and marine).
- Plant body is unicellular, colonial or filamentous.
- Cell wall contains cellulose.
- Chloroplasts are of various shapes like discoid, plate-like, reticulate, cup-shaped, ribbon-shaped or spiral with chlorophyll a and b.
- Reserved food is in the form of starch.
- Pyrenoids are located in the chloroplast.
- Green algae like Chlorella are rich in protein, hence used as food even by space travelers. e.g. Chlamydomonas, Spirogyra, Chara, Volvox, Ulothrix, etc.

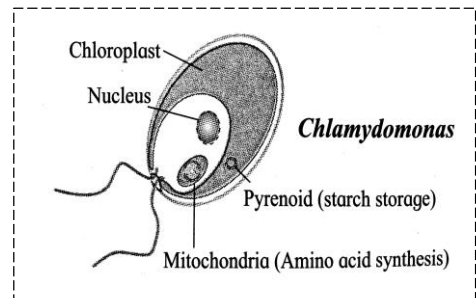
Q.8 Draw neat and labelled diagram of:

- Spirogyra
- Chlamydomonas
- Chara

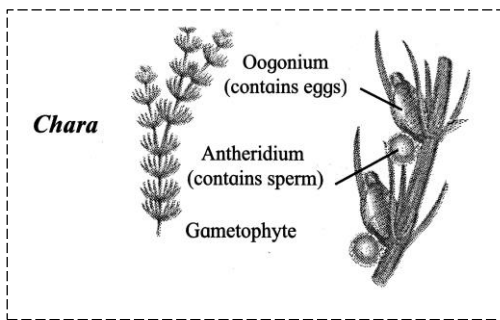
Ans: i) Spirogyra:



ii) Chlamydomonas



iii) Chara

**Ans: Characteristics of Rhodophyceae (Red algae):**

- i) Habitat: These are found in marine as well as fresh water on the surface, deep sea and brackish water.
- ii) Plant body: Plant body is thalloid.
- iii) Photosynthetic pigments: Cells contain chlorophyll-a, chlorophyll-d and phycoerythrin.
- iv) Cell wall: Cell wall is made up of cellulose and pectin glued with other carbohydrates.
- v) Stored food: Stored food is in the form of Floridean starch.

Q.9 Write the characteristics of Phaeophyceae.**Ans: Characteristics of Phaeophyceae (Brown algae):**

- i) These algae are mostly marine, rarely fresh water.
- ii) Plant body is simple branched, filamentous (e.g. Ectocarpus) or profusely branched (e.g. Petalonia).
- iii) Cell wall has cellulose, fucans and algin.
- iv) Photosynthetic pigments like chlorophyll-a, chlorophyll-c and fucoxanthin are present.
- v) Mannitol, laminarin are stored food materials. Body is usually differentiated into holdfast, stalk called stipe and leaf-like photosynthetic organ called frond.
- vi) Many species of marine algae are used as food. e.g. Laminaria, Sargassum.
- vii) Some species are used for the production of hydrocolloids (water holding substances). e.g. Ectocarpus, Fucus, etc.

Q.10 Differentiate between Chlorophyceae and Phaeophyceae.**Ans: Chlorophyceae and Phaeophyceae:**

No	Chlorophyceae (Green algae)	Phaeophyceae (Brown algae)
i	Photosynthetic pigments are chlorophyll-a, chlorophyll-b.	Photosynthetic pigments are chlorophyll-a, chlorophyll-c and fucoxanthin.
ii	Reserve food is in the form of starch.	Reserve food is mannitol and laminarin.
e.g.	Chlorella, Chlamydomonas, Spirogyra, Chara, Volvox, Ulothrix.	Ectocarpus, Sargassum, Fucus, Laminaria, etc.

Q.11 Write short note on Rhodophyceae.**Q.12 Enlist examples of Chlorophyceae and Rhodophyceae.****Ans: i) Examples of Chlorophyceae:**

Chlorella, Chlamydomonas, Spirogyra, Chara, Volvox, Ulothrix, etc.

ii) Examples of Rhodophyceae:

Chondrus, Batrachospermum, Porphyra, Gelidium, Gracillaria, Polysiphonia, etc.

Q.13 Differentiate between red algae and brown algae.**Ans: Red algae and Brown algae:**

No	Red algae (Rhodophyceae)	Brown algae (Phaeophyceae)
i	Photosynthetic pigments are chlorophyll-a, chlorophyll-d and phycoerythrin.	Photosynthetic pigments are chlorophyll-a, chlorophyll-c and fucoxanthin.
ii	Reserve food is Floridean starch.	Reserve food is mannitol and laminarin.
e.g.	Porphyra, Gracilaria, Gelidium, Polysiphonia, etc.	Ectocarpus, Sargassum, Fucus, Laminaria, etc.

Q.14 Complete the following table.

No	Groups of algae	Chlorophyceae	Phaeophyceae	Rhodophyceae
i	Stored food	Starch	-----	-----
ii	Cell wall	-----	Cellulose and algin	-----
iii	Major pigments	-----	-----	Chl-a, d and phycoerythrin

Ans:

No	Groups of algae	Chlorophyceae	Phaeophyceae	Rhodophyceae
i	Stored food	Starch	Mannitol, laminarin	Floridean starch
ii	Cell wall	Cellulose	Cellulose and algin	Cellulose, pectin
iii	Major pigments	Chl-a, b	Chl-a, c, fucoxanthin	Chl-a, d and phycoerythrin

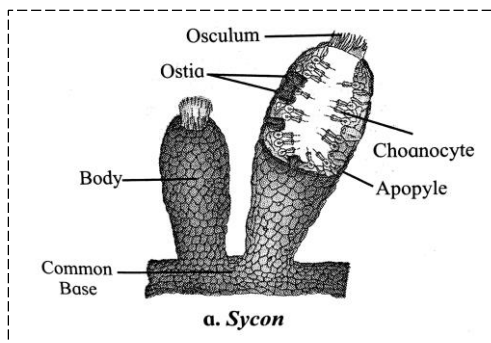
Q.8 Draw neat and labelled diagram of

i) Sycon

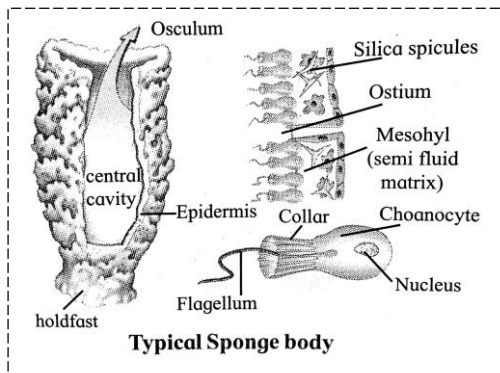
ii) Sponge

iii) Aurelia

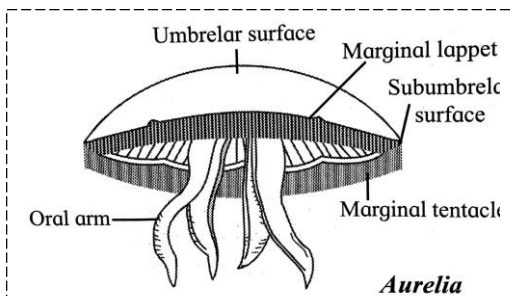
Ans: i) Sycon:



ii) Sponge:



iii) Aurelia:



3) Phylum-Ctenophora

Q.9 Give the salient features of phylum Ctenophora.

Ans: Salient features of Phylum Ctenophora:

The members of this phylum are commonly known as comb jellies and sea walnuts. They are also known as acnidarians as they lack cnidoblasts. The phylum is considered as one of the minor phyla as it is represented by very few members.

Salient features of phylum Ctenophora:

i) Habitat: They are exclusively marine.

ii) Forms: They are free swimming animals.

iii) Germ layers: Members of this phylum are diploblastic.

iv) Body Symmetry: They are radially symmetrical.

v) Body plan: The animals of this phylum show blind-sac body plan.

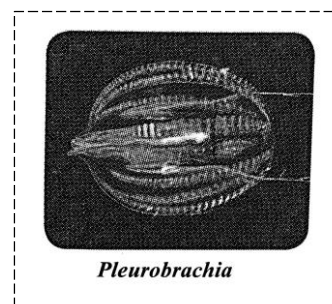
vi) Body organization: They show tissue level organization.

vii) Locomotion: It is carried out by eight rows of ciliated comb plates.

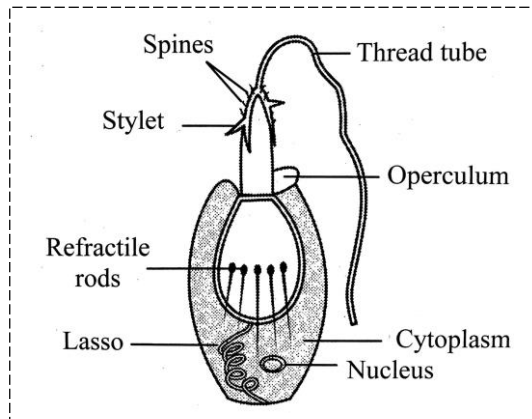
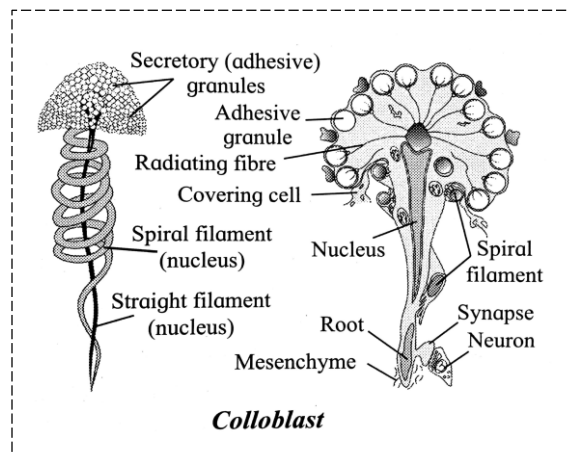
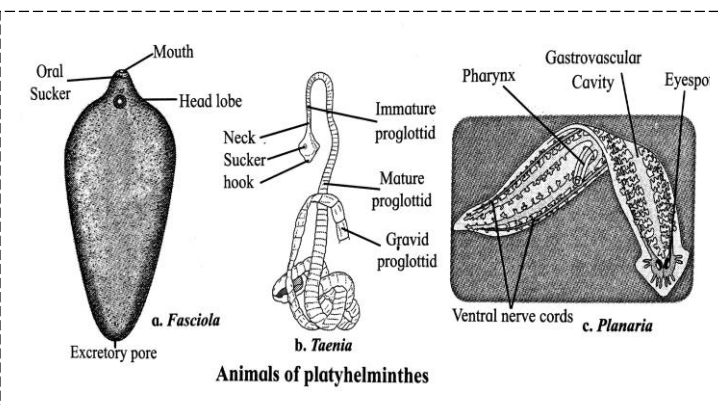
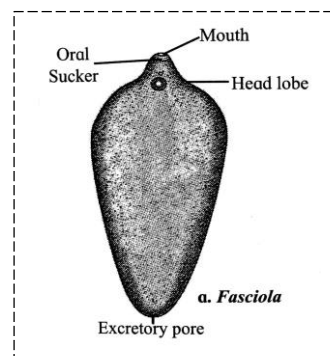
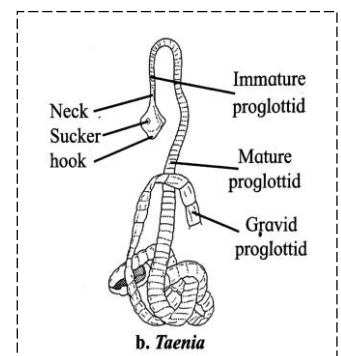
viii) Bioluminescence: It is the characteristic feature of the members of this phylum.

ix) Digestion: It is extracellular and intracellular.

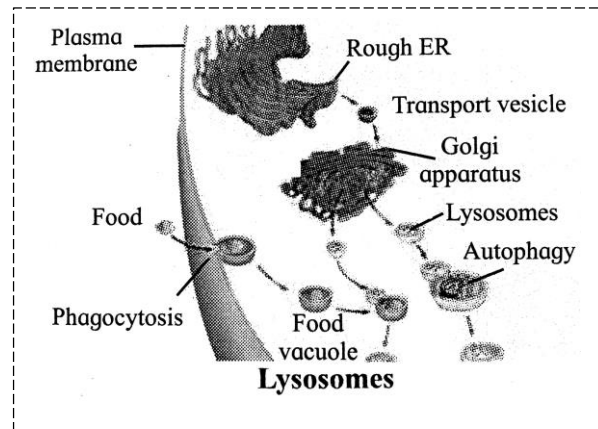
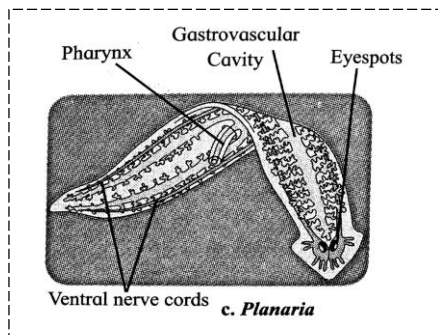
x) Reproduction: Reproduction is sexual with indirect development.

xi) Colloblasts: These sticky cells are used to capture prey.
e.g. Pleurobrachia, Ctenoplana

Q.10 Draw a neat and labelled diagram of:

i) Cnidoblast**ii) Colloblast****Ans: i) Cnidoblast:****ii) Colloblast:****4) Phylum-Platyhelminthes**
(Platy-flat, helminth-worms)**Q.11 Give the silent features of phylum Platyhelminthes.****Ans:** The members of this phylum are called as flatworms.**Unique features of phylum Platyhelminthes:****i) Body shape:** Body of these animals is dorsoventrally flattened.**ii) Coelom:** They are acoelomates.**iii) Germ layers:** Platyhelminthes are triploblastic.**iv) Body organization:** They show organ-system grade of organization.**v) Forms:** Most of them are endoparasites and few are free-living. Parasitic forms have hooks and suckers for attachment to the hosts' body. In parasitic forms, body is covered by cuticle and in free-living forms it is covered by cilia.**vi) Digestive system:** Parasitic forms generally lack digestive system. In free-living forms, the digestive system is incomplete.**vii) Body plan:** They show blind-sac body plan.**viii) Excretion and osmoregulation:** It occurs by flame cells or protonephridia.**ix) Reproduction:** They are mostly hermaphrodite (bisexual). Self-fertilization is seen. Few animals show high power of regeneration and show polyembryony. e.g. Planaria, Taenia (Tapeworm), Fasciola (Liver fluke) are included in this phylum.**Q.12 Draw neat and labelled diagram of:****i) Fasciola****ii) Taenia****iii) Planaria****Ans:****i) Fasciola:****ii) Taenia:**

iii) Planaria



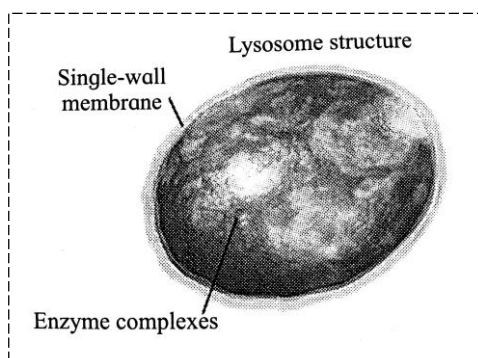
Q.25 Write a note on lysosomes. Give the names of lysosomal enzymes.

Ans: Lysosomes:

- i) Lysosomes are considered as dismantling and restructuring units of a cell.
- ii) These are membrane bound vesicles containing hydrolytic enzymes. The enzymes in lysosomes are used by most eukaryotic cells to digest (hydrolyse) macromolecules.
- iii) The lysosomal enzymes show optimal activity in acidic pH.
- iv) Lysosomes arise from Golgi associated endoplasmic reticulum.
- v) Lysosomes are polymorphic in nature and are classified as primary lysosomes, secondary or hybrid lysosomes, residual body and autophagic vesicle.

The list of lysosomal enzymes includes:

All types of hydrolases viz, amylases, proteases and lipases.



Q.26 "Lysosomes are called suicide bags of the 'cells". Explain.

- Ans:** i) Lysosomes which bring about digestion of cell's own organic material like a damaged cell organelle are called autophagic vesicle (suicide bags).
 ii) An autophagic vesicle essentially consists of lysosome fused with membrane bound old cell organelle or organic molecules to be recycled.
 iii) Thus, lysosomes are capable of destructing all kinds of material in the cell. Therefore, can digest its own cell organelles due to presence of lysosome.
 Hence, lysosomes are also called as suicide bags.

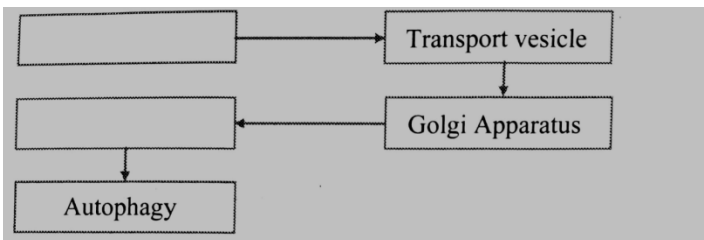
Q.27 Explain Intracellular and Extracellular digestion in lysosomes.

Ans: Intracellular digestion: The intracellular digestion is brought about by autophagic vesicle or secondary lysosomes which contain foreign materials brought in by processes like phagocytosis.
 e.g. Food vacuole in amoeba or macrophages in human blood that engulf and destroy harmful microbes that enter the body.

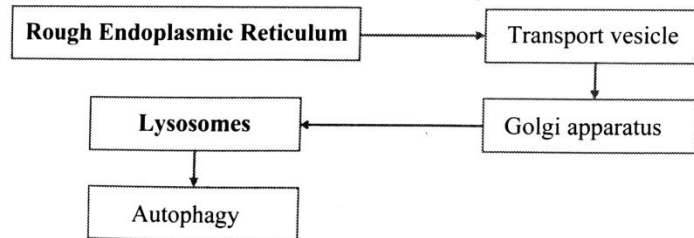
Extracellular digestion: Extracellular digestion is brought about by release of lysosomal enzymes outside the cell.

e.g. acrosome, a cap like structure in human sperm is a modified lysosome which contain various enzymes like Hyaluronidase. These enzymes bring about fertilization by dissolving protective layers of ovum.

Q.28 Complete the flow chart.



Ans:



5) Phylum- Aschelminthes

Q.13 Give the characteristics of Aschelminthes.

Ans: Phylum Aschelminthes (ascus - sac, helminth - worm) is also called as Nematelminthes (Nema = thread, helmins = worms).

Characteristics of Aschelminthes:

i) Forms: These are mostly parasitic. However, few forms are free-living.

ii) Body shape: The body is long, cylindrical, thread-like, circular in cross section, hence they are known as roundworms.

iii) Body symmetry: These are bilaterally symmetrical.

iv) Coelom: They are pseudocoelomate animals.

v) Germ layers: These animals are triploblastic.

vi) Body plan: They show tube within a tube type body plan.

vii) Body covering: The body is covered by tough, resistant cuticle.

viii) Muscles: Body wall has longitudinal muscles, but circular muscles are absent.

ix) Digestive system: Alimentary canal is complete with mouth and anus, at opposite ends.

x) Excretion: Excretion takes place either by canals or gland cells.

xi) Nervous system: Nervous system consists of a nerve ring and nerves.

xii) Reproduction: Animals are unisexual i.e. sexes are separate. Fertilization is internal. Development may or may not include larval stages. It shows sexual dimorphism.

e.g. *Ascaris* (Roundworm), *Wuchereria* (filarial worm) and *Ancylostoma* (hookworm)

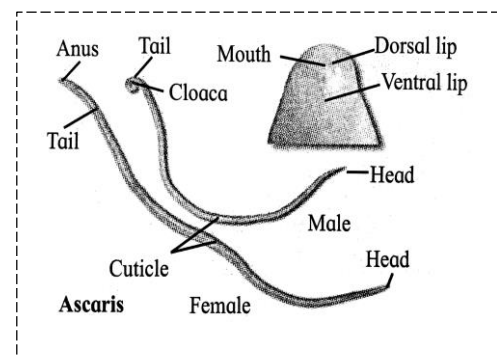
Q.14 Draw neat and labelled diagram of:

i) Ascaris

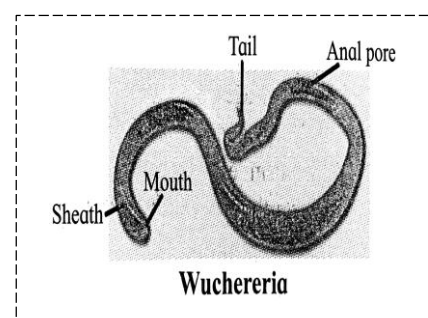
ii) Wuchereria

Ans:

i) Ascaris:



ii) Wuchereria:



B) Division-Bryophyta

Q.15 Give silent feature of Bryophyta.

Ans: Silent features of Bryophyta:

i) Bryophytes are mostly terrestrial plants. They are found in moist shady places. But they need water for fertilization and completion of their life cycle. Hence they are called 'amphibious plants'.

- ii) They include approximately 960 genera and about 25,000 species.
- iii) Life cycle of Bryophytes shows sporophytic and gametophytic stages.
- iv) Vegetative plant body is thalloid or leafy which represents gametophytic generation.
- v) Spore producing capsule represents sporophytic generation.
- vi) Bryophytes have root-like structures called rhizoids.

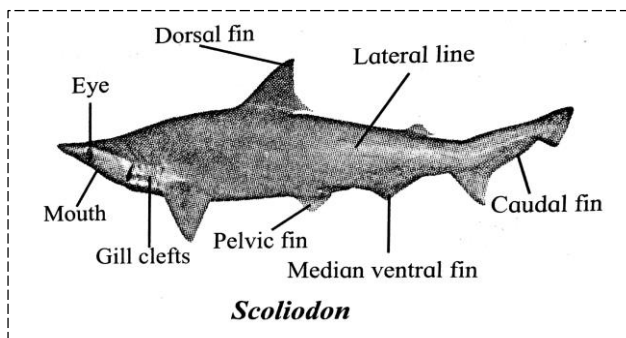
Q.37 Draw neat and labelled diagram of:

i) Scoliodon

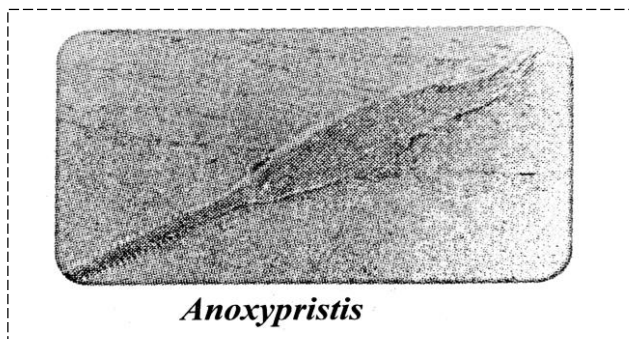
ii) Anoxypristis

iii) Catla

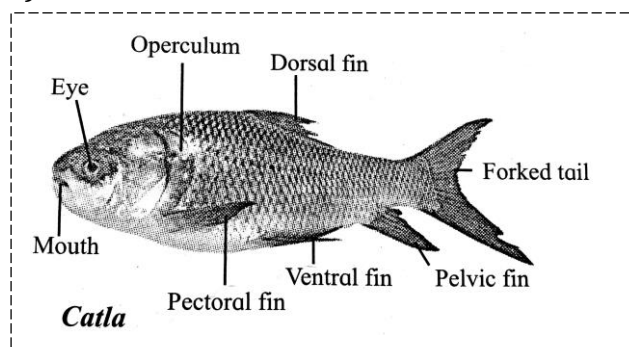
Ans: i) Scoliodon



ii) Anoxypristis



iii) Catla



B) Superclass- Tetrapoda

1) Class-Amphibia (Amphi: both, bias: life)

2) Class- Reptilia (Repere: to creep or to crawl)

3) Class-Aves (Avis: bird)

4) Class: Mammalia (mammas: breasts, nipples)

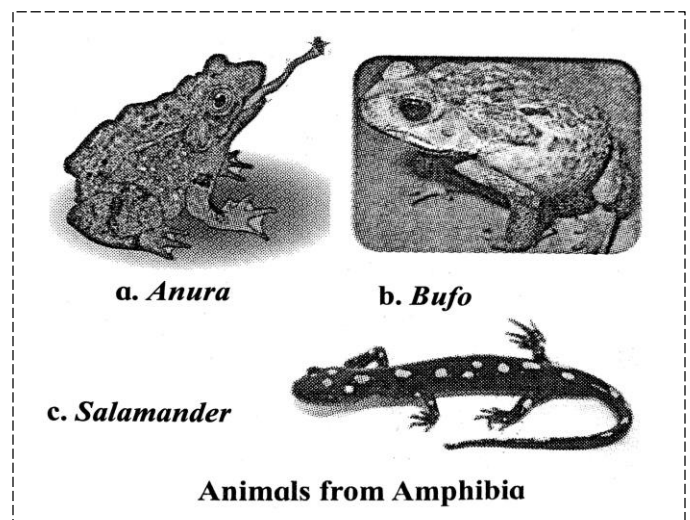
Q.38 Write a short note on amphibians.

OR

Q.38 Give silent features of class: Amphibia

Ans: Silent features of Class-Amphibia:

- i) These animals live on land as well as in water (fresh water only).
 - ii) Amphibians are poikilothermic animals.
 - iii) Body is differentiated into head, and trunk. Neck and tail are absent in many adults with few exceptions.
 - iv) Two pairs of limbs arise from the pectoral and pelvic girdles respectively, which help in locomotion.
 - v) Skin is moist and glandular with mucous glands.
 - vi) Exoskeleton is absent.
 - vii) Eyelids are present. Tympanum represents the ear.
 - viii) Excretory products, digestive products and gametes are released through the common chamber cloaca.
 - ix) Circulatory system is of closed type. Heart is three chambered and ventral. RBCs are biconvex and nucleated.
 - x) Respiration is by skin, lungs and bucco-pharynx.
 - xi) Nervous system is well developed.
 - xii) Sexes are separate. Amphibians are oviparous. Fertilization is external and development is indirect through aquatic larval stage.
 - xiii) They exhibit metamorphosis.
- e.g. Rana (Frog), Bufo (Toad), Salamandra (Salamander), Ichthyophis, Hyla (Tree frog), etc.



Carbohydrates चे महत्त्व:

Carbohydrates हे metabolism (चयापचय) क्रियेसाठी energy provide करतात. Lactose सारखे carbohydrates दुधामध्ये असतात, व त्यांचा उपयोग सस्तनी प्राण्यांच्या मादीला तिच्या babies (पिलांना) उर्जा देण्यासाठी होतो. Carbohydrates मुळे Cellwall (पेशी-भित्तीका) व Cellmembranes (पेशीपटल) तयार होण्यासाठी मदत होते. यातील glucose या मुख्य respiratory घटकामुळे, heat व ATP च्या स्वरूपात energy release (मुक्त) होते. Starch व Glycogen सारख्या complex carbohydrates मध्ये अन्नसंचय करता येतो.

Lipids (मेद) म्हणजे organic compounds चा असा group कि, ज्यामध्ये oily (तेलकट) व greasy consistency (चरबीयुक्त) घटकांचा समावेश होतो, याला Lipids म्हणतात. १९४३ मध्ये Bloor यांनी lipids या संज्ञेचा सर्वप्रथम वापर केला. Lipids हे fats (चरबी), oils (तेल), steroids, waxes (मेण) यासारख्या संयुगांनी बनते. Lipids हे पाण्यामध्ये insoluble (अद्रावणीय) आहे, परंतु benzene, chloroform सारख्या organic किंवा non-polar solvents मध्ये soluble (द्रावणीय) आहे. Lipids ची रचना हि C, H, O च्या अणूंपासून बनलेली असते. यामध्ये $H:O$ चे प्रमाण २:१ पेक्षा जास्त असते. Lipids च्या संयुगामध्ये C, H, O व N, S, P असतो. वनस्पती व प्राण्यांपासून waxes तयार होते. Animal fats हे room temperature ला solids असतात तर plants lipids हि room temperature ला liquids असतात, त्यालाच oils म्हणतात. Lipids मध्ये (fatty acids व long chain alcohols) ह्या दोन प्रकारची monomers (एकवारिके) असतात.

Classification of Lipids (मेदाचे वर्गिकरण):

Lipids चे प्रामुख्याने simple lipids, compound lipids व derived lipids असे प्रकार पडतात.

i) Simple Lipids (साधे मेद): simple lipids हे fatty acids चे esters असतात, यामध्ये alcohol सुद्धा असते. Fatty acids हि carbon ची long term chain आहे, त्या group च्या एका end ला $COOH$ असतो. Glycerol हे ३-carbon व ३-OH गटासह असते. Fatty acids चे molecules हे glycerol च्या रेणूला जोडले जातात. व या रेणूच्या संख्येवरून Simple lipids चे तीन भाग पडतात. (Mono-glycerides, Di-glycerids, व Tri-glycerides) Carbon atoms मधील bonds वरून fatty acids चे saturated fatty acids (संतृप्त मेदाम्ले) व unsaturated fatty acids (असंतृप्त मेदाम्ले) असे भग पडतात. saturated fatty acids शृंखलेमध्ये carbon च्या अणूमध्ये double bond नसतो, व त्यामध्ये hydrogen चे maximum atoms असतात. unsaturated fatty acids शृंखलेमध्ये carbon च्या अणूमध्ये एक किंवा अधिक दुहेरी बंध असतात. ज्या unsaturated fatty acids मध्ये fats असतात, ते room temperature ला liquids असतात व त्यालाच oils म्हणतात.

Butter सारखी Animal fats हि room temperature ला solids असतात.

ii) Compound lipids (संयुक्त मेद): या मेदामध्ये मेदाम्ले व alcohol जसे Nitrogen, Phosphorous, Sulphur व Proteins यांसारखी अतिरिक्त मुलद्रव्ये किंवा गट असतात.

iii) Derived lipids (अनुजात मेद): हे मेद म्हणजे Lipids चे hydrolytic products (जलपघटनाचे उत्पादिते) आहेत. त्याचे खालील भाग पडतात.

A) Steroids- Steroids ची रचना मात्र इतर मेदांपेक्षा थोडी वेगळी असते. Steroids च्या प्रत्येक रेणूचे carbon atoms हे four interlocking rings (चार आंतर्गथित वलयामध्ये असतात.)

B) Waxes (मेण): हे saturated fatty acids चे esters आहेत, यात alcohol व ketone ची शृंखला असते.

उदा. खोडावर, फळावर, पानावर मेणचट पदार्थ स्रवतो व त्याचा थर जमा होतो.

C) Carotenoids -हि रंगद्रव्ये आहेत. Carotenoids च्या रचनेत hydrocarbons च्या २ to ६ carbon rings ह्या highly unsaturated straight chain (उच्च असंतृप्त शृंखलेसह) असतात.

Lipids चे महत्व:

अन्न पदार्थांमध्ये lipids असते. उदा. Oil seeds मधील oil, animals मधील fats etc.

Eukaryotic (दृश्यकेंद्रकी) सजीवांच्या पेशीमध्ये पेशी पटलात मेद हा घटक महत्त्वाचा आहे. Enzymes च्या काही components मध्ये मेद असते. Skin च्या खाली असणारे lipids हे heat insulator (उष्णता रोधक) व shock absorber (उष्णता शोषक) म्हणून कार्य करते. पानाच्या पृष्ठभागावर असलेल्या wax मुळे transpiration कार्य घडते. Wax मुळे leaves or hairs or feathers हि waterproof राहतात. Cholic acid सारखे lipids हे पित्तसाचे कार्य करते, Cholesterol मुळे Vitamin D चे संश्लेषण होते. बरीच lipids हि sex hormones (लैंगिक संप्रेरके) निर्माण करतात.

Proteins (प्रथिने): Amino acids च्या long chain polymers (बहुवारिकां पासून) proteins तयार होतात. Proteins हि निसर्गामध्ये abundant (मुबलक) प्रमाणात आहेत. Proteins हे micromolecules (अतिसूक्ष्म) molecules आहेत व त्यांचे molecular weight जास्त असते. प्रत्येक पेशीमध्ये Proteins चे molecules vary (बदलत) असतात. पेशीमध्ये प्रथिनांची संख्या वेगवेगळी असते. Proteins मध्ये Carbon, Hydrogen, Oxygen व Nitrogen यांचे प्रमाण असते. काही proteins मध्ये sulphur सुद्धा असते. Proteins च्या वेगवेगळ्या प्रमाणामुळे species (जातीमध्ये) विविधता येते.

१८३० मध्ये Berzelius यांनी Proteins हि संज्ञा वापरली.

Formation of Proteins: सर्व Proteins हि वेगवेगळ्या २०

प्रकारच्या Amino acids पासून बनलेली असतात. प्रत्येक amino

Multiple Choice Questions

1) Chemical nature of chitin is _____
 a) protein b) carbohydrate c) lipid d) glycoprotein

2) Cockroach has _____ type of mouthparts.
 a) sponging b) chewing and biting
 c) piercing and sucking d) lapping

3) Spiracle is a part of _____ system of cockroach.
 a) circulatory b) respiration c) reproductive d) nervous

4) _____ is a part of digestive system.
 a) Trachea b) Hypopharynx
 c) Haemocyte d) Seminal vesicle

5) _____ is also called as brain of cockroach.
 a) Supra-oesophageal ganglion
 b) Sub-oesophageal ganglion
 c) Hypo-cerebral ganglion
 d) Thoracic ganglion

6) Cockroach shows _____ adaptations.
 a) Cursorial b) Arboreal c) Fossorial d) Aquatic

7) Cockroach is a/an _____ animal.
 a) omnivorous b) nocturnal
 c) cursorial d) all of these

8) Ocellar spots situated at the base of each antenna of cockroach is called as
 a) ommatidia b) lingua
 c) fenestrae d) proventriculus

9) Foregut of cockroach is also known as
 a) stomodaeum b) mesenteron
 c) proctodaeum d) tergum

10) Circlet of six chitinous teeth and backwardly directed bristles are present in
 a) fenestrae b) mesenteron
 c) rectum d) gizzard

11) Blood filled cavity in cockroach is called
 a) haemocoel b) paracoel
 c) spongocoel d) metacoel

12) In cockroach, ventral nerve cord is present in the
 a) pericardial sinus b) perineural sinus
 c) head sinus d) perivisceral sinus

13) In cockroach, malpighian tubules are present at junction of
 a) foregut and midgut b) midgut and hindgut
 c) hindgut and foregut d) foregut and hindgut

14) The main excretory organ of cockroach is
 a) gizzard b) malpighian tubules
 c) utricular gland d) mushroom shaped gland

15) Central nervous system consists of
 a) nerve ring b) ingluvial ganglion
 c) ventral nerve cord d) both (a) and (c)

16) _____ are external genitalia of male cockroach.
 a) Phallomeres b) Utricular gland
 c) Seminal vesicles d) Spermatheca

17) The total number of ovarian tubules in a female cockroach is
 a) 8 b) 2 c) 16 d) 26

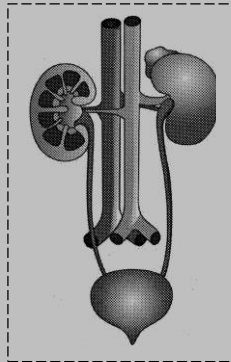
18) The secretion of collateral glands forms a capsule around them is called
 a) spermatophore b) nymph
 c) ootheca d) gonophore

Answers to Multiple Choice Questions

1	b&d	7	d	13	b
2	b	8	c	14	b
3	b	9	a	15	d
4	b	10	d	16	a
5	a	11	a	17	c
6	a	12	b	18	c

15.2 Excretory System in human Being

Q.12 Label the diagram and complete following paragraphs.



OR

Q.12 Explain the excretory system of man.

i) Kidney:

A pair of ----- shaped kidneys are present on either side of the ----- from 12th thoracic to 3rd lumbar vertebra. Kidneys are present behind ----- . Hence are called retroperitoneal. Dimensions of each kidney are 10 × --- × ----- cms. Average weight is ----- g in males and 135 g in ----- . Outer surface is ----- and inner is concave. Notch on the inner concave surface is called --- . Renal artery enters and renal vein as well as ureter leave the kidney through hilus. Each kidney has almost 1 million functional units called ----- .

ii) Ureters:

A pair of ureters arise from ----- of each kidney. Each ureter is a long muscular tube 25 — 30 cm in length. Ureters open into ----- by separate openings, which are not guarded by valves. They pass obliquely through the wall of urinary bladder. This helps in prevention of ----- of urine due to compression of ureters while bladder is filled.

iii) Urinary bladder:

It is a median ----- sac. A hollow muscular organ, the bladder is situated in pelvic cavity posterior to pubic symphysis. At the base of the ----- there is a small inverted triangular area called trigone. At the apex of this triangle is opening of urethra. At the two points of the base of the triangle are openings of ureters. Urinary bladder is covered externally by peritoneum. Inner to peritoneum is muscular layer. It is formed by detrusor muscles which consist of three layers of smooth muscles.

Longitudinal - circular – longitudinal respectively.

Innermost layer is made up of transitional ----- . It helps bladder to stretch.

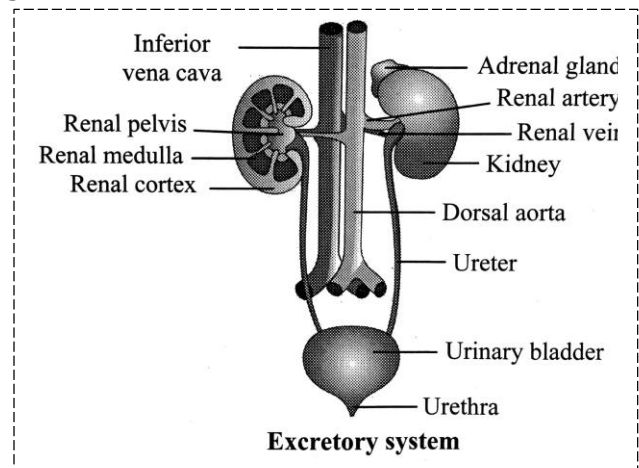
iv) Urethra:

It is a ----- structure arising from urinary bladder and opening to the exterior of the body. There are ----- urethral sphincters between urinary bladder and urethra.

a) Internal sphincter: Made up of ----- muscles, involuntary in nature.

b) External sphincter: Made up of ----- muscles, voluntary in nature. If this valve is not functioning properly during inflammation of bladder, it can lead to kidney infection.

Ans:



i) Kidney:

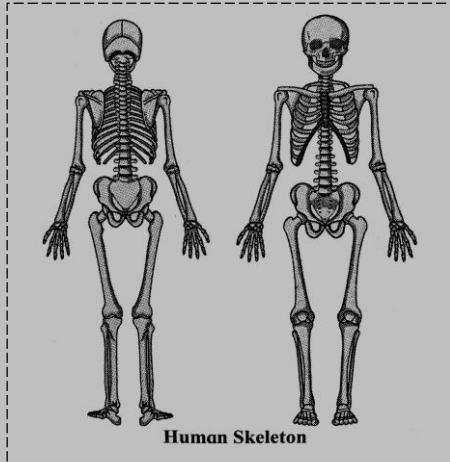
A pair of bean shaped kidneys are present on either side of the backbone from 12th thoracic to 3rd lumbar vertebra. Kidneys are present behind peritoneum. Hence are called retroperitoneal. Dimensions of each kidney are 10 × 5 × 4 cms. Average weight is 150 g in males and 135 g in females. Outer surface is convex and inner is concave. Notch on the inner concave surface is called hilum. Renal artery enters and renal vein as well as ureter leave the kidney through hilus. Each kidney has almost 1 million functional units called nephron.

ii) Ureters:

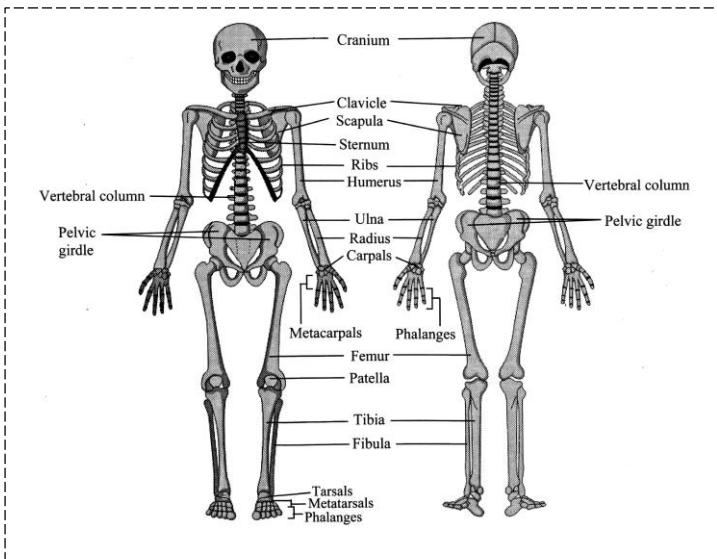
A pair of ureters arise from hilum of each kidney. Each ureter is a long muscular tube 25 — 30 cm in length. Ureters open into urinary bladder by separate openings, which are not guarded by valves. They pass obliquely through the wall of urinary bladder. This

16.9 Group of Skeleton

Q.25 Identify the different bones.



Ans:



A) Axial Skeleton

Q.26 Give schematic plan of human skeleton.

Axial Skeleton	
Skull	
Cranium	8
Face	14
Hyoid	1
Ear ossicles	6
Vertebral Column	26
Thorax	
Sternum	1
Ribs	24

Subtotal	80
Appendicular Skeleton	
Pectoral Girdle	
Clavicle	2
Scapula	2
Upper Limbs	
Humerus	2
Radius	2
Ulna	2
Carpals	16
Metacarpals	10
Phalanges	28
Pelvic Girdle	
Hip Bone	2
Lower Limbs	
Femur	2
Patella	2
Tibia	2
Fibula	2
Tarsals	14
Metatarsals	10
Phalanges	28
Subtotal	126
Total	206

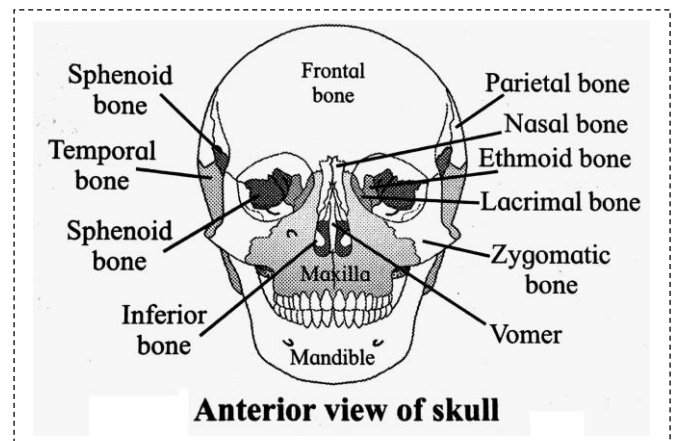
Q.27 Give an account of bones of human skull.

OR

Q.27 Enlist the bones of cranium

Ans: Bones of human skull:

Skull is made up of 22 bones. It is located at the superior end of vertebral column. The bones of skull are joined by fixed or immovable joints except for jaw. Skull consists of cranium or brain box and facial bones.



B) Oxidative आणि payoff phase-

या टप्प्यामध्ये hydrogen गमावला जावून oxidation क्रिया घडते आणि ऊर्जा निर्माण होते.

६) Oxidation and Phosphorylation (ऑक्सिडीकरण आणि स्फुरदीकरण)-

i) Phospho glyceraldehyde dehydrogenase (फॉस्फो ग्लिसेराल्डेहाइड डिहायड्राजेनेज) ह्या enzymes च्या उपस्थित ३-PGAL चे oxidation होते, त्याचवेळेस Phosphorylation ची क्रियाही घडते. यामध्ये १,३-di-phosphoglyceric acid (१,३-diPGA) तयार होते.

ii) ह्या अभिक्रियेत coenzyme (सहविकर) NAD (Nicotinamide Adenine Dinucleotide) हे hydrogen घेतो आणि NADH₂ चे reduction होते. याची reaction वरील प्रश्नामध्ये पहा.

७) ATP Generation-I (ए.टी.पी.ची निर्मिती- I)

i) १, ३-diphosphoglyceric acid चे ३-phospho-glyceric acid मध्ये रूपांतर होते. यामध्ये Phosphate group गमावला जातो.

ii) ह्या Phosphate चा ADP बरोबर संयोग होवून ATP चा रेणु तयार होतो, हि अभिक्रिया Phosphoglycero-kinase (फॉस्फोग्लिसेरोक्यानेज) ह्या enzymes च्या उपस्थितीत घडते. याची reaction वरील प्रश्नात दिली आहे. त्याचे निरीक्षण करा.

८) Isomerisation (समसुत्री रूपांतरण)-

i) Phospho-glycero-mutase ह्या enzyme मुळे ३-PGA चे रूपांतर त्याच्या समसुत्रात म्हणजेच २-PGA मध्ये होते.

ii) ह्या reaction मध्ये phosphate group चे तिस-या carbon atom वरून दुस-या carbon atom कडे विस्थापन होते. त्याची reaction वरील प्रश्नातून समजून घ्या.

९) Dehydration (निर्जलीकरण)-

i) २-PGA चे dehydration होवून PEPA (Phospho-enol-pyruvic acid) तयार होते.

ii) हि reaction Mg^{++} ह्या cofactor (सहघटकाच्या) उपस्थितीत आणि enolase च्या enzyme मुळे होते. यामध्ये पाण्याचा एक molecule मुक्त होतो. याची reaction वरील प्रश्नातून पहा.

१०) ATP Generation-II (ए.टी.पी.ची निर्मिती-II)-

i) Hydrolysis (जलअपघटनामध्ये Phospho-enol-pyruvic acid) हे Phosphate चा group गमावते आणि pyruvic acid किंवा Pyruvate तयार होते.

ii) मुक्त झालेला Phosphate group हा ADP शी संयोग पावतो व ATP निर्माण होते. Pyruvate kinase ह्या विकरांच्या उपस्थितीत हि अभिक्रिया घडते. याची reaction वरील प्रश्नामध्ये दिली आहे.

Krebs Cycle (क्रेब्ज चक्र)- किंवा Citric acid cycle (सायट्रिक आम्ल चक्र) किंवा TCA (Tri Carboxyl acid)-

i) Mitochondria च्या Matrix (आधारकामध्ये) घडणारी kreb cycle हि respiration मधील तिसरी step आहे.

ii) Kreb cycle मध्ये सर्व acids मध्ये तीन Carboxylic (COOH) groups असल्याने त्याला TCA Cycle म्हणतात.

iii) Kreb cycle मध्ये पहिला stable product हा citric acid असतो, त्यामुळे त्याला Citric acid cycle असे म्हणतात.

iv) १९३७ मध्ये सर हॅन्स क्रेब ह्या शास्त्रज्ञाने TCA चक्रातील अनेक अभिक्रिया शोधून काढल्याबद्दल त्या cycle ला Kreb cycle म्हणतात, त्यांच्या ह्या कामाबद्दल १९५३ मध्ये त्यांना Noble Prize मिळाले होते.

वरील प्रश्नामध्ये Kreb cycle ची outline दिली आहे.

Kreb cycle मधील महत्वाच्या अभिक्रिया-**१) Condensation (संघटन)-**

i) Mitochondrion Matrix मध्ये Acetyl coenzyme-A ची Oxalo-acetone (४C) बरोबर अभिक्रिया होवून Citric acid किंवा Citrate (६C) तयार होते, त्यामुळे Citrate हे Krebs cycle मधील पहिले stable product आहे.

ii) ह्या अभिक्रियेत पाण्याच्या एका रेणुचा वापर होतो.

iii) Citrate synthetase ह्या enzyme मुळे हि reaction, catalyse (उत्प्रेरित) होते. हि reaction वरील प्रश्नामध्ये दिली आहे.

Pyruvate च्या दुस-या molecule च्या acetylation साठी Co-A हे recycled (पुनःचक्रीय) होते.

२) Isomerisation (समसुत्री रूपांतरण)- F^{++} आणि aconitase ह्या enzyme च्या उपस्थितीत Citric acid चे त्याच्या isomer म्हणजेच iso-Citric acid मध्ये रूपांतर होते. हि अभिक्रिया दोन steps मध्ये घडते.

i) **Dehydration (निर्जलीकरण)-** Citrate मुळे पाण्याचा रेणु गमावतो व Cis-aconitate (६C) तयार होतो. याची reaction वरील प्रश्नामध्ये दिली आहे.

ii) **Hydration (सजलीकरण)-** Cis-aconitate चा पाण्याच्या molecule बरोबर संयोग होवून iso-citrate तयार होते. त्याची reaction वरील प्रश्नामध्ये दिली आहे.

३) Oxidation (Dehydrogenation-I) (ऑक्सिडीकरण) (डीहायड्रोजनेशन-I)-

i) Iso-Citrate (६C) चे oxidation होऊन oxalo-succinate (ऑक्सॅलोसक्सिनेट) (६C) तयार होतात.

ii) ह्या step मध्ये दोन hydrogen atoms मुक्त होतात व ते Coenzyme NAD कडून घेतले जातात आणि NADH₂ तयार होतात.

iii) ह्या reaction साठी iso-citrate dehydrogenase (आयसो-सायट्रेट डिहायड्रोजनेज) ह्या enzyme ची आणि Mn^{++} ची आवश्यकता असते. याची reaction वरील प्रश्नामध्ये दिली आहे.

Q.6 With the help of suitable diagrams, explain karyokinesis in brief.

OR

Q.6 Draw neat and labelled diagram of Anaphase.

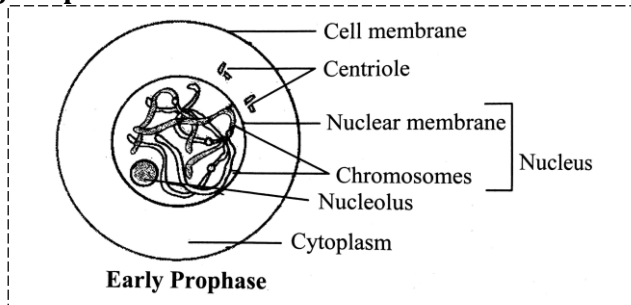
OR

Q.6 Draw a neat and labelled diagram of Telophase.

OR

Ans: Karyokinesis - Karyokinesis is the nuclear division which is divided into prophase, metaphase, anaphase and telophase.

a) Prophase:



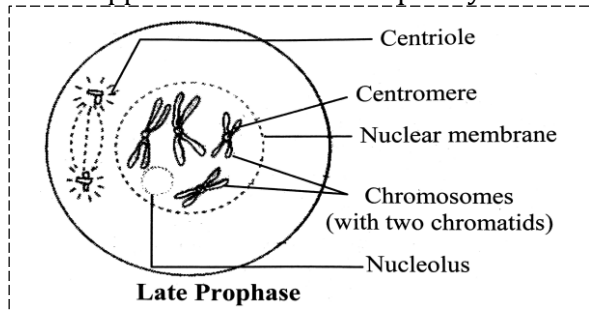
i) In this phase, condensation of chromatin material, migration of centrosomes, appearance of mitotic apparatus and disappearance of nuclear membrane takes place.

ii) Due to condensation, each chromosome with its sister chromatids connected by centromere is clearly visible under light microscope.

iii) The nucleolus starts to disappear.

iv) Centrosome starts moving towards the opposite poles of the cell.

iv) Mitotic apparatus is almost completely formed.



b) Metaphase:

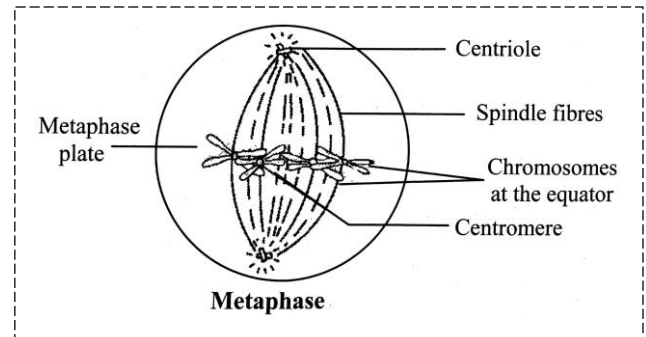
i) Chromosomes are completely condensed and appear short.

ii) Centromere and sister chromatids become very prominent.

iii) All the chromosomes are arranged at equatorial plane of cell. This is called metaphase plate.

iv) Mitotic spindle is fully formed in this phase.

v) Centromere of each chromosome divides into two, each being associated with a chromatid.

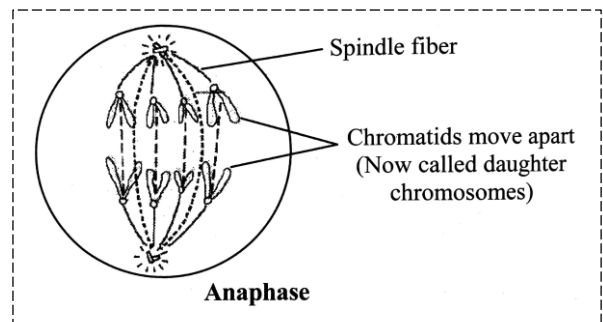


c) Anaphase:

i) In this phase, chromatids of each chromosome separate and form two chromosomes called daughter chromosomes.

ii) The chromosomes which are formed are pulled away in opposite direction by spindle apparatus.

iii) Anaphase ends when each set of chromosomes reach at opposite poles of the cell.



d) Telophase:

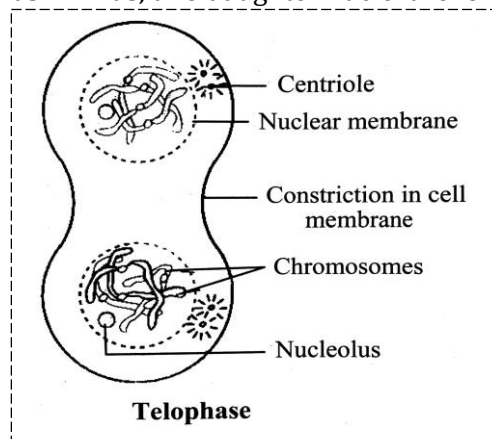
i) This is the final stage of karyokinesis.

ii) The chromosomes with their centromeres begin to uncoil at the poles.

iii) The chromosomes lengthen and lose their individuality.

iv) The nucleolus reappears and the nuclear membrane appear around the chromosomes.

v) Spindle fibres breakdown and get absorbed in the cytoplasm. Thus, two daughter nuclei are formed.



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