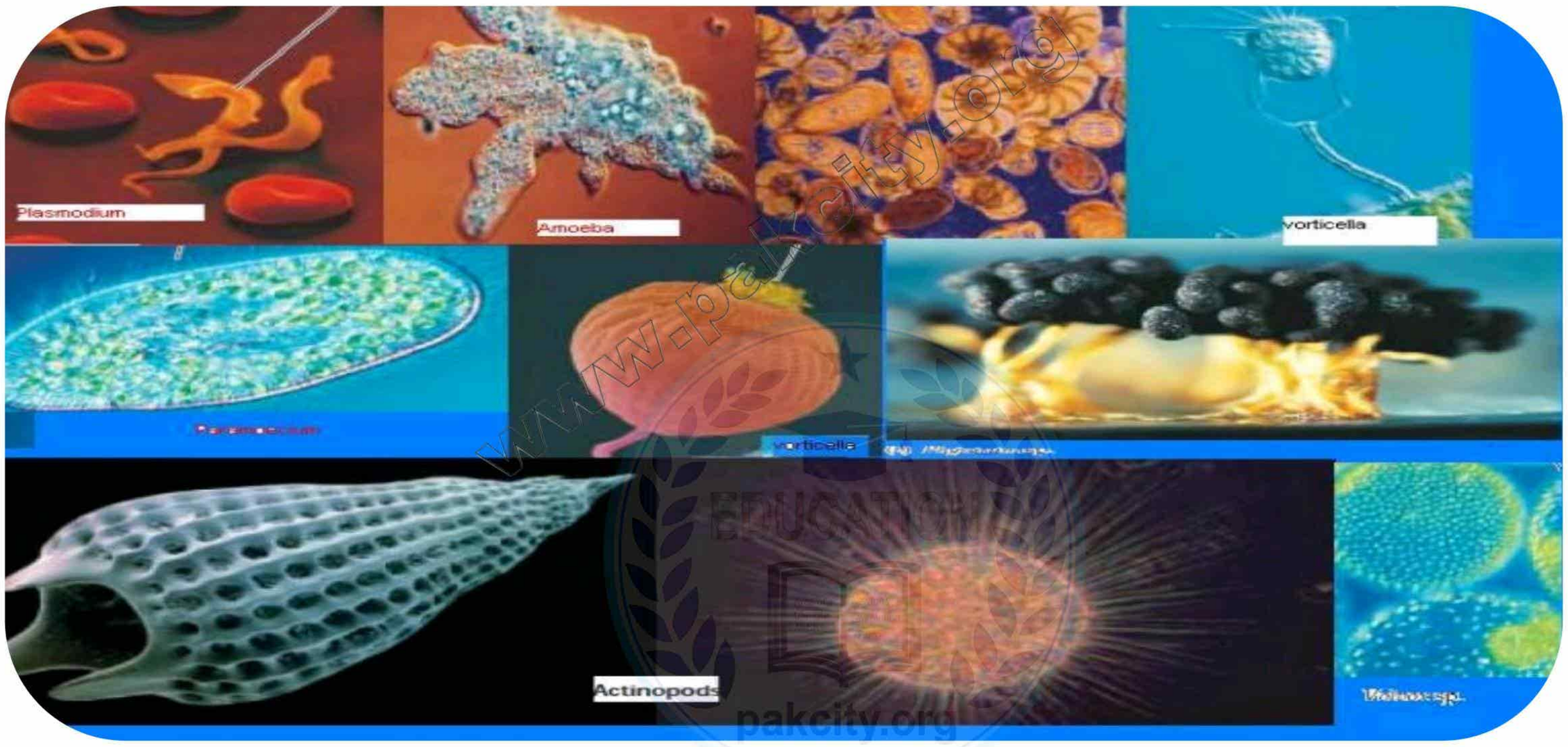
CHAPTER 7

THE KINGDOM PROTISTA (PROTOCITISTA)



- **Exercise short answers**
- **Important Short Answers**
- **Exercise MCQ's**
- **Important additional MCQ's**
- **Past MDCAT MCQ's**

Exercise MCQ's

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❖ **Encircle the correct answer from the multiple choices.**

1) **Amoeba move and obtain food by means of:**
   a) Plasmodium
   b) Flagella
   c) Cilia
   d) Pseudopodia
   e) Gamentangia
2) **The sexual process exhibited by most ciliates is called:**
   a) Oogamy
   b) Binary Fission
   c) Conjugation
   d) Fertilization
   e) Zygote
3) **Parasitic protozoans that form spores at some stage in their life belong to which group:**
   a) Ciliates
   b) Actinopods
   c) Diatoms
   d) Apicomplexans
   e) Zooflagellates
4) **Algae which have shells composed of two halves that fit together like petri dish belong to:**
   a) Brown algae
   b) Diatoms
   c) Euglenoids
   d) Green algae
   e) Red algae
5) **Algae in which body is differentiated into blades/ stipes and holdfasts belong to:**
   a) Golden algae
   b) Diatoms
   c) Kelps
   d) Euglenoids
   e) Green algae
6) **Chl a, Chl b, and carotenoids are found in:**
   a) Brown algae, golden algae and diatoms
   b) Green algae, golden algae and euglenoids
   c) Green algae, euglenoids and plants
   d) Red algae, euglenoids and brown algae
   e) Red algae, golden algae and plants
7) **The feeding stage of slime mold is called:**
   a) Mycelium
   b) Pseudopodium
   c) Hyphae
   d) Plasmodium
   e) Rhizoids
8) **Cell wall in Oomycetes is chemically composed of:**
   a) Cellulose
   b) Chitin
   c) Proteins
   d) Lignin
   e) Proteins and some carbohydrates

Answer key:

1	d	**2**	c	**3**	d	**4**	b	**5**	c
6	c	**7**	d	**8**	a				

Additional Important MCQ's

❖ **Encircle the correct answer from the multiple choices.**

Protists and Taxonomic Position

1) Which one structure is not present in protists?

a) Flagella b) Embryo c) Cilia d) Chlorophyll

2) In five kingdom system of Robert Whittaker (1669) only unicellular eukaryotes were paced in kingdom:

a) Monera b) Protista c) Fungi d) Plants

3) John Hogg proposed the kingdom:

a) Monera b) Protista c) Fungi d) Protoctista

4) Margulis and Schwartz accommodate the diverse assemblage of organism of Protista into:

a) 37 phyla b) 27 phyla c) 10 phyla d) phyla

5) Who first separated bacteria from other protists as a group?

a) John Hogg
b) Ernst Haeckel
c) Margulis and Schwartz
d) Herbert Copeland

6) Which of the following statement about Kingdom Protista is incorrect?

a) Their members have characteristics which separate them from other kingdoms
b) They only include unicellular aquatic eukaryotic organisms
c) They do not develop from Blastula or embryo
d) They contain ancestors for fungi plants & animals

Animal like Protists

7) Amoeba move and obtain food by means of:

a) Flagella b) Pseudopodia c) Flexing d) Cilia

8) Pseudopodia are present in:

a) Amoeba b) Actinopodia c) Foraminifera d) All of these

9) Entamoeba histolytica caused amoebic:

a) Cholera b) Fever c) Dysentery d) Migraine

10) Amoebic dysentery is caused by:

a) Amoeba b) Entamoeba c) Vorticella d) Plasmodium

11) The intestinal parasite causes amoebic dysentery in human is:

a) Trichonymphas
b) Pelomyxa paustris
c) Entamoeba histolytica
d) Apicomplexans

12) The scientific name of giant amoeba is:

a) Entamoeba histolytica
b) Amoeba
c) Vortecilla
d) Pelomyxa palustris

13) Pelomyxa palustris is:

a) Bacterium
b) Amoeba
c) Zooflagellate
d) Ciliates

14) ..... zooflagellates are supposed to be ancestor of the sponges:

a) Trypanosoma b) Trichonympha c) Euglena d) Choanoflagellates

15) Trypanosoma is an example of:

a) Actinopods
b) Zooflagellate
c) Apicomplexans
d) Ciliates

16) Which of the protozoa has a striking resemblance to collar cells in sponges?

a) Zooflagellates
b) Choanflagellates
c) Trypanosomoa
d) Trichonymphas

17) Based on molecular data euglenoids are thought to be closely related to:

a) Dinoflagellates b) Zooflagellates c) Protozoans d) Algae

18) All photosynthetic euglenoids lose their chlorophyll when grown in dark and obtain their nutrients heterotrophically this statement is:

a) True
b) False
c) May be true may be false
d) Unpredictable

19) Complex specialized flagellates living symbiotically in the gut of termites are:

a) Trichonymphas b) Trypanosoma c) Euglena d) Radiolarians

20) Which of the following causes sleeping sickness:

a) Trichonympha b) Trypanosoma c) plasmodium d) None

21) Sleeping sickness is spread/transmitted by (the bite of infected):

a) Tsetse fly b) Trypanosoma c) Mosquito d) Plasmodium

22) Which of the following is not a ciliates:

a) Paramecium b) Pseudomonas c) Vorticella d) Stentor

23) An outer flexible covering of ciliates is:

a) Cell wall b) Cell membrane c) Pellicle d) All of these

24) The protozoans having two kinds of nuclei:

a) Amoeba b) Zooflagellates c) Ciliates d) Actinopods

25) One or more, small diploid micronuclei of ciliates function in:

a) Metabolism
b) Growth
c) Sexual process
d) Exertion

26) The sexual process exhibited by most ciliates is called:

a) Oogamy b) Binary fission c) Conjugation d) Fertilization

27) Foraminiferans and actinopods are the marine protozoa. They produce porous shells through which cytoplasmic projections extend out to form sticky network. The function of this network is:

a) Locomotion b) To trap prey c) Defense d) Secretion

28) Which of the following are marine protozoans that produce shells of calcium carbonate?

a) Diatoms b) Dinoflagellates c) Euglena d) Foraminiferans

29) Lime stone deposits are formed from:

a) Zooflagellates b) Foraminferans c) Actinopods d) Apicomplexans

30) The definite shape to ciliates is given by:

a) Pellicle b) Penicle c) Calcium d) Cell wall

31) Chalk is gradually formed of dead:

a) Actinopods b) Foraminiferans c) Radiolarians d) Apicomplexans

32) Tests of foraminifera are made of:

a) Silica b) Calcium c) Oxalate d) Magnesium

33) Tests of Actinopods are made of:

a) Calcium b) Stone c) Chalk d) Silica

34) Actinopods with glassy shells are:

a) Rotifers b) Radiolarians c) Diatoms d) Forams

35) Radiolarians belong to which of the following protozoal group?

a) Zooflagellates b) Actinopods c) Foraminifera d) Apicomplexans

36) Apicomplexans move by:

a) Tube feet b) Cilia c) Flexing d) Pseudopodia

37) Plasmodium is a malarial parasite. It is an animal like protest. It belong to:

a) Zoo flagellates b) Apicomplexans c) Ciliates d) Choanoflagellate

38) Mosquitoes infect plasmodium to human in the form of:

a) Cysts b) Sporozoites c) Merozoites d) Gametocytes

39) Example of Apicomplexans is:

a) Vorticella b) Plasmodium c) Stentor d) Amoeba

Plants like Protists

40) Chlorophyll 'a' is found in all photosynthetic organisms except:

a) Diatoms b) Red algae c) Bacteria d) Euglena

41) Which of the following statement is incorrect about algae?

a) Their zygote unlike plants is protected by parental tissue
b) Their classification is based on pigment composition
c) Most of them have different morphological forms in-different stages of their life cycle
d) Almost all of them are aquatic.

42) In which of the following pigments major energy reserves and cell wall are like plants?

a) Rhodophyta b) Chlorophyta c) Phaeophyta d) Chrysophyta

43) Most of the photosynthesis on earth is carried by:

a) Kelps b) Gymnosperms c) Angiosperms d) Algae

44) Of the following which one is not the characteristic of green algae?

a) Some green algae possess cell wall with cellulose
b) They are generally accepted as the ancestors of green plants
c) Chlorella is unicellular non-motile green algae
d) None of these

45) Common name for pyrophyta is:

a) Euglenoids
b) Diatoms
c) Dinoflagellates
d) Brown algae

46) Ecologically, dinoflagellates are one of the most important group of:

a) Primary consumer
b) Decomposer
c) Producer
d) Secondary consumer

47) Most dinoflagellates are:

a) Unicellular
b) Multicellular
c) Both of these
d) Zooflagellates

48) Of the following which one is not the characteristic of dinoflagellates?

a) Most of them are unicellular
b) They have blooms
c) Their cells are often covered with shells of interlocking cellulose plates impregnated with calcium
d) None of these

49) Ceratium belongs to:

a) Pyrrophyta
b) Chrysophyta
c) Phaeophyta
d) Rhodophyta

50) Examples of Rhodophytes are:

a) Chondrus b) Polysiphonia c) Both a & b d) Pinnularia

51) In chlorophytes the main energy stores are:

a) Cellulose b) Starch c) Glycogen d) All of these

52) Diatoms belong to phylum:

a) Rhodophyta b) Phaeophyta c) Chrysophyta d) Pyrrophyta

53) Members of phylum Chrysophyta are commonly called:

a) Brown algae b) Dinofagellates c) Red algae d) Diatoms

54) Which one is the member of the Chrysophyta?

a) Ceratium b) Macrocystis c) Polysiphonia d) Pinnularia

55) The cell wall of each diatom consists of……:

a) Single shell b) Two shells c) Four shells d) Six shells

56) Algae which have shells composed of two halves that overlap or fit together like petri dish belong to:

a) Brown algae b) Diatoms c) Green algae d) Red algae

57) Which chemical is deposited in the shells of diatoms:

a) Calcium b) Pectin c) Silica d) Lignin

58) Freqularia belong to phylum……:

a) Chrysophyta b) Phaephyta c) Pyrrophyta d) Chlorophyta

59) The largest brown algae is called:

a) Diatoms b) kelps c) Stentor d) None

60) Giants of the protists kingdom are included in:

a) Brown algae b) Red algae c) Green algae d) Brown algae

61) Algae in which body is differentiated into blades, stripes and holdfast are:

a) Golden algae b) Diatoms c) Kelps d) Green algae

62) Algae which take part in building coral reefs with coral animals are:

a) Diatoms b) Red algae c) Green algae d) Brown algae

63) Chlorophyll a, carotene and phycoerytrin are found in:

a) Red algae b) Green algae c) Diatoms d) Brown algae

64) Phycoertyhrin is found in:

a) Phodophyta b) Rhodophyta c) Phaeophyta d) Chrysophyta

65) Polysiphonia is an example of:

a) Red algae b) Green algae c) Brown algae d) Diatoms

66) Which of the following may build coral reefs along with coral animals?

a) Myxomycota b) Green algae c) Brown algae d) Red algae

67) Which is not included in Chlorophyta?

a) Chlorella b) Pinnularia c) Spirogyra d) Acetabulria

68) RNA sequencing indicates that green algae and plants form a:

a) Monophylatic lineage
b) Biphylatic lineage
c) Polyphylatic lineage
d) Paraphtic lineage

69) The only group of algae having no flagellated motile cells at any stage is:

a) Chrysophyta b) Phaeophyta c) Pyrrophyta d) Rhodophyta

70) A unicellular non-motile alga is:

a) Chlorella b) Volvox c) Ulva d) Kelps

71) Chlorella is:

a) Multicellular
b) Acellular
c) Unicellular motile
d) Unicellular non-motile

72) Edible algae is:

a) Mushroom b) Kelps c) Diatoms d) Dinoflagellates

Fungi like Protists

73) Phytophthora infestans belongs to the group:

a) Myxomycota b) Oomycota c) Euglenoids d) Rhodophyta

74) The feeding stage of slime mold is:

a) Mycelium b) Pseudopodium c) Hyphae d) Plasmodium

75) In slime molds spores develop into:

a) Swarm cells
b) Biflagellated cells
c) Amoeboid reproductive cells
d) All of these

76) Spores produced by slime molds are:

a) Haploid b) Diploid c) Triploid d) None of these

77) Which of the following is responsible for Irish potato famine?

a) Dinoflagellates
b) Kelps
c) Physarum polycephalum
d) Phytophthora infestans

Answer key:

1	b	**2**	b	**3**	d	**4**	b	**5**	D	**6**	b	**7**	b	**8**	d	**9**	c	**10**	b
11	c	**12**	d	**13**	b	**14**	d	**15**	B	**16**	b	**17**	b	**18**	b	**19**	b	**20**	b
21	a	**22**	b	**23**	c	**24**	c	**25**	C	**26**	c	**27**	b	**28**	c	**29**	b	**30**	a
31	b	**32**	b	**33**	d	**34**	b	**35**	B	**36**	c	**37**	b	**38**	b	**39**	b	**40**	c
41	a	**42**	b	**43**	d	**44**	a	**45**	C	**46**	c	**47**	a	**48**	c	**49**	a	**50**	c
51	b	**52**	c	**53**	d	**54**	d	**55**	B	**56**	b	**57**	c	**58**	a	**59**	b	**60**	a
61	c	**62**	b	**63**	a	**64**	b	**65**	A	**66**	d	**67**	b	**68**	a	**69**	d	**70**	a
71	d	**72**	b	**73**	b	**74**	d	**75**	D	**76**	a	**77**	D						

Past MDCAT MCQ's

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1) **The African sleeping sickness is caused by …….:**
   a) Entamoeba histolytica
   b) Zooflagellate
   c) Trypanosoma
   d) Ciliates
2) **Which of the following may build coral reefs along with coral animals?**
   a) Myxomycota b) Green algae c) Brown algae d) Red algae

2009

3) **The giant amoebas inhabit mud at the bottom of fresh water ponds and obtain energy from:**
   a) Microscopic bacteria
   b) Anaerobic bacteria
   c) Aerobic bacteria
   d) Methanogenic bacteria
4) **A large group of parasitic protozoa, some of which causes various diseases such as malaria to humans, are:**
   a) Aschelminthes
   b) Annelida
   c) Platyhelminthes
   d) Arthropods

2010

5) **Trypanosoma is a human parasite causing:**
   a) African sleeping sickness
   b) Indonesian sleeping sickness
   c) European sleeping sickness
   d) American sleeping sickness
6) **The feeding stage of slime mold is a:**
   a) Gastrozoid b) Plasmodium c) Sporozoite d) Merozote

Answer key:

1	c	**2**	d	**3**	d
4	a	**5**	a	**6**	b

Exercise Short Answers

Q: Write two characteristics of each of the following group:

i. Protozoa
ii. Dinoflagellates
iii. Diatoms
iv. Sime molds
v. Oomycetes

Ans:

i. Protozoa:

- All protozoans are unicellular
- Most ingest their food by endocytosis.

ii. Dinoflagellates:

- Their cells are often covered with shells of interlocking cellulose plates impregnated with silicates.
- They have rarely population explosions or blooms. These blooms color the water orange, red or brown and are called red tides.

iii. Diatoms:

- The cell wall or each diatom consists of two shells. These shells overlap where they fit together, much like a petri dish.
- Diatoms are very important in aquatic food chain.

iv. Slime molds:

- The feeding stage of slime mold is plasmodium. It is a multinucleate mass of cytoplasm that can grow up to 30 cm (1 ft.) in diameter.
- During unfavorable conditions, slime molds forms resistant haploid spores. These spores are formed by the process of meiosis within the stalked structure called sporangia.

v. Oomycotes:

- Their cell walls contain cellulose.
- Their hyphae are aseptate (without cross walls).

Important Short Answers

Q:1 Differentiate between Fungi & Fungi like protists / Oomycetes.

Ans:

Fungi	Fungi like protists
• Their cell wall is made up of chitin.	• Their cell wall is made up of cellulose.
• Their body is composed of hydra (Mycelium).	• Their body may be a mycelium or plasmodium.
• They lack centrioles.	• Centrioles are present.
• Flagellated sex cells are absent.	• Flagellated sex cells may be present.
• Examples: Rhizopus, yeast, mushroom, penicillium.	• Examples: Phytophtora infestations, Physarum polycephalum.

Q:2 Differentiate between Algae and Fungi.

Ans:

Algae	Fungi
• These are photosynthetic protists. Chlorophyll and chloroplast is present in them.	• Fungi are heterotrophic. They lack chlorophyll and chloroplasts.
• Their cell wall is made up of cellulose.	• Their cell wall is made up of chitin.
• Body may be unicellular, thallus or filamentous.	• Their body is composed of hyphae.
• Their reserve food material is starch.	• Their reserve food material is glycogen.

Q:3 Write down the characteristics of ciliates.

Ans: Following are some characteristics of ciliates:

- Ciliates are unicellular organism with a flexible outer covering called a pellicle.
- They move by means of fine, short, hair like structures called cilia. Some are sessile.
- Their food is mostly bacteria or other tiny protists.
- Contractile vacuoles perform the function of water regulation in freshwater ciliates.

- Ciliates differ from other protozoans in having two kinds of nuclei i.e, one or more small diploid micronuclei involved in sexual process. A large, polyploid macronucelus that controls cell metabolism and growth.
- Most ciliates reproduce sexually by conjugation. During conjugation two individuals come together and exchange genetic material.

Q:4 What are diatoms? Write their ecological importance.

Ans: Diatoms:

The algae in which organism in covered by two overlapping shells are called diatoms.

- The cell of each diatom consists of two shells that fit together like a petri dish.
- The shell contains silica and this glass like material is laid down in complex patterns.

Ecological importance of diatoms:

These are the largest producers of marine and freshwater ecosystem because of their large number.

Q:5 What are the major groups of eukaryotic organisms of kingdom protista?

Ans: The kingdom protista contain four major groups i.e.

1) Single cell protozoans
2) Unicellular algae
3) Multicellular algae
4) Slime molds and Oomycotes

Q:6 In which respects during course of evolutionary history, organisms in kingdom protists have evolved diversity?

Ans: During course of evolutionary history, organisms in kingdom protists have evolved diversity by following respects:

- Size and structure
- Means of locomotion
- Ways of obtaining nutrients
- Interactions with other organisms
- Habitat
- Modes of reproduction

Q:7 Write characteristics of protists. Who proposed kingdom Protista?

Ans: The protists are unicellular, colonial or simple multicellular organisms that possess a eukaryotic cell organization. e.g., Algae, Protozoa.

- John Hogg proposed kingdom protista for microscopic organisms.

Q:8 What do you know about giant amoeba?

Ans: The giant amoeba (Pelomyxa palustris):

- Giant amoeba lives in mud at the bottom of freshwater ponds. Here they help in the degradation of organic molecules.
- The giant amoeba, Pelomyxa palustris, may be the most primitive eukaryotes.
- It has many membrane bound nuclei.
- However other organelles are absent that are usually present in a eukaryotic cell.
- It contains energy from methanogenic bacteria, which are present inside it (endosymbiont relationship).

Q:9 How zoo-flagellates obtain their food? What is the habitat of zoo-flagellates?

Ans: Uptake of food by zoo-flagellates:

- They obtain food either by ingesting living or dead organisms e.g., Euglena, Amoeba or by decomposing organic matter. e.g., Slime Algae.

Habitat of zoo-flagellates:

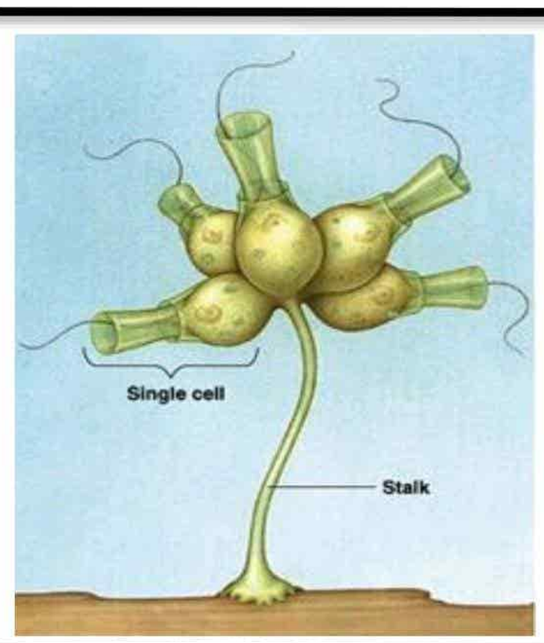
- Zooflagellates are free living, parasite, or symbionts.

Q:10 What are choanoflagellates?

Ans: Choanoflagellates:

Choanoflagellates are sessile marine or freshwater flagellates.

- A stalk attaches these and a delicate collar surrounds their single flagellum.
- They closely resemble the collar cells in sponges (hence regarded as ancestor of kingdom Animalia).



Q:11 What do you know about green algae? Give two examples.

Ans: Green algae are thought to be the ancestors of plants because of the following similarities:

- RNA sequencing indicates that green algae and the plants form a monophyletic linage. It means plants are evolved from green algae.
- Most green algae possess cell walls with cellulose. Green algae have pigments, energy reserve products and cell walls that are identical to the plants.
- Green algae are photosynthetic, with chlorophyll a, chlorophyll b and carotenoids present in their chloroplasts.
- The main energy reserves are in the form of starch.

Examples of green algae:

Chlorella, spirogyra, chlamydomonas, ulva etc

Q:12 What are limestone deposits? How are they formed by foraminifera?

Ans: These are marine protozoans.

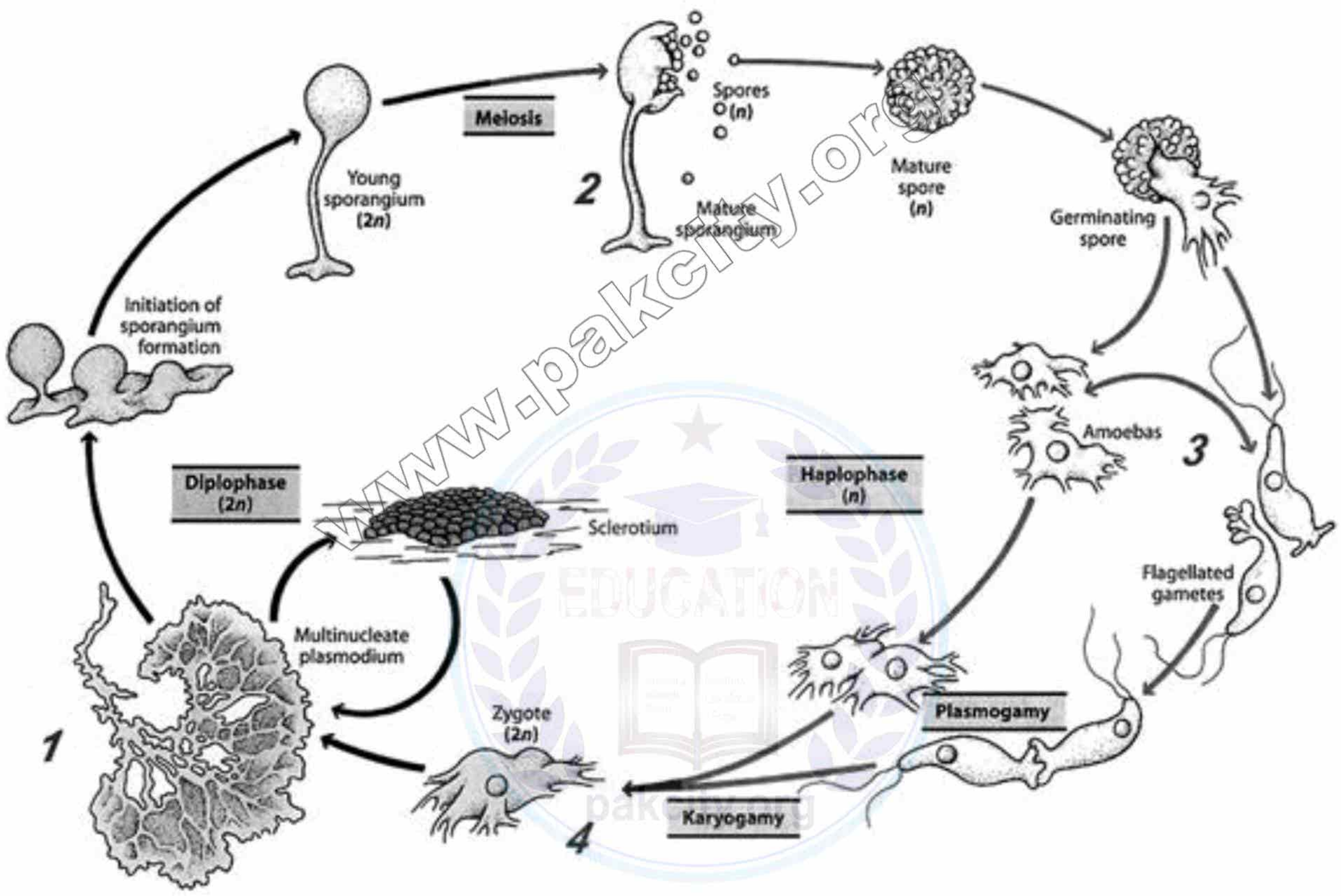
- They produce shells (or tests).
- Tests of foraminifera are made up of calcium.
- Shells of actinopods are made of calcium.
- The shells or tests contain pores through which cytoplasmic projections can be extended that catches prey.
- Chalk Formation:

  Dead foraminiferans sink to the bottom of the ocean. Here their shells form a grey mud that is gradually transformed into chalk.

Examples: Foraminiferans, for the past, have created vast limestone deposits.

Q:13 Draw life cycle of polycephalum (Slime mold).

Ans:



Q:14 Write two characteristics of Apicomplexans. Write the name of apicomplexans that cause malaria

Ans. Characteristics of Apicomplexans:

1) Apicomplexans are unicellular
2) They are non-motile.

Apicomplexans that cause malaria:

Plasmodium, the apicomplexans that cause malaria enters human body by the bite of infected female anopheles mosquito.

Q:15 What are three major groups of protists? Give at least two examples of each group of protists.

Ans:

Major groups of protists	Description	Examples
1) Protozoa	Animal-like protists	Plasmodium, Amoeba.
2) Algae	Plant-like protists	Euglena, Spirogyra
3) Slime molds and Oomycotes	Fungi-like protists	Phytophthora infestans, Physarum polycephalum

Q:16 Why Green algae are considered ancestral organisms of green land plants?

Ans:

Due to the presence of starch and cellulose cell wall, it is generally accepted that plants arose from ancestral green algae. Evidence from RNA sequencing also indicates that green algae and the plants from a monophyletic lineage.

Q:17 Write two differences between algae and plants.

Ans: Algae:

- Sex organs are unicellular.
- The parent body does not protect the zygote.

Plants:

- A plant zygote grows into a multicellular embryo.
- Zygote is protected by parental tissue.

Q: 18 What characteristics of kingdom Protista exclude it from other kingdom?

Ans: Following are the characteristics:

- All protists are eukaryotic.
- All protists evolved from prokaryotes.
- They do not develop from blastula of an embryo.

Q:19 How do ciliates differ from other protozoans?

Ans: Ciliates differ from other protozoans by the followings:

- Presence of a Pellicle which is flexible outer covering.
- Presence of cilia as locomotary organs.
- Presence of two kinds of nuclei: Micronucleus and macronucleus

Q:20 What are the functions of micronucleus and macronucleus in ciliates?

Ans:

The micronucleus is a small, diploid and functions in sexual reproduction while the macronucleus is a large, polyploid which controls cell metabolism and growth.

Q:21 Define the Following terms:

I. **Trypanosoma**
II. **Conjugation**
III. **Thallus**

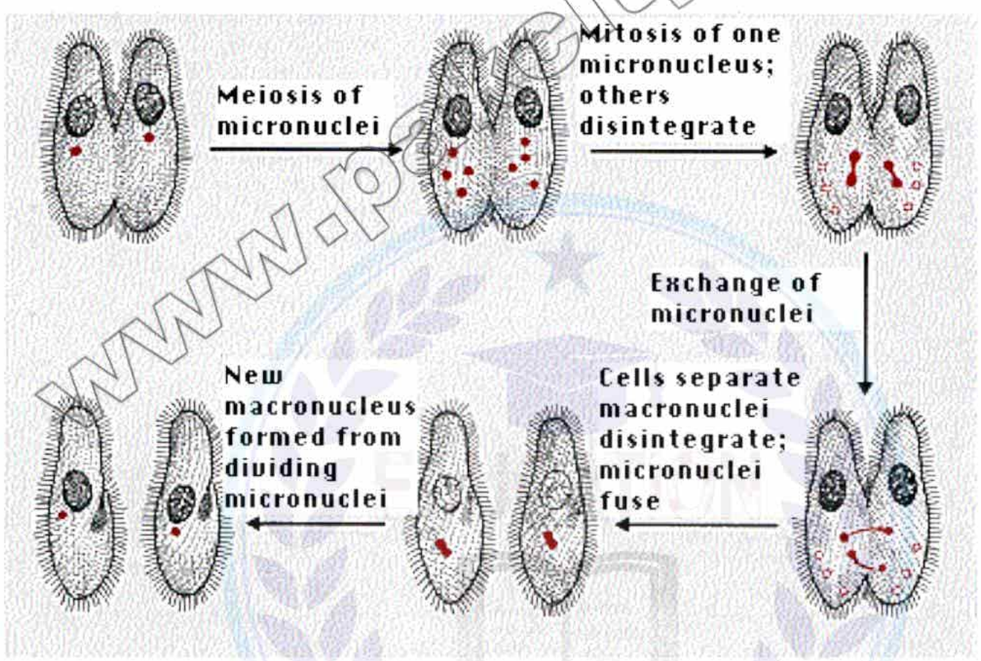
Ans:

I) Trypanosoma:

Trypanosoma is a human parasite causing African sleeping sickness. It is transmitted by the bite of infected tsetse fly.

II) Conjugation:

Conjugation is a sexual process of cilliates during which two individuals come together and exchange genetic material.



III) Thallus:

A plant body which is not differentiated into true roots stems and leaves and lack vascular tissues (xylem and phloem) is called a thallus.

Q:22 Name the pigments present in diatoms.

Ans: Following are the pigment in diatoms:

- Chlorophyll a
- Chlorophyll c
- Caroteins
- Fucoxanthin

Q:23 Which protists cause diseases in humans?

Ans:

- The intestinal parasite, Entamoeba Histolytica that causes amoebic dysentery, germinates from resistant cysts with the digestive tracts of their mammalian hosts including humans.
- Trypansoma is a human parasite causing African sleeping sickness. It is transmitted by the bite of infected tsetse fly.
- Some Apicomplexans such as Plasmodium cause serious diseases such as malaria in humans.
- Phytophthora Infestans have played infamous roles in human history as they were the cause of Irish potato famine of the 19th century. It causes a disease commonly known as late blight of potatoes. Because of several rainy, cool summers in Ireland in the 1840's, the water mold multiplied unchecked, causing potato tubers to rot in the fields. Since potatoes were the staple of Irish peasant's diet, many people (250,000 to more than 1 million) starved to death. The famine prompted a mass migration out of Ireland to such countries as the United States.

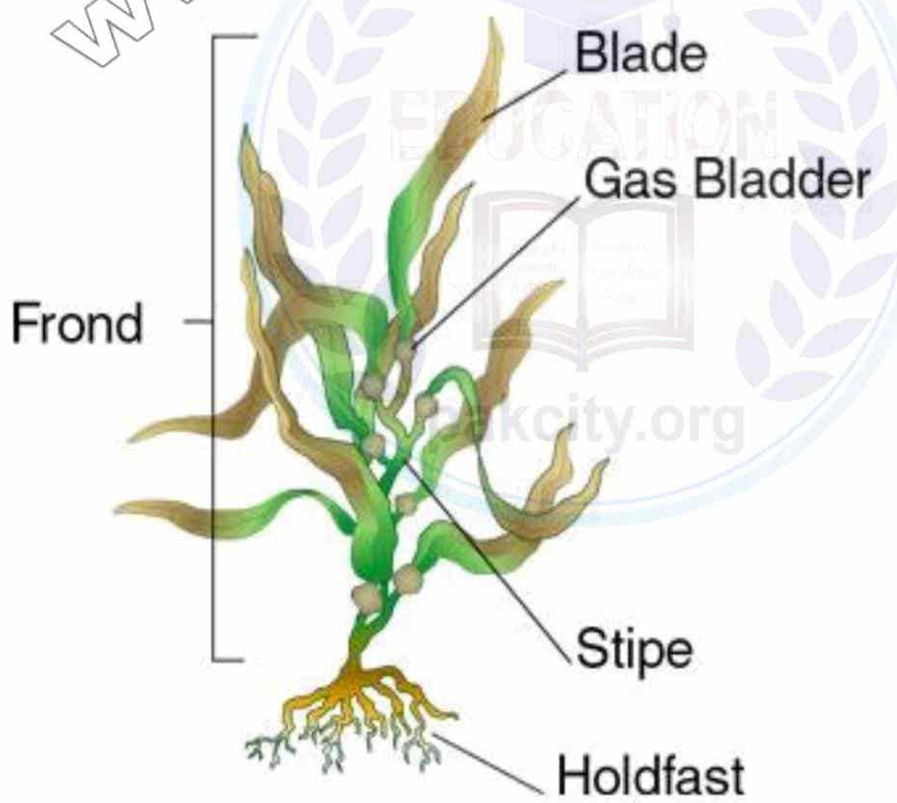
Q:24 What cause red tides? Also define kelps.

Ans: Red tides:

Dinoflagellates are known to have occasional population explosions or blooms. These blooms color the water orange, red or brown and are called red tides.

Kelps:

Kelps are the largest brown algae, which are tough and leathery in appearance. Whose leaf like structure called blade, stem like called stipes and root like structure called hold fast.



Q:25 How are protists important to humans? What is their ecological importance?

Ans. Importance of Protists:

.As Food:

- Some algae such as kelps are edible and may be used to overcome shortage of food in the world.
- Larvae of some aquatic insects feed on aquatic protozoans. While these larvae are taken as food by clam, prawn and young fishes which are the ultimate source of food of man.

Useful Substances:

- Marine algae are also source of much useful substance like algin, agar, carrageenan and antiseptics.

Produces:

- Algae are major producers of the aquatic ecosystem, thus they play a basic role in food chains, providing food and oxygen to other organisms.
- Ecologically, diatoms and dinoflagellates are the most important groups of producers in marine ecosystem.

Q:26 How protozoans are helpful in Sanitation:

Ans:

Some protozoans play an important role in the sanitary betterment and improvement of the modern civilization in keeping water safe for drinking purpose. The protozoans living in polluted water feed upon waste organic substances and thus purify it. Some bacteria feed on the bacteria and purify the water indirectly.