CHAPTER 1 AND 2

Life is a unique, complex organization of molecules that expresses it self though chemical reactions which lead to growth, development, responsiveness, adaptation & reproduction.

- Unique features of living organesim:
  Growth- reproduction- metabolism- consciousness-life span.
- Living organisims are therefore, self- replicating, evolving & self-regulatory interactive systems capable of responding to external stimuli.
- Currently 1.7-1.8 billion living organisms known to science. Out of which 1.25 are animals and abut 0.5 millions are plants.
- Systematic is branch of biology that deals with cataloguing plants, animals and other organism into categories that can be named, compared & studied.
- Biology : father of biology- Aristotle,Biology (Bio-life form, logy-study)

  -Father of Zoology (Aristotle)
  Father of Botany (Theophrastus)

- Taxonomy: study of rules & procedure to classify organisms.
- Cell contains - Cytoplasm

  and { Nucleoplasm } Collectively called
  Protoplasm }

  (Physical bas is of life)

  given

  by purkinje

- Taxonomic categories (7 obligate)
  - Kingdom (less similarities)
  - Phylum (animal) / Division (plant)
  - Class
  - Order
  - Family
  - Genus
  - Species (More similarity) basic unit of classification
- Bionomical nomenclature given by C.linneaus

Taxonomic AIDS:

Herbarium: It is a place where dried and pressed specimens, mounted on sheets are kept systematically according bentham to bantams & hooker classification. It carries a label on right corner which provide. Information for future use. It provides a quick refer back system and is quite useful for people involved in taxonomic studies. All institutes leading with baotanical studies maintain their herbaria.

HISTORY OF HERBARIA : Majority of the world's famous herbaria originated from the botanical gardens. The first herbarium was set up at Pisa in Italy by a professor of botany Luca Ghini. His students bound the paper sheets having plant specimens

mounted on them into book volumes, and spread the art of herbarium throughout Europe.

Linnaeus started storing the paper sheets with plants mounted on them in piles, a practice followed even today.

MAJOR HARBARIA: Largest herbaria of the world are at Royal Botanic Garden, Kew, England (6.5) million speciment) and Museum of Natural history. Paris (6 million specimens). In India, the largest herbarium is at Indian Botanical Garden, sibpur, Kolkata, called Central Natonal Herbarium (2milion speciment).

ROLE OF HERBARIA:

Repository of plant specimens
Safety of type specimens
Compilation of Flora, Manuals and Monographs
Identification facility
Preservation of voucher specimens
Knowing ecology of different places.

MUSEUMS: Museums have collection of preserved plants and animals for study and reference. Only those plants are preserved in museum which can not be kept in herbaria, e.g. algae, fungi, mosses, ferns, parts of gymnosperms, fruits, underground storage organs, etc. animals are preserved in chemical solutions (mostly formalin) as well as in stuffed and skeleton forms.

The objective of preparing a ;museum is to record information and preserve specimens for taxonomic studies. It does intend to kill or destory the animals unnecessarily. Biology students are asked to collect and preserve plants, plant parts and dead animals and others.

MUSEUMS.:IMPORTANT

American Museum of Natural History, New York, U.S.A.
State Museum of Natural Histqry, Stuttgaut, Germany.
Museum of Natural History, Switzerland.
National Museum of Natural History, Paris.
National Museum of Natural History, Barakhamba Road, New Delhi.
Museum of Mumbai Natural History Society (Hombill House, Shahid Bhagat Singh Road)Mumbai.
Museum of Arthropoda (Shaniwar Petu), Pune. .

Role:

The collection of specimens helps in gathering the first hand information about the habitat, soil and organisms of the area.
They are used to deposit type specimens whenever new taxa described.

ZOOLOGICAL PARKS: : An enclosed place where live wi1d anImals are Kept tor public exhibitlon is called a zoological park. Zoological parks provide more natural environment.

A scientific purpose of the zoo is to breed the animals which otherwise are facing a threat in their
natural habitat. Due to development activities, they are facing poaching and habitat destruction.

Information about common name and a scientific name is also displayed in the zoological garden
park.

In India, there are about 300 zoological parks. A Central Zoo Authority looks after their
management in India.

Role:

Study of live animal types.
Sources of tourist attraction.
Ex situ conservation through captive breeding of endangered animals

EXERCISE

1. The term Biology was coined by:
   (a) Linnaeus (b) Aristotle
   (c) Theophrastus (d) Lamarck

2. Physical basis of life is;
   (a) Nucleus (b) Cell
   (c) Protoplasm (d) Food

3. The Most peculiar feature shown by
   (a) excetion (b) autotropic nature
   (c) transpiration (d) cellular structur

4. The "protoplasm" term was given by:
   (a) Van Mohl (b) 'Purkinje
   (c) both (a) and (d) none of these

5. The main difference between non-living and living is:
   (a) in size
   (b) in movement and growth
   (c) in presence of protoplasm
   (d) none of the above

6. Nutrition occurs in:
   (a) living (b) non living
   (c) both (a) and (b) (d) none of

7. Body organization may be uncontrol in:
   (a) living (b) non livine
   (c) both (a) and (b) (d) none of these

8. Mechanical movement is present in:
   (a) living (b) non livine
   (c) both (a) and (b) (d) none of these

9. Metabolic activities shown by
   (a) living (b) non livine
   (c) both (a) and (b) (d) none of these

10. A definite shape and size is present in
(a) living (b) non livine
(c) both (a) and (b) (d) none of these

11. Waste products are excreted by:
(a) living (b) non livine
(c) both (a) and (b) (d) none of these

12. Who said " Protoplasm is physical basis of life"?
(a) Huxley (b) Robert Hooke
(c) Robert Brown (d) Lamarck

13. In which of the following body organization is control ?
(a) Non-livine (b) Living
(c) Mountains (c) all of these

Directions for Q 14-15: In each of the following questions two statements are given, one is Assertion (A) and second is Reason (R) Of the statements, mark the correct answer as :

(a) If both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion

(b) If both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.

(c) If Assertion (A) is true but Reason (R) is false.

(d) If Assertion (A) is false but Reason (R) is true.

14 Assertion: Living being exchange their energy with surroundings. Reason: Living being are example of open system.

15. Assertion: Study of internal structure is called anatomy. Reason: It is useful for phylogenetic study.

16. Genera Plantarum was written by
(a) Bentham and Hooker (b) Engler
(c) Bessey (d) Hutchinson

17. Species Plantarum and Systema Naturae were written by
(a) Engler (b) Linnaeus
(c) Hooker (d) Wallace

18. The book Historia Plantarum was written by
(a) Aristotle (b) Theophrastus
(c) Linnaeus (d) Bentham and Hooker

19. Distinction of procaryota and eukaryota is mainly based on
(a) Nucleus only (b) Cell organelles only
(c) Chromosomes only (d) All of these

20. The first herbarium was set up by
(a) Linnaeus (b) Theophrastus
(c) Luca Ghini (d) None of these

21. The standard size of herbarium sheet is
(a) 34 x 47 cm (b) 29 x 41 crn
(c) 43 x 45 cm (d) 24 x 41 crn

22. The first complete flora of the British India was compiled by
(a) J.D. Hooker (b) J. K. Mal1eshwari
(c) H. H. Rains (d) D. Prain

23. National Botanical Research Institute is situated at .
(a) DehraDun (b) Lucknow
(c) Simla (d) Kolkata

24. The most famous Indian taxonomist is regarded to
(a) H. Collet (b) santapau
(c) P. Maheshwari (d) M. B. Raizada

25. The Central National Herbarium is located at
(a) Mumbai (b) Chennai
(c) Kolkata (d) Delhi

26. Taxonomic keys are based on the
(a) Morphological characters ;
(b) Reproductive characters
(c) Anatomical characters (d) Contrasting characters

27. A taxonomic system based on all phenotypic similarities, equally weighted and without regard to evolutionary relationship is called
(a) Phylogeny (b) Cladistics
(c) Classical evolutionary taxonomy (d)phonetics

28. Most recent branch of taxonomy is
(a)Experimental taxonomy (b) Biochemical taxonomy
(c) Numerical taxonomy (d) Classical systematics

29. Bionomial nomenclature was given by
(a) Linnaeus (b) Pliny
(c) Harvey (d) Bentham and Hooker

30. In the hierarchial classification, number of obligate categories is
(a) 7 (b) 8
(c) 6 (d) 12

31 The fundamental taxonomic category or basic unit of classification is

(a) Genus (b) Species

(c) Sub-specie (d) Variety

32. The word ending with -aceae indicates

(a) Genera (b) Family

(c) Order (d) Class

33. The correct sequence of taxona categories is

(a) Division-class-family-tribe-order- genus-species

(b) Division-class-tribe-order- family- genus-species

(c) Division-class-order-family-tribe- genus-species

(d) Division-order-class-tribe-family- genus-species

34. Taxon is

(a) Any type of taxonomic grouping

(b) A rank in hierarchial classification

(c) A constituent of taxonomic hierarchy

(d) Category

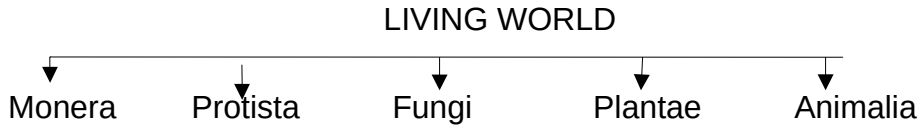
ANSWERS

1	(d)	8	(b)	15	(b)	22	(a)	29	(a)
2	(c)	9	(a)	16	(a)	23	(b)	30	(a)
3	(d)	10	(a)	17	(b)	24	(b)	31	(b)
4	(b)	11	(b)	18	(b)	25	(c)	32	(b)
5	(c)	12	(a)	19	(a)	26	(d)	33	(c)
6	(a)	13	(b)	20	(c)	27	(d)	34	(a)
7	(b)	14	(a)	21	(b)	28	(a)		

I

FIVE KINGDOM SYSTEM OF CLASSIFICATION .

According to Robert H. Whit taker (1969), an American ecologist, non-chlorophyllous heterotrophil plants to be classified under kingdom Fuhgi. Five kingdoms in which the living world is divided all Monera, Protista, Fungi, Plantae/Metaphyta (Plants) and Animalia/Metazoa (Animals).



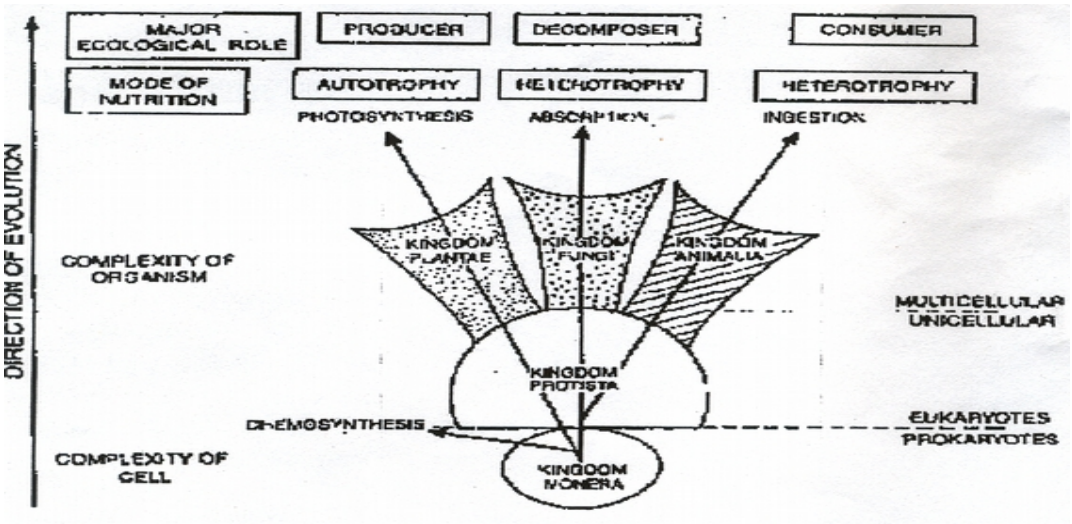
FIVE KINGDOMS OF ORGANISMS

The classification is based mainly on following three main criteria :

Complexity of cell structure: prokaryotic or eukaryotic
Complexity of cellular organization: unicellular to multicellular
Mode of nutrition: autotrophic or heterotrophic.
Other criteria include life style and the **phylogenetic relationships.**

Evolution is reflected through increase in complexity of cell, as well as in the organism. The mode 0f
nutrition also diverged in the multicellular kingdom *viz* **Plantae, Fungi and Animalia**. The ecological role of these three multicellular kingdoms was also established as **producers, decomposers** and consumers, respectively.

The organisms, according to the Five Kingdom System, are re-distributed into additional thre(kingdoms while retaining the two kingdoms -**Plantae and Animalia**. All multicellular, mobile and heterotrophic organisms were included in the kingdom Plantae. Some of the unicellular algae and protozoans were taken out from plant and animal kingdoms and were included in a separate kingdom Protista. All bacteria and multicellular blue green algae with prokaryotic cells were transferred from kingdom plantae to anew Kingdom Monera.



FIVE KINGDOMS SHOWING INCREASING COMPLEXITY DURING EVOLUTION

In the Five Kingdom classification it is thought that the Monera has given rise to the Protista, which gave rise to the remaining three kingdoms of multicellular organisms, *viz.* Fungi, Plantae and Animalia.

SIGNIFICANCE OF FIVE KINGDOM CLASSIFICATION –

This system seems more natural and indicates gradual evolution of early organisms into plants and animals.

Kingdom Animalia has become more homogenous with the exclusion of protozoa.

Kingdom Plantae has become more coherent after exclusion of bacteria, fungi and some unicelluar algal forms.

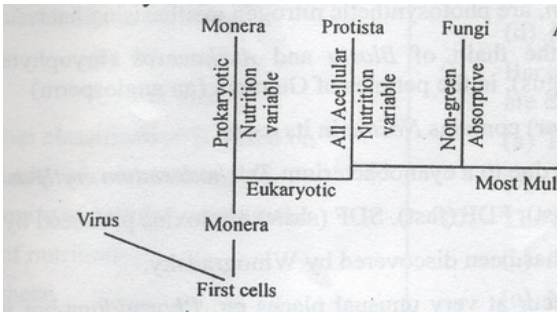
Creation of kingdom Monera from prokaryotes is fully justified.

Some organisms like *Euglena* showing mixotrophic mode of nutrition could be placed *either* in plant or animal kingdom easily.

The creation of kingdom protista including all unicellular eukaryotes, irrespective of the mode of nutrition, has resolved this problem.

The fungi, included as sub-division of division *Thallophyta* of two kingdom classification is raised to the rank of a kingdom as they differ morphologically and physiologically from plants with whom they are grouped in old two kingdom classification.

Five kingdom classification is undoubtedly better than two kingdom classification, resolving many problems, faced in old systems of classification. However, this system is also not perfect. Still it has some drawbacks as briefly discussed below:



I.J 'c:

PHYLOGENETIC RELATIONSHIP OF FIVE KINGDOM

Demerits:

Kingdoms Monera and Protista still retain heterogenosity , as both heterotroph and autotroph organisms with or without cell wall are included in both these kingdoms. The slime moulds are quite different-t from the other protista with which they have been combined.

Multicellular green algae can't be phylogenetically separated from unicellular algae and, thus unicellular algae like *Chlamydomonas* are placed in kingdom Plantae rather than Protista. Placing algae in three kingdoms seems to be unrealistic.

Viruses do not find any place.

Red and brown algae are not related to other members of kingdom Plantae.

Copeland (1956) created the group of Mychota for prokaryotes. It was called

Monera by Dougherty and Allen (1960).

Algae are spread over three kingdoms-Monera (Cyanobacteria). Protista and Plantae.
Dougherty (1957) distinguished prokaryotes and eukaryotes.

KEY POINTS

- Louis Pasteur (1822- 1895) is considered father of microbiology.
- Robert Koch (1834-1940) is regarded as father of bacteriology.
- The 'germ theory of diseases' was given by Robert Koch.
- Robert Koch identified the protein tuberculin derived from *Mycobacterium tuberculosis.*
- Mycobacterim leprae. (Hensen's bacillus) causes leprosy and cannot be cultured in vitro, therefore, eyes of Armadillo are used to prepare vaccination.
- A colourless Dinoflagellate, Blastodinium, is parasite on animals.
- Fire algae produce protein **luciferin** during bioiuminiscence.
- Noctiluca is a colourless dinoflagellate of coastal areas where bioluminescence was recorded for the first time.
- Micro-organisms like bacteria sometimes can exist without cell wall. The cell membrane and its intact contents are then called as protoplast. (Osmotically fragile). Young actively growing gram(+) bacteria are sensitive to penicillin. So these bacteria can be made protoplasts.
- Mycoplasma are also called Jokers of "Plant kingdom" because of showing pleomorphism.
- The archaebacteria and eubacteria possibly arose from a more ancient form of life progenote.
- The non-symbiotic free living nitrogen fixing bacterium is Clostridium pasteurianum.
- Chromatium, Rhodospirillum, are photosynthetic nitrogen synthesising bacteria.
- Nostoc. sp occurs within the thalli of Blasia and Anthoceros (bryophytes), in Geosiphon pyreforme (a fungus), in the petioles of Gunnera (an angiosperm)
- Trifolium alexandrium (clover) contains Nostoc in its roots.

- Reddish colour of Red sea is due to a cyanobacterium Trichodesmium erythraeum.
- Death factors VFDF (very fast), FDF (fast), SDF (slow) are toxins produced by cyanobacteria.
- Biological nitrogen fixation has been discovered by Winogradsky .
- Some cyanobacteria may occur at very unusual places eg. 'Phormidium-hot water springs. Some have been reported from arctic and antarctic regions.
- The cells of certain bacteria like Aquaspirillum magnetotacticum contains structures composed of
- iron in the form of magnetite (FeJO4) which are called magnetosomes. They help in orientation among themselves along geomagnetic lines.
- Mycobacterium and Xanthomonas form nodules in leaves of Ardisia and Pavettla, while Frankia forms nodules in roots of Alnus and Casuarina.
- When gram positive bacteria are treated with lysozyme (found in egg white, secretion of skin and mucous membranes and tears). They are rapidly denuded of their cell walls and become naked protoplasts. While peptidoglycan of cell wall of Gram negative bacteria is protected by outer layer of lipo complex (it can ,be removed by ethylene diamine: tetra acetate or EDT A). So the cell wall of gram (-ve) bacteria is completely removed. Such only partially denuded cells are called 'sphaeroplasts'.
- Term protista was given by Emst Haeckel.
- Laveran (1880) discovered Plasmodium in erythrocytes.
- Ronald Ross (1897) found oocysts in the stomach of mosquito and transfer of parasite to second host.
- Flagellated cells are absent in red algae, higher seed plants and higher fungi.
- Proterosporangia is a colonial protozoan protist having choanocyte like flagellated and collared
- cells. It is a connecting link between protista and porifera.
- Auxospores are rejuvescent spores fonned in diatoms to correct the size which decreases with each binary fission.
- Some dinoflagellates such as Noctiluca are phosphorescent (bioluminescent). They make the sea
- surface glow in dark.

- E.coli is found as an endocommensal in the colon of about 50% of population.

EXERCISE

1. According to Linnaeus Bacteria is kept under
a) Plantae (b) Monera
(c) Protista (d) Animalia

2 Emst Haeckel included , in three kingdom system of classification
(a) Protista (b) Monera
(c) Fungi (d) Plantae

3 Five kingdom classification is based on
(a) Complexity of cell structure
(b) Complexity of cellular organization (c) Mode of nutrition
(d) All of these

4. In five kingdom classification number of kingdoms having eukaryotic organism are:
(a) 5 (b) 4 (c) 3
(d) 2

5 Cyanobacteria are included in
(a) Monera (b) Plantae
(c) Protista (d) Fungi

6. The smallest bacterium is
(a) Dialister pneumocintes
(b) Spirillum volutans
(c) Beggiatoa mirabilfs
(d) Epulopscium flShelsoni

7. Gram stain represents
(a) A technique for staining bacteria, developed by Christian Gram
(b) A stain got from Gram
(c) A cytochemical technique for differentiation of mitochondria (d) A trade name

8. Some bacteria have a capsule outside cell wall. It is made of
(a) Protein
(b) Cellulose (c) Fat
(d)Mucopolysaccharide

9. Bacteria having a tuft of flagella at both ends are called
(a) Peritrichous (b) Lophotrichous
(c) Amphitrichous (d) Atrichous

10. The bacterial genome is called
(a) Incipient nucleus (b) Genophore
(c) Nucleoid (d) All of these

11. In prokaryotes the ribosomes are
(a) 50 S (b) 80S (c) 70S (d) 30 S

12. Pasteurization is performed at
(a) 100°C for 15 minutes (b) 82°C for 30 minutes (c) 72°C for 20 minutes
(d) 62° for 30 minutes .

13. Milk is spoiled/femented by
(a) Rhizobium (b) Lactobacillus
(c) Azotobacter (d) Clostridium

14. Crown gall is due to
a) Agrobacterium
(c Mycobacterium
(b) Clostridium (d) Erwinia

15. Biogas is produced by
(a) Eubacteria
(b) Archaebacteria
(c) Mycoplasma (d) Cyanobacteria

16. An obligate anaerobe is
(a) Ulothrix (b) Spirogyra
(c) Methane bacteria
(d) Chlamydomonas

17 The tenn ' Protista ' was proposed by
(a) Copeland (b) E. Haeckel
(c) Whittaker (d) None of these

18. In protists the locomotory organelles are
(a) Flagella
(b) Flagella, cilia and pseudopodia
(c) Flagella and cilia
(d) Flagella, cilia, pseudopodia and wrigglers

19. The photosynthetic protists are
(a) Diatoms, Euglenoids and slime moulds
(b) Sarcodines, Dinoflagellates and Diatoms
(c) Euglenoids, Diatoms and Dinoflagellates
(d) Ciliates, Zooflagellates and Dinoflagellates

20. In Dinoflagellates, the two flagella are
(a) Anterior (b) Lateral
(c) Posterior (d) One transverse and the other vertical

21. Sea water glows during night due to occurrence of
(a) Gonyaulax (b) Noctiluca
(c) Euglena (d) Gymnodinium

22. Food reserve df Diatoms is
(a) Starch (b) Chrysolaminarin
(c) Paramylon (d) Glycogen

23. Reserve food in Euglena is
(a) Paramylum (b) Floridean starch
(c) Glycogen (d) Mannitol

24. Myxotrophic nutrition occurs in
(a) Paramecium (b) Euglena
(c) Plasmodium
(d) Amoeba

25. Which of the following is a cellular slime mould?

(a) *Dictyostelium* (b) *Fuligo*
(c) *Dictydium* (d) *Lycogala*

26. Decomposer protists are
(a) Sarcodines (b) Dinoflagellates
(c) Slime moulds (d) Diatoms

27. Father of modem mycology and plant pathology is regarded to (a) E. J. Butler (b) H. A. de Bary
(c) Alexopolous (d) None of these

28. Fungi differ from algae in being mostly
(a) Heterotrophic
(b) Autotrophic
c) Parasitic
(d) Epiphytic

29. Mycelium of *Albugo* is

(a) Intracellular (b) Intercellular
(c) Surface of host
(d) Surface of flower

30. Heterothallism was first discovered by
(a) Blakslee (b) K.C.Mehta
(c) Pasteur (d) Alexopolous

31. Common form of food stored in fungal cells is
(a) Starch (b) Sucrose
(c) Glucose (d) Glycogen .

32. Zygospores are produced in
(a) *Mucor* (b) *Penicillium*
(c) *Puccinia* (d) *Alternaria*

33. Penicillium is commonly known as
(a) Black mould
(b) Blue green mould
(c) Pin mould
(d) None of these

34. Fungi imperfecti (deuteromycetes) lack
(a) Spores
(b) Sexual reproduction
(c) Asexual reproduction
(d) Hyphae

35. Ari edible fungus is
(a) *Aspergillus*
(b) *Polyporus*
(c) Ustilago
(d) *Morchella*

36. To which Kingdom do liverworts ant mosses belong?
(a) Plantae
(b) Protista
(c) Monera
(d) None of these

37. Which of the following lack tissues?
(a) Bryophytes (b) Algae
(c) Pteridophytes
(d) Gymnosperms

38. Vascular system is absent in
(a) Algae (b) Bryophytes
(c) Both (a) and (b)
(d) Pteridophytes

39. Ingestive type of nutrition is present in
(a) Animals (b) Plants
(c) Fungi (d) Monera

40. Evemia, a lichen is used for
(a) Raising dough
(b) Retting
(c) Making Dhoop
(d) None of these

41. Which of the following are archaebacteria?
(a) Green sulphur(b) Methanogens
(c) Pseudomonas (d) Chlamydias

42. The bacteria (Clostridium botulinum) that cause botulism are
(a) Obligate aerobes
(b) Facultative anaerobes
(c) Obligate anaerobes
(d) Facultative aerobes

43. The bacteria (Treponema pallidum) that cause the veneral disease syphilis are
(a) Pseudomonads
(b) Purple nonsulphur bacteria
(c) Rickettsias (d) Spirochete

44. MAB stands for
(a) Man and biosphere

(b)Mammal & biosphere
(c) Man and biology
(d) Mammal & biology

45. Which of the following reduces soil fertility? (a) Nitrosomonas
(b) Nitrobacter
(c) Bacillus denitrificans
(d) Azotobacter

46. In bacteria the respiratory organelle is
(a) Mitochondria (b) Dictyosomes
(c) Mesosome (d) Vacuole

47. The filamentous bacteria are represented by
(a) Bacilli (b) Actinomycetes
(c) Spirilli (d) Cocci

48. A compound produced by one livillg organism and inhibits the growth of another organism is called
(a) Antiseptic (b) Antibiotic
(c) Antiallergic (d) Antibiosis

49. The gram positive bacteria in their cell wa.ll have
(a) 80% murein
(b) 60% proteins
(c) Lipids and proteins
(d) Cellulose only

50. Which of the following is not tile Characteristics of Monera?
(a) DNA is naked
(b) Vacuoles are absent in cytoplasm
(c) They are ubiquitous
(d) Reproduction is mainly through sexual reproduction

51. Which of the following bacteria is oxygenic ?
(a) Archaebacteria
(b) Cyanobacteria
(c) Actinomycetes
(d) Rickettsiae

52. Which of the following is not characteristic of Gram +ve bacteria
(a) Mesosomes are abundantly present
(b) Presence ofTeichoic acid
(c) Presence ofPili
(d) Usually non-pathogenic forms

53 Which of the following is not the characteristics of Archaebacteria
(a) They are most primitive bacteria
(b) Cell wall contains proteins and non cellulosic polysaccharides
(c) Can tolerate adverse condition like high temperature
(d) Presence of peptidoglycan

54. Which of the following is caused by mycoplasma?
(a) Witches Broom (b) Citrus canker
(c) Red stripe of sugarcane (d) Crown gall

55. Which of the following pigment is characteristic of dinoflagellates?
(a) Chlorophyll a& c
(b) Chlorophyll a& d
(c) Chlorophyll a& b
(d) Chlorophyll c & d

56. Capillitium is characteristic of
(a) Cellular slime moulds
(b) Acellular slime moulds
(c) Dinoflagellates
(d) Diatoms

57. The vegetative cell of diatoms is
(a) Haploid (b) Diploid
(c) Triploid (d) Tetraploid

58. Plasmodium of acellular slime moulds contains
(a) Haploid many nuclei
(b) Diploid many nuclei
(c) Diploid single nucleus

(d) Haploid single nucleus

59. A transparent siliceous shell of diatoms is called as

(a) frustule (b) Pusule

(c) Theca (d) Peridium

60. Which of the following is not true for both algae & fungi ?

(a) Presence of thallose plant body

(b) Lacking of vascular tissue

(c) Presence of chlorophyll

(d) No embryo fonnation

61. Compact web of mycelium in which individual hyphae cannot be distinguished ,

(a) Prosoplectenchyma
(b) Pseudoparenchyma
(c) Pseudomycelium
(d) True parenchyma

62. Which of the following is called *Drosophillr* of plant kingdom?

(a) *Neurospora*

(b) *Rhizopus*
(c) *Penicillium*
(d) *Aspergillus*

63. Which of the following group of fungi lack sexual reproduction?

(a) Ascomycetes (b) Basidiomycetes

(c) Deuteromycetes (d) Phycomycetes

64. Sexual reproduction in fungi in which two vegetative cells take over the sexual function and fuse together is

(a) Somatogamy

(b) Spermatization

(c) Gametangial contact

(d) Gametangial copulation

65. Solution of volutin in vacuole of yeast contains

(a) RNA + lipoproteins

(b) RNA + lipoproteins + polymetaphosphates (c) Lipids + Glycogen

(d) Lipoproteins + polymetaphosphates

66. Antibody like substance produced by host cell after infection of fungi is

(a) Antibiotic

(b) Insecticide

(c) Phytoalexins

(d) Antitoxin

67. Planogametic copulation refers to

(a) Fusion of motile gametes of opposite strains

(b) Fusion of motile gametes of similar strains

(c) Fusion of hyphae without simultaneous nuclear fission

(d) None of these

68. Pseudomycelium is characteristic feature of

(a) Rhizopus (b) Mucor
(c) Blue mould (d) Yeast

69. Copulation between mother cell and daughter cell in yeast is called

(a) Adelphogamy (b) Pedogamy
(c) Parthenogamy (d) Apomixis

70. Some fungi like Taphrina are dimorphic in forms i.e. . (a) It is unicellular & yeast like form in host

(b) Filamentous form in soil as saprophytes

(c) Filamentous form when grown in labculture

(d) All of these

71 Nonmotile sporangiospore is

(a) Aplanospores (b) Zoospores
(c) Arthrospore
(d) Conidiosporse

72. Asexual spores having highly organised protective structure called fruiting bodies is
(a) Acervulus (b) Perithecium (c) Apothecium (d) All of these

73. Jams and Jellies are usually contaminated by fungus rather than bacteria because
(a) Bacterial cell cannot attach to Jam & Jelly
(b) Fungi grow more in anaerobic condition
(c) Anaerobic condition is produced where no any bacteria can grow
(d) Fungi grow in high sugar concentration

74. Which of the following is asexual spore in fungi
(a) Ascospores (b) Basidiospores (c) Zygospores (d) Blastospores

75. Fungi is sensitive to which of the following?
(a) Penicillin (b) Tetracycline
(c) Griseofulvin (d) Chloramphenicol

76. Saccharomyces can be seen growing on the surface of Grapes because
(a) It gets sugar from the grape
(b) It gets Nitrogen from the grape
(c) It gets sulphur from the grape
(d) All of these

77. Large yeast cell in Saccharomyces cerevisiae are
(a) Haploid (b) Haploid & rounded
(c) Diploid (d) Diploid & oval

78 Puccinia graminis is a macrocyclic fist because
(a) Five types of spores are produced in two different hosts
(b) Five types of spores are produced in single host
(c) Four types of spores are produced in single host
(d) Four types of spores are produced in two different host

79. Aseptate club shaped fertile cells called basidia in Agaricus is found in
(a) Sub-hymeniumlayer (b) Hymenium layer
(c) Trama (d) None of these

80. Structure of Lichen
(a) Resembles with algal partner
(b) Resembles with fungal partner
(c) Intetn1ediate between Algal & fungal Partner
(d) Have distinct structure different from algal and fungal partner

81 Lichens growing on bark of trees are
(a) Saxicaulous lichens
(b) Corticaulous lichens
(c) Terricaulous lichens
(d) None of these

82. Which of the following is not true about lichens?
(a) Lichens can grow in adverse habitat where plants cannot grow
(b) Lichens can grow on base rocks
(c) Lichens can grow on arctic regions
(d) Lichens can grow near big cities

83. Lichens which are tinyplants and attached to substratum by disc is
(a) Crustose lichens (b) Foliose lichens
(c) Fructicose lichens (d) None of these

84. Structure analogous to. stomata of higher plants is
(a) Cyphellae
(b) Cephalalodia
(c) Breathing pores (d) Isidia

85. Asexual reproduction in lichen is by
(a) Ascospore (b) Sporangiospore
(c) Basidiospore (d) Pycnidiospores

86. Ascolichens in which the fruiting body is apothecium it is called
(a) Pyrenocarpae (b) Gymnocarpae
(c) Ascocarpae (d) Basidiolichens

87. Lichen represent symbiotic relationship between
(a) Algae and fungi
(b) Viruses and algae (c) Algae & bacteria

(d) Viruses and bacteria

88. Lichen used as laxative is

(a) *Cetraria* (b) *Xanthoria parietina* (c) *Peltigera canina* *(d) None of these*

89. Which of the following is pioneer in xerosere

(a) Foliose lichens (b) Crustose lichen
(c) Fruticose lichens (d) None of these

90. Which of the following denotes the name of Amsvirus

(a) ARV (b) LAV (c) HIV (d) All

91. Infectious agent which js smaller than virus and having no protein coat is

(a) Virion (b) Viroids
(c) Prions (d) Mycophages

92. Tobacco mosoic virus is having

(a) Helical symmetry (b) Cubical symmetry
(c) Bisymmetry (d) Spherical

93. Bacterial cell which are having prophages inside them is

(a) Lysogenic bacteria (b) Lytic bacteria
(c) Both (a) and (b) (d) None of these

94. Which of the following is true about virus:

(a) Having well developed en~me system
(b) Having RNA or DNA as generic material
(c) These can be facultative parasite also
(d) All of these

95. The shape of rabies virus is

(a) Icosehedral (b) Bullet shaped
(c) Tadpole shaped (d) Brick shaped

96. Which of the following has single strand DNA

(a) T2 phage (b) T4 phage
(c) *S/3* E. coli phage (d)

97. Single-stranded RNA virus called retrovirus is

(a) Influenza virus (b) Rous sarcoma Virus
(c) Poliomyelitis virus (d) Aids virus

98. Which is the correct sequence of' multiplication in Bacteriophage in bacteria cell

(a) Penetration absorption replication lysis
(b) Absorption penetration lysis replication
(c) Absorption penetration replic8.tiol'1 lysis
(d) Penetration replication absbrption lysis

99. Protein molecule multiplication is

(a) Interferons (c) Prions
(b) Viroids (d) None of these

100. Coliphage contain

(a) RNA (b) DNA
(c) RNA or DNA (d) RNA as well as DNA

101. Citrus exocortis is caused by

(a) Mycophage (b) Viroids
(c) Prions (d) Cyanophages

102. Mycophages have

(a) ssRNA (b) dsRNA
(c) ssDNA (d) dsDNA

103. In the structure of bacteriophage, nucleic acid is present in

(a) Head (b) Collar (c) Neck (d) Tail

104. The virus that infects bacteria are made up of

(a) DNA only (b) RNA only

(c) Protein only (d) Both (a) and (c)

105. The intact virus unit or infectious particle is called:

(a) Capsomere (b) Virions (c) Bacteriophage(d) Muton

106. Interferon are

(a) Antiviral protein

(b) Complex protein

(c) Antibacterial protein

(d) Anticancer protein

107. The plant viruses that multiply within their insect vectors are called

(a) Nar persistent (b) Persistent

(c) Propagative (d) Circulative

108. Which of the following is not a viral disease (a) AIDS (b) Leprosy

(c) Ascariasis (d) Polio

109. Bacteria were regarded to be plants because (a) Some of them are green

(b) They are present everywhere (c) Some of them cannot move (d) They have a rigid cell wall

110. If a bacterium cell divides in every 20 minutes, how many bacteria will be formed in two hours?

(a) 4 (b) 16 (c) 8 (d) 64

111 .A peculiar amino acid present in bacterial cell wall is

(a) Glutamate (b) Alanine (c) Diaminopimelic acid (d) Aspartate

112. Bacteria and other Monerans do not posses

(a) Ribosomes (b) Mitochondria

(c) Plasma membrane (d) Nucleoid

113. In bacteria the site for respiratory activity is found in

(a) Episome (b) Microsome

(c) Ribosome (d) Cell membrane

114. Genophore or nucleoid is made up of

(a) Histones

(b) RNA and non histones

(c) A single double stranded DNA

(d) A single stranded DNA

115. In bacteria, sex is determined by presence of

(a) Pili (b) Episome (c) Mesosome (d) Flagella

116. Which of the following is not a bacteria.} aqtion?

(a) Nitrogen fixation (b) Emulsification of fat

(c) Sewage disposal (d) None of these

117. Of the following processes the one carried out only by bacteria is

(a) Maturing of cheese

(b) Synthesis of antibiotics

(c) Formation of humus

(d) Synthesis of vitamin K in the intestine

118. Typhoid is caused by

(a) Xanthomonas typhosus (b) Bacillus dysenteriae

(c) Salmonella typhi (d) Bacillus diplococcus

119. Streptomycin is produced by

(a) Streptomyces griseus (b) Streptomyces scoleus

(c) Streptomyces fradie

(d) Streptomyces venezuelae

120. Food poisoning is caused by

(a) Clostridium botulinum

(b) *Salmonella typhosa*
(c) *Clastridium tetani* .
(d) None of these

121. Terramycin is obtained from
(a) *Streptomyces ramosus*
(b) Streptomyces grise us
(c) *Streptomyces venezuelae*
(d) Streptomyces aurefaciens

122. The fixation of free nitrogen is done by bacteria
(a) *Azotobacter* *(b) Rhizobium*
(c) *Bacillus subtilis* *(d) Both (a) and (b)*

123. Among the following which one is recently discovered non legume nitrogen fixing bacterium?
(a) *Azotobacter* (b) *Rhizobium*
(c) Nitrosomonas (d) *Spirillum*

124. *Acetobacter aerogens* can degrade
(a) Petroleum wastes (b) 2,4-D
(c) DDT (d) Antibiotics

125. A number of organic compounds can be decomposed by
(a) *Pseudomonas* *(b) Mycoplasma*
(c) Chemolithotrophs (d) *Azotobacter*

126. Nitrogen fixing aerobic, photosynthetic and Gram (-) bacteria are
(a) Archaebacteria (b) Cyanobacteria (c) Chlorobacteria (d) Rickettsiae

127. Blue colour qfblue green algae is due to (a) Phycocyin and allophycocyanin
(b) Phycoerythrin
(c) Anthocyanin (d) Fucoxanthin

128. Chromoplasm refers to
(a) Cytoplasm rich in chloroplasts
(b) Cytoplasm having photosynthetic pigments
(c) Peripheral thylakoid rich part of cyanobacteria
(d) Inner thylakoid rich part cyanobacterial cell

129. Common mode of multiplication cyanobacteria is by
(a) Heterocyst (b) Exospore
(c) Hormogone (d) Trichome

130.. Red sea is named after the abundallt occurrence of
(a) *Trichodesmium erythraeum*
(b) Chlamydomonas nivalis
(c) Gonyaulax species
(d) Rhodymenia

131. Most common nitrogen cyanobacterium of paddy fields is .
(a) *Cylindrospermum* (b) *Aulosira*
(c) Oscillatoria (d) *Nostoc*

132. Sexual reproduction does not occur in
(a) *Nostoc* (b) *Riccia*
(c) *Ulothrix* (d) *Rhizopus*

133. A protein rich organism is
(a) Spirulina (b) *Chlamydomonas*
(c) *Ulothrix* (d) *Oedogonium*

134. A free living as well as symbiotic nitrogen
fixing prokaryote is
(a) *Spirulina* (b) *Anabaena*
(c) *Oedogonium* (d) *Cladophora*

135. The group of bacteria devoid of peptidoglycan in its wall is
(a) Archaebacteria (b) Cyanobacteria
(c) Eubacteria (d) Nostocales

136. For production of methane. Methanogens
(a) Oxidize CO2 (b) Reduce CO2
(c) Reduce alcohol (d) Oxidize alcohol

137. Cell membranes contain branched lipids in
(a) Actinomycetes (c) Eubacteria
(b) Spirochaete (d) Archaebacteria

138. Cellulose present in the food of grazing animals, is
(a) Digested by intestinal bacteria
(b) Digested by animal itself
(c) Digested partly by the animal and partly by bacteria
(d) Passed out undigested

139. Prokaryotes that can trap solar energy for A TP synthesis but not for photosynthesis are
(a) Methanogens (b) Thermoacidophiles (c) Halophiles
(d) Cyanochloronta

140. Carotenoids present in cell membranes of halophiles provides
(a) A mechanism of facultative photosynthesis
(b) Protection against intense radiations
(c) Photoperception
(d) A mechanism of A TP synthesis

141. Red oceanic tides can be due to
(a) Diatoms (b) Dinophyceae
(c) Red algae (d) Blue green algae

142. The organisms showing characters intermediate between prokaryotes and eukaryotes are
(a) Diatoms (b) Cyanobacteria
(c) Dinoflagellates (d) Archaebacteria

143. Diatoms lack flagella and float in water due to the presence of
(a) Lipids stored in them as food reserve
(b) Air sacs formed inside the cell
(c) Silica in the cell wall (d) None of these

144. A protistan that is commonly called plant animal is
(a) *Navicula* (b) *Noctiluca*
(c) Vorticella (d) *Euglena*

145. The flagellum in *Euglena* is made up of
(a) Desmosomes (b) Microtubules
(c) Microfilaments (d) Spindic fibres

146. Cellular slime moulds are believed to be
(a) Advanced protists (b) Primitive fungi
(c) Both (a) and (b) (d) Neither(a)nor(b)

147. The fructification in cellular slime moulds is known as
(a) Sporophore (b) Sporocarp
(c) Peridium (d) Plasmodium

148. Pseudoplasmodum is
(a) A multinucleate structure formed by union of cellular slime moulds
(b) False foot of *Amoeba*
(c) Pseudopodia of *Plasmodium* ,
(d) None of these

149. Which of these are called communal slime moulds
(a) Acellular slime moulds
(b) Cellular slime moulds (c) Both (a) and (b)
(d) Neither (a) nor (b)

150. On germination, each spore of cellular slime moulds gives out
(a) Promycelium (b) Germ tube
(c) Myxamoeba (d) Zygosporangium

151. All heterotrophs require an environment that can provide
(a) Nitrates in solution (b) Organic compounds
(c) Ammonium salt (d) Vitamin A

152. The hyphae of *Aspergillus* are
(a) Aseptate and multinucleate
(b) Septate and multinucleate
(c) Aseptate and uninucleate
(d) Septate and uninucleate

153. When thallus of fungus entirely converts b reproductive body, it called as
(a) Eucarpic (b) Holocarpic
(c) Holozoic (d) Homothallic

154. Fungal spores produced asexually at the tip of hyphae are called

(a) Sporangiospores (b) Arthrospores
(c) Conidia (d) Spores

155. Conidia of *Penicillium* are arranged
(a) Irregularly (b) Acropetally
(c) Basipetally (d) Intercalary .

156. In yeast during budding which of the following processes occurs?
(a) Synapsis (b) Unequal division of cytoplasm
(c) Doubling of chromosomes
(d) Spindle formation

157. A fungus contains cells with two nuclei from
different genomes. The nuclei do not fuse but divide independently and simultaneously as new cells are fonned. It belongs to
(a) Phycomycetes (b) Zygomycetes
(c) Deuteromycetes (d) Basidiomycetes

158. Dikaryon fonnation is characteristic of
(a) Ascomycetes and Basidiomycetes
(b) Phycomycetes and Basidiomycetes
(c) Ascomycetes and Phycomycetes
(d) Phycomycetes and Zygomycetes

159. Irish famine is related to a disease of potato called
(a) Late blight of potato (b) Early blight of potato
(c) Dry rot ofpotato (d) Wart of potato

160. Which one secretes pheromones for the
function?
(a) *Rhizopus* for fomation of zygospore
(b) All fungi for sexual reproduction
(c) Yeast for mating
(d) Plants for growth and development

161. Yeast produces an enzyme complex that is responsible for fomentation. The enzyme complex is
(a) Aldolase (b) Dehydrogenase
(c) Invertase (d) Zymase

162. The reserve food material in the members of Kingdom plantae is mostly
(a) Starch (b) Fat
(c)Glycogen (d) None of these

163. An embryo stage is absent in
(a) Mosses (b) Ferns
(c) Algae (d) None of these

164. The Kingdom Animalia comprises the animals, except
(a) Sponges (b) Protozoans
(c) Both (a) and (b) (d) None of these

165. Reindeer's moss is 1
(a) *Cladonia* (b) *Marchantia*
(c) Funaria (d) *Selaginella*

166. Litmus is obtained from
(a) *Rocella* (b) *Cladonia*
(c) *Usnea* (d) *Letharia* .

167. A plemorphic bacterium is
(a) *Acetobacter* (b) *Bacillus*
(c) *Rhizobacter* (d) *Azotobacter*

168. Photosynthetic monerans are
(a) Eubacteria (b) Rickettsias
(c) Myxobacteria (d) Halophiles

169. Little leaf ofBrinjal is caused by
(a) Bacteria (b) Mycoplasma I
(c) Actinomycetes . (d) Cyanobacteria

170. Mycoplasma differ from viruses in being sensitive to
(a) Penicillin (b) Tetracyclines
(c) Both (a) and (b) (d) Sugars

171. Blue-green alga responsible for red colour o red sea is
(a) *Nostoc* (b) *Trichodesmium*
(c) *Cephareuros* (d) *Anabaena*

172. Water blooms are caused by
(a) Bacteria (b) Mycoplasma

(c) Blue-green algae (d) None of these

173. Mad cow disease is caused by a
(a) Virus (b) Bacteria
(c) Mycoplasma (d) Prion

174. 'Potato spindle tuber' is a disease caused by
(a) Prions (b) Viroids
(c) Mycoplasma (d) Virus

175. Trachoma, a common eye disease is caused by a
(a) Bacteria (b) Virus
(c) Chlamydia (d) Rickettsia

ANSWERS

1.	(1)	36.	(1)	71.	(1)	106.	(1)	141.	(2)
2.	(1)	37.	(2)	72.	(1)	107.	(3)	142.	(3)
3.	(4)	38.	(3)	73.	(4)	108.	(2)	143.	(1)
4.	(2)	39.	(1)	74.	(4)	109.	(4)	144.	(4)
5.	(1)	40.	(3)	75.	(3)	110.	(4)	145.	(2)
6.	(1)	41.	(2)	76.	(4)	111.	(3)	146.	(3)
7.	(1)	42.	(3)	77.	(4)	112.	(2)	147.	(2)
8.	(4)	43.	(4)	78.	(1)	113.	(4)	148.	(1)
9.	(2)	44.	(1)	79.	(2)	114.	(3)	149.	(2)
10.	(4)	45.	(3)	80.	(4)	115.	(3)	150.	(3)
11.	(3)	46.	(3)	81.	(2)	116.	(2)	151.	(2)
12.	(4)	47.	(2)	82.	(4)	117.	(4)	152.	(2)
13.	(2)	48.	(4)	83.	(4)	118.	(3)	153.	(2)
14.	(1)	49.	(1)	84.	(1)	119.	(1)	154.	(3)
15.	(2)	50.	(4)	85.	(4)	120.	(1)	155.	(3)
16.	(3)	51.	(2)	86.	(2)	121.	(1)	156.	(2)
17.	(2)	52.	(3)	87.	(1)	122.	(4)	157.	(4)
18.	(2)	53.	(4)	88	(1)	123.	(1)	158.	(1)
19.	(3)	54.	(1)	89.	(2)	124.	(3)	159.	(1)
20.	(4)	55.	(1)	90.	(4)	125.	(1)	160.	(1)
21.	(2)	56.	(2)	91.	(2)	126.	(2)	161.	(4)
22.	(2)	57.	(2)	92.	(1)	127.	(1)	162.	(1)
23.	(1)	58.	(2)	93.	(1)	128.	(3)	163.	(3)
24.	(2)	59.	(1)	94.	(2)	129.	(3)	164.	(2)
25.	(1)	60.	(3)	95.	(2)	130.	(1)	165.	(1)
26.	(3)	61.	(2)	96.	(3)	131.	(2)	166.	(1)
27.	(2)	62.	(1)	97.	(4)	132.	(1)	167.	(4)
28.	(1)	63.	(3)	98.	(3)	133.	(1)	168.	(1)
29.	(2)	64.	(1)	99.	(1)	134.	(2)	169.	(2)
30.	(1)	65.	(2)	100.	(2)	135.	(1)	170.	(2)
31.	(4)	66.	(3)	101.	(2)	136.	(2)	171.	(2)
32.	(1)	67.	(1)	102.	(2)	137.	(4)	172.	(3)
33.	(2)	68.	(4)	103.	(1)	138.	(1)	173.	(4)
34.	(2)	69.	(2)	104.	(4)	139.	(3)	174.	(2)
35.	(4)	70.	(4)	105.	(2)	140.	(2)	175.	(3)

CHAPTER -3
THE CELL-A UNIT OF LIFE

Cytology (Greek: Kytos -cell + Logos –study) in the branch which comprises the study of cell structure and function.

- **All living organism** : (Plants and animals) are composed of repeated structural units called cells. Each cell independent in performing all necessary processes of life and is the least complex unit of matter which can be called living.
- **Robert Hooke** (1665) discovered hollow cavities in a thin piece of bottle cork under very light microscope and the term cell. (Latin, Cella, hollow cavity) has been given to these cavities by him. Actually these so called cells were cell walls and original photographs of these are present in **'Micrographia'.**

- **Grew and Malpighi** observed some hollow cavities surrounded by cellulosic walls in different materials. i.e., actual cells. Leeuwenhoek (1674) observed free cells with an improved microscope and upto some extent observed the internal organization of the cells.

CELL THEORY

- H.J.Dutrochet (1824) a French worker gave the idea of cell theory. He boiled Mimosa in nitric acid and separated the cells.

- Actual credit of the cell theory goes to two Germans a botanist Schleiden and a zoologist T .Schwann (1839). The concept the " All living organisms are composed of cells" is known as cell theory .
- R. Virchow (1859) extended this theory and said "Omnis cellula e cellula", i.e. all cells arise from the pre-existing cells.

Main Components of cell theory

(i) All living beings are composed of cells.
(ii) All cells arise from the pre-existing cells
(iii) All cells are basically similar in chemical composition and metabolism.
(iv) All living beings function because of the activities and interaction of these cells.

Exceptions to the cell theory

- **Viruses are** an **exception to the cell theory** as **they are obligate parasites (subcellular in nature). Paramoecium, Rhizopus,** Vaucheria **are some examples which mayor may not be exceptions to the cell theory** .

SIZE. NUMBER. SHAPE AND **TYPE OF CELLS**

Cell size: Generally the cell size range between 0.2- 20 µ

- The smallest cell so for observed in considered to be ofPPLO (pleuropneumonia like organism) or Mycoplasma gallisepticum, i.e., 0.1μ

- The largest cell is an egg of ostrich which measures as much as 6 inches in diameter with shell and 3 inches without shell.

- The bacteriophage or viruses are still smaller in size (but cannot be considered as cells because of sub-cellular nature).

- Acetabularia, a unicellular green alga is about 10cm in length
- In the alga caulerpa (Siphonales) the length of cell may be upto one metre.
- Fibres of ramie are about 50-55 cm long.
- **In** animals nerve fibres are the longest, upto 90 cm to few metres.

Some important aspects

- Metabolically active cells are smaller in size.
- Cell size directly Proportionar to chromosome number.
- Cell of a particular type have almost same volume.

Cell Number: There is a wide range in number of cells ranging from a single cell in unicellular organisms to indefinite cells in multicellular forms

- Unicellular organisms have single cell, e.g., yeast, diatoms, etc
- In multicellular organisms, number is not definte i.e., a man of 80 kg has about 60 thousand billion cells.
- In green alga Pandorina, the colony is having a fixed number of cells(8, 10 or 32). Eudorina, another green alga, has a colony of(16, 32 or 64) cells.

Cell shape

There is great variability in cell shape, i.e., spherical polygonal, disc-like, etc. Individual cells are generally ball-like (spherical) but due to mutual pressure they become polyhedral.

- Shape of the cell sometimes changes because of the function, e.g., Amoeba and Leucocytes etc.

Types or cells

Depending upon the nature of the nucleus, cells are of two types

(i) Prokaryotic cells: (Greek: Pro-primitive + Karyon- nucleus)

Here primitive or ill defined or incipient nucleus is present e.g., in bacteria, blue-green. algae (myxophyceae or cyanophyceae or cyanabacteria) and PPLO (pleuropneumonia like organisms) or mycoplasma i.e., akaryobionta.

- The most extensively studied prokaryote is E.coli (Escherichia coli), a commonbacterium found in. intestine of human beings.

(ii) Eukaryotic cells (Greek: Eu-good or well + Karyon -nucleus).

Cells with true or well defined nucleus with membrane are eukaryotic cells, e.g., higher plants and animals (karyobionta).

- Prokaryote and eukaryote terms were given by Chatton.
- In members of class Dinophyceae of algae (e.g., Desmocapsa, Desmomastix, Dinophyss, Heterocapsa, Dinothrix, etc.), there is present an intermediate type of cell organization called Mesokaryotic. Here, there is a present a true or eukaryotic nucleus with definite nuclear membra11e and chromosome (eukaryotic characters), but chromosomes are not well organized as basis proteins or histones are absent (prokaryotic feature).

- Clear optically homogeneous fluid part of cytoplasm after removal or organelles or particulate component is called Cytoplasmic Matrix or Cytosol or Hyaloplasm or Groundplasm. It is made of 90% water in which different substances(like proteins, enzymes starch, fat, minerals, etc.) are present in the form of true solution and colloidal solution

.

DIFFERENCES BETWEEN PROKARYOTIC AND EUKARYOTIC CELL

Sr.no	PROKARYOTIC	EUARYOTIC
1.	Nuclar membrance or envelop is absent	Nuclear membrance is present
2.	DNA is naked i.e. not combined with protine Histones are altogether absent.	DNA is combined with proteins (histones as well as protein. non-histones).
3.	Single naked chromosome is present is Prokaryotes.	Multiple chromosomes are present
4.	Nucleolus is absent.	Nucleolus is present
5.	Ribosomes are of 70S type (50S + 30S)	Ribosomes are of 80,S type (60S + 40S).
6.	Mitochondria are absent (respiratory enzymes on plasma membrane).	Mitochondria are present.
7	Endoplasmic and endocytosis are absent	These all are present
8.	Exocytosis and endocytosis are absent.	Both are present
9.	Flagellum single standed i.e. only one fibril is present	Generally 9 + 2 pattern is present.
10.	Cell size is 100-2,000 nrn(1000 Å - 10,000-20,000Å	10,000-1,00,000 nm

Endoplasmic reticulum, mitochondria, ribosomes, golgi compled, lysosomes etc)

PROTOPLASM (= **BIOPLASM)**

- The presence of protoplasm is the most important characteristic of living organism.
- It is a distinctive material found only in living beings.
- All life activities takes place in it.
- Huxley (1863) called it "Physical basis of life".
- Every individual has a distinctive type of protoplasm.
- 'Protoplasm theory' proposed by **Max Schultze** in 1861. According to this, "Cell is and accumulation of living substance (or protoplasm) which is limited by an outer membrane and possess a nucleus".

PLASMA MEMBRANE
(CYTOPLASMIC MEMBRANE OR PLASMALEMMA)

- I t is selectively permeable thin film like covering membrane of a cell.
- Beside plasma membrane, in eukaryotic cells a intracellular membrane is present which surround the vacuole and organelles.

- Danielli and Davson (1935) proposed a trilamellar model, states that the plasma membrane is formed of a bimolecular layer of phospholipids (35A thick) sandwitched between two layers ()f proteins (each 20A) thick).
- Robertson (1959) proposed 'Unit membrane model'.
- Singer and Nicolson (1972) put forward the 'Fluid mosaic model' of membrane structure.
- Main function is to regulate the flow of material into and out side the cell and diffusion of O_2 and CO_2

CYTOPLASM

- **It** is part of protoplasm lies between plasma membrane and nucleus.
- **It** is not a structureless mass of protoplasm. Instead, it is highly organized structure being having different cell organelles.
- **It** is ajelly like fluid.
- Helps in the intracellular distribution of nutrients, metabolites and enzymes.

CELL WALL

- Cells of most fungi, prokaryotes (bacteria and blue-green algae) and plants (except gametes) are surrounded by a wall.
- In animals, cell wall is absent.
- In true bacteria and cyanobacteria, cell wall is of peptidoglycan while in some fungi it is of chitin in most of the algae and higher green plants it is of cellulose.

CELL ORGANELLES
MITOCHONDRIA
(Gk. *mitos* = thread; *chondrion* = granule)

- Altmann (1890) found them to be granules and called bioplast.
- C. Benda (1897) coined the term mitochondria first time.
- It plays significant role in respiration.
- Plant cells have fewer number of mitochondria as compared to animal cell.
- Outer membrane is separated from the inner membrane bya space -perichondrial space (6-10 DDl wide).
- Cristae -Inner membrane is folded and projected into a number of finger like structure called cristae.
- They are semi-autonomus organelles. They contain DNA, m-RNA, ribosomes and able to synthesized own protein.
- It is power house of cell, as oxidation of fuel occurs stepwise in it resulting in the release of chemical energy (A TP).
  01ATP=7.3kcal

Hint: @ 50 kca l=˜210 KJ

ENDOPLASMIC RETICULUM

- It is a membrane", bound intercommunicating of ,channels consisting cisternae, vesicles and narrow fluid filled tubules.
- It is two types.
  (i) Smooth Endoplasmic Reticulum (SER) with ribosomes, not take part in protein synthesis.
  (ii) Rough endoplasmic Reticulum (RER) with ribosomes, take part in protein synthesis.

RIBOSOMES

- Very minute organelles could be seen through electron microscope only.
- Discovered and named ribosome by Palade (1955).
- Two basic types of ribosomes are 70S types and 80S type.
- 70S ribosomes are found in prokaryotic cells, mitochondria and plastids of eukaryotic cell and consists of 50S (larger) and 30S (smaller) subunits.
- 80S ribosomes are present in cytoplasm of eukaryotic cell and consist of 60S (largest) and 40S (smaller) subunits.
- It provides space as well as enzyme for the synthesis of protein in a cell, hence called protein factories.

LYSOSOMES

(Gk. *lysis* = splitting, *soma* = body)

- Commonly called suicidal bags.
- Single membraned, spherical, tiny sacs like body.
- Most common in eukaryotic cells but abundantly found in animal cells exhibiting phagocytic activity .
- Discovered by Christian de Duve in 1955.
- Lysosomes are reservoirs of hydrolytic enzymes (about 40).
- Helps in the digestion of material taken in by endocytosis.

GOLGI BODIES(GOLGICOMPLEX)

- Complex organization of net like tubller and Surrounded by smaller spherical vesicles.
- Discovered by **Camillo Golgi** in 1898 and got Nobel prize.
- Mainly present in eukaryotic cells abundantly found in secretion cells.
- The Golgi apparatus plays an important role in the formation of lysosome, acrosome of sperms, formation of yolk and storage of secretion, formation of melanin secretion of hormones (insulin).

NUCLEUS

- Every eukaryotic cell consist of at lest one, almost spherical, dense, highly specialized structure called as nucleus. {Exceptions - Sieve tube element of mature phloem, RBCs of mammals).

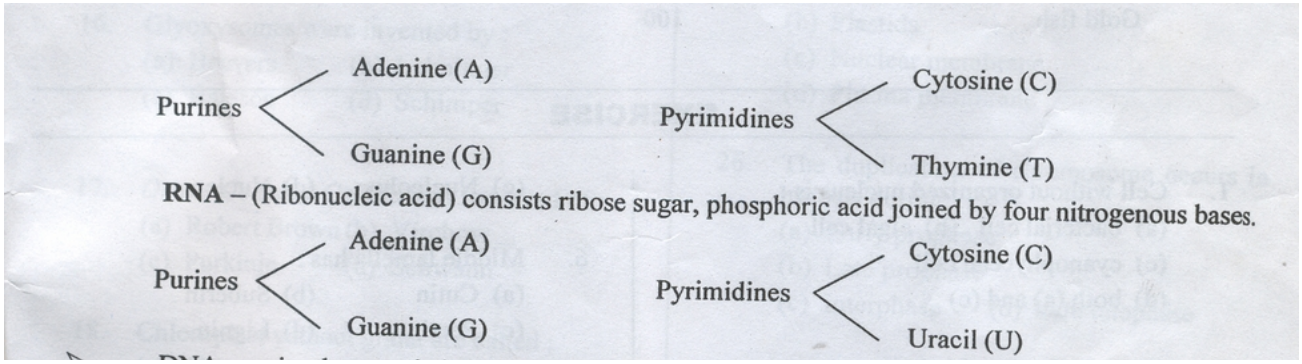
- Discovered by Robert Brown.
- Contains nuclear sap or nucleoplasm, nuclear envelope, chromatin and nucleolus.
- Chemically nucleus consists of 80% proteins, 20% DNA, 5% RNA and 3% lipids.

- It is the vehicle of heredity as it contain the genetic information for reproduction, development metabolism as well as behaviour of organism.

NUCLEIC ACIDS

- Nucleic acid are complex carbonic acid and most important macromolecules of cell.
- They consist of units called nucleotides, joined end to end by hydrogen bonds to form long chains.
- Nucleotides -Sugar + Nitrogenous base + Phosphate group.
- Nucleosides -Sugar + Nitrogenous base.
- Two nucleic acids are :

DNA –(Deoxyribonucleic acid) consists pentose sugar deoxyribose, phosphoric acid and nitrogenous base.



- DNA carries the genetic information of cell and controls the structure and function of the cell.
- In some viruses RNA is genetic material. RNA is of three types i.e., m-RNA, t-RNA and r-RNA
- Nucleolus takes part in the production of ribosomes.

CHROMOSOMES

- Chromatin material which is found in the interphase nucleus condensed at the time of division into small and thick thread called chromosome.
- Waldeyer (1888) coined the term chromosome.
- Sutton and Boveri (1902) proved that chromosome is physical basis of heredity.

- Chromosome has a centromere and arms.
- Chromosome number for a species remains always be same. It is diploid (2n) in somatic cell and haploid (n) in gametes.

Organism		Chromosome No.
Round worm	—	2
Mosquito	—	6
Garden pea	—	14
Onion	—	16
Maize	—	20
Rice	—	24
Frog	—	26
Sunflower	—	34
Mouse	—	40
Rat	—	42
Human beings	—	46
Potato	—	48
Dog	—	64
Pigeon	—	80
Gold fish	—	100

EXERCISE

1. Cell without organized nucleus is
(a) bacterial cell (b) algal cell
(c) cyanophycean cell
(d) both (a) and (c)

2. Size of mitochondria is :
(a) 5-15μ (b) 1-10μ
(c) 50- 150 μ (d) 75- 400μ

3.Who proposed cell theory?
(a) Robert Hooke (b) Robert Birown
(c) Schleiden and Schwann (d) Watson and Crick

4. Extra nuclear DNA is found in :
(a) Chloroplast (b) Mitochondria
(c) Cytoplasm (d) Both (a) and (b)

5. Cell activities are controlled by:
(a) Chloroplast (b) Mitochondria
(c) Nucleolus (d) Nucleus.

6. Middle lamella has :
(a) Cutin (b) Suberin
(c) Pectin (d) Lignin

7. Unit of starch and cellulose is :
(a) Amino acid (b) Glycerol
(c) Fructose (d) Glucose

8. 80S ribosome have subunits of :
(a) 70S + lOS (b) SOS + 30S
(c) 60S +40S (d) 60 S + 20 S

9. Mitochondria are absent in:
(a) Nostoc (b) Clostridium
(c) Gleotricha (d) All the these

10. Smallest plant cell is of :
(a) Virus (b) Bacteria
(c) Gleotricha (d) All of these

11.Cellulose is used as food by:
(a) Man (b) Microbes
(c) Animals (d) Both (a) and (b)

12. Oxysomes are found in :
(a) Cell (b) Cytoplasm (c) Mitochondria
(d) Microsome

13. Cell plate is fonned by:
(a) Lipochondria (b) Chondriosome
(c) Mitochondria (d) Microsome

14 . Pigment absent in
(a) Chlorophyll (c) Xanthophyll
l chloroplast is : (b) Carotene
(d) Anthocyanin

15. Cristae are related with :
(a) Photosynthesis (b) Protein synthesis

(c) ATP synthesis(d) Fat synthesis

16. Glyoxysomes were invented by:
(a) Beevers (b) Lehninger (c) Bateson
(d) Schimper

17. Omnis Celluls e Cellula was the word of
(a) Robert Brown (b) Virchow
(c) Purkinje (d) Schwann

18. Chloroplast without grana are called : (a) Chromoplast (b) Leucoplast
(c) Chloroplast (d) Chromatophore

19. The power house of cell is :
(a) Nucleus
(b) Endoplasmic reticulum
(c) Mitochondria
(d) Chloroplast

20. Cell organelles are embedded in :
(a) Cytoplasm (b) Protoplasm
(c) Nucleolus (d) Mitochondria

21. Synapsis occurs during :
(a) Meiosis (b) Amitosis
(c) Mitosis (d) Cytokinesis

22. Pachytene occurs during (a) Meiosis (b) Mitosis
(c) Free cell formation (d) Budding

23. Chiasmata fonnation occurs during : (a) Leptotene (b) Zygotene (c) Pachytene (d) Diplotene

24. The nuclear membrane disappear in mitosis, at :
(a) Metaphase (c) Anaphase
(b) Late prophase (d) Early prophase

25. The cellular structure which always disappear during mitosis is :

(a) Mitochondria (b) Plastids
(c) Nuclear membrane
(d) Plasma membrane

26. The duplication of chromosome occurs in mitosis during :
(a) Early prophase (b) Late prophase
(c) Interphase (d) Late telophase

27. Karyokinesis mean division of
(a) Nucleus into two
(b) Cytoplasm into two
(c) Protoplasm into two
(d) None of these

28. In meiosis bival,ent condition chromosomes occurs in :
(a) Leptotene
(b) Zygotene
(c) Pachytene
(d) Diplotene of

29. In meiosis, terminalization almost completed in : (a) Zygotene (c) Diplotene
(b) Pachytene (d) Diakinesis

30.Which type s of cell division occurs in somatic cell. ?
(a) Mitosis (b) Meiosis
(c) Both (a) and (b) (d) None of these

31. In endospeffi1 cells, which type of cell division occurs?
(a) Mitosis (b) Budding
(c) Amitosis
(d) Free cell formation

32 In yeast, which type of cell division occurs?
(a) Mitosis (c) Amitosis
(b) Budding (d) Meiosis

33. In algae, which type of cell division occurs?
(a) Meiosis (c) Amitosis
(b) Mitosis (d) Budding

34. In mitosis, division of centromere occurs m:
(a) Prophase (b) Metaphase
(c) Anaphase (d) Telophase

35. In mitosis, spindle formation occurs in
(a) Prophase (b) Metaphase
(c) Anaphase (d) Telophase

36 In animal which type of cytokinesis occurs?
(a) By cell plate
(b) By cell furrowing
(c) Both (a) and (b)
(d) None of these

37. Which of the following is not related to DNA?
(a) Adenylic acid (b) Uridylic acid
(c)Guanilic acid (d) Allofthese

38. An adenine pairs with :
(a) Guanine (b) Uracil
(c) Thiamine (d) Adenine

39. Circular DNA is found in :

(a) E.coli (b) Mitochondria
(c) Chloroplast (d) All of these

40 Double stranded RNA is found in
(a) Bacteriophage (b) TMV
(c) Mycoplasma (d) Retro virus

41 Smallest RNA is
(a) m-RNA (c) r-RNA .'
(b) t-RNA (d) G-RNA

42. Bacterial DNA is called as :
(a) Chromosome (b) Genome
(c) Genophore (d) Gene

43. Genes are segments of :
(a) Chromosome (b) DNA
(c) m-RNA (d) Nucleulus

44. Nitrogenous base lacks :
(a) Carbon (b) Nitrogen
(c) Phosphorus (d) Hydrogen

45. T fonn ofDNA is present in :
(a) Ti plasmid (b) Bacteriophage
(c) Colliphage (d) Cyanobacteria

46. Match List I with List II and se1ect the correct answer using the code given below the lists :

List I	List II
A. Lysosome	1. Cytoskeleton
B. Microsomes	2. Autodigestion
C. Microtubules	3. Secretory granules
D. Golgi bodies	4. A fragement of ER

Codes:

A B C D	A B C D
(a) 1 2 3 4	(b) 2 4 I 3
(c) 2 3 1 4	(d) 1 4 2 3

47. Consider the following statements :
1. Prokaryotic cells have no cell wall
2. In prokaryotes. cell membrane beal respiratory enzymes.
3. Cell membrane forms mesosomes i eukaryotic cells.

Which of these statements is / are correct?
(a) 1 and 2 (c) 1 and 3

(b) 2 only (d) 3 only

48. Consider the following statements regarding the living cell :
1. The Golgi apparatus links carbohydrates with proteins to form glycoproteins.

2. In plants, the Golgi complex synthesizes pectin.

3. The lysosome store the hydrolyzing enzymes.

Which of these statements is / are correct?
(a) 1 and 2 (b) 2 only
(c) 3 only (d) 1,2, and 3

49. The largest somatic chromosome number, 1262 has been recorded in :

(a) a fern plant (b) a fungus

(c) an insect (d) a vertebrate animal

50 Which one of the following groups of organisms is of prokaryotes?
(a) Blue-green algae
(b) Red algae
(c) Brown algae
(d) Green algae

51.Which one of the following statements is correct?
(a) Ascomycetes are haploid fungi
(b) Yeasts are single celled basidiomycetes
(c) Fungal cell walls are made up of chitin
(d) Fungi imperfecti reproduce only sexually

52. The chromosome theory of inheritance was first postulated by:
(a) Avery, Mc Carty and MacLeod
(b) Frederick Griffith
(c) Morgan and Sturtevant
(d) Sutton and Boveri

53. The process by which DNA gives rise to RNA is known as :
(a) Transfonnation (b) Replication
(c) Translocation (d) Transcription

54. The enzymes that are used as molecular seissors to cut DNA at specific sites Dr various purposes in genetic engineerillg are:
(a) DNA ligases (b) DNA polymerases
(c) Restriction endonucleases
(d) Restriction exonucleases

55. The total genetic material within an individual is known as the :
(a) Chromosome (b) Gene pool
(c) Genome (d) Genetic code

56 .If an organism is treated with a chemical that destroys the spindle, then which one of the following events will follow?
(a) Cytokinesis will go on, but karyokinesis will stop
(b) Karyokinesis will go on, but cytokinesis will stop
(c) Neither karyokinesis nor cytokinesis will stop
(d) Among with the spindle, the: chromosomes will also disintegrate

Directions for Q. 57 -66 : In each of the following questions two statements are given, one is Assertion (A) and second is Reason (R). Of the statements, mark the correct .answer as :

(a) If both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.

(b) If both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.

(c) If Assprtion (A) is true but Reason (R) is false.

(d) It Assertion (A) is false but Reason (R) is true.

57. Assertion: Cells are functional unit of life. Reason: Cells are totipotent.

58. Assertion: Prokaryotes lack membrane bound organelles.
Reason: Bacteria, cynobacteria do not possess a nucleus.

59. Assertion: Mitochondria is an important cell organelle of both eukaryotes and prokaryotes.
Reason: They are called power-house.

60 Assertion: Golgi complex is absent only in prokaryotic cells.
Reason: A eukaryotic cell contains golgi complex.

61. Assertion: Complex carbohydrates are synthesized by ER.
Reason: Endoplasmic reticulum is involved in both protein and lipid synthesis.

62. Assertion: Lyosomes are formed by Golgi complex.
Reason: Golgi complex forms plasmalemma and cell wall.

63. Assertion: DNA serves as hereditary material.
Reason: DNA functions as blue print for building and running cellular machinery.

64. Assertion: Cytokinin is a growth regulator and an important mitogen in plants.
Reason: Cytokinin controls mitosis in animal cells also.

65. Assertion: Mitosis occurs in both unicellular and multicellular organisms**.**
Reason: Mitosis is reductional division.

66. Assertion: In mitosis each replication cycle of DNA is followed by one cell division.
Reason: In meiosis one replication cycle of DNA is followed by two divisions.

67. In case of protozoans e.g. ciliates, the food vacuole moves at certain path to complete digestion. It is
(1) Due to interaction ofmicrotubules
(2) Due to cyclosis
(3) Due to interaction of microfilaments
(4) Both (2) and (3) correct

68. Cell theory given by Schleid.en and Schwann was incomplete because there was no explanation about the formation of new cell. This aspect of cell theory Was completed by
(1) Robert Hooke (2) Virchow
(3) Robert Brown (4) Kolliker

69. Which one of the following should be
considered most important for the cellular totipotency:
(1) Mitochondria
(2) Large number of ribosomes
(3) Full amount of genetic information
in nucleus
(4) Large number of dictyosomes (Golgi complex)

70 In which of the following type of cell the nucleocytoplasmic ratio will be in limit

(I) Undifferentiated cells .
(2) Differentiated cells
(3) Dedifferentiated cells
(4) All of these

71. The cell with high metabolic rate will have
(1) High nucleocytoplasmic ratio ,
(2) Low surface area per unit volum ratio
(3) Larger size
(4) Both (I) and (2)

72. Pectinase helps in the ripening of fruit
Because it dissolves
(1) Cellulose
(2) Primary cell wall
(3) Secondary cell wall
(4) Calcium pectate .?

73. Cell wall is absent in
(1) Gametes
(2) Zoospores of lower plants
(3) P.P.LO
(4) All of these

74. Glycosyltransferase is synthesized *by* endoplasmic reticulum and provided to different organelles. Due to the action of the enzyme
(I) Glucan chains are polymerized into cellulose microfibrils
(2) Glucan chains are polymerized into cellulose macrofibrils
(3) Cellulose microfibrils are polymerized into glucan chain
(4) None of these

75. Which one of the following structure is non-extensible in nature and further prevents development of cell
(1) Middle lamella
(2) Primary cell wall
(3) Secondary cell wall
(4) All of these

76. Which one of the following is true for the plasmodesmata
(I) It connects two adjacent plant cells
(2) It is protoplasmic bridge between two adjacent plant cells
(3) It helps in movement of water and maintain tonocity
(4) All of these

77. Select the structure which synthesize more amount of cellulose respectively .
(1) Golgi complex
(2) Plasmamembrane
(3) Endoplasmic reticulum
(4) None of these

78. Cellulose contains straight polysaccharilie chain made of glucose units linked by
(1) -1-3 glycosidic bonds
(2) -2-3 glycosidic bonds
(3) -1-4 glycosidic bonds
(4) -3-4 glycosidic bonds

79. Which one of the following acts a-s cementing material
(1) Calcium salt
(2) Pectic acid
(3) Calcium pectate
(4) None of these

80. The middle lamella and two primary walls in the pit region together constitute the pit membrane, which has a thickening called
(1) Simple pit
(2) Torus
(3) Middle lamella
(4) Primary cell wall

ANSWERS

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

CHAPTER-4 TO CHAPTER-07
CELL DIVISIONS

- **Rudolf Virchow** - Law of cell Lineage : *"Omnis cellula e cellula* " New cells arise from prexisting cells.
- Strasburger -First study of cell division in plants.
- Walter Flemming -First study of cell division in animals.
- Boveri and Flemming - Studied details of somatic cell division.
- Flemming- gave term 'Mitosis'.
- Van Beneden -discovered Meiosis.
- Sutton, Winiwater and Strasburger - studied details of Meiosis.
- Farmer and Moore -gave term 'Meiosis'.
- Gregoire used term Meiosis I and Meiosis II.

TYPES OF CELL DIVISION

1. Mitosis takes place when new cells are added to multicellular organisms as they grow and when tissues are repaired or replaced. Root tips (root meristem) of onion *(Allium cepa,* 2n = 16) are best plant material for the study of mitosis in labs. Root tips of *Viciafaba* (broad bean) are also used. In animals, cells at base of nail, bone marrow cells and skin cells (statum germinativum) are taken to study mitosis.
2. Meiosis occurs in the production of gametes by organisms which reproduce sexually. Best material to study meiosis in class room is anthers from young unopened buds (buds before anthesis) of *Tradescantia* and onion and testes of Grasshopper .

3. Acetocarmine is a nuclear basic stain used to study the cell division in plant material.

Factors Controlling Cell Divison :

1. Cell Size When cells grow in size, its nucleo-cytoplasmic ratio and surface area -volume ratio decreases. To maintain these ratios cells divide as smaller cells have high ratios, therefore more active.

2. **Mitogens** are polypeptide growth factors that control cell proliferation. Common plant mitogen is hormone cytokinin. Mitogens in human beings include lymphokines, Epidermal growth factor **(EGF)** or platelet derived growth factor . **(PDGF)**

- **Dinomitosis**. It is a type of nuclear division in dinoflagellates in which (i) nuclear membrane does not disappear (ii) microtubular spindle is not formed (iii) chromosomes move while attached to inner nuclear membrane.
- **Endomitosis** It is the multiplication ofchromosomes present in a set in nucleus without karyokinesis and cytokinesis.
- c-mitosis It is colchicine induced mitosis.
- **Intranuclear division.** Mitosis is extra cellular division as spindle is formed outside the nucleus, in cytoplasm. In fungi spindle is formed inside nucleus (intranuclear spindle) from spindle pole bodies (SPBS). Nuclear membrane remains intact. Nucleus divides by furrow. This type of division is called karyochorisis.
- **Non disjunction (Bridges** 1916) is the failure of particular pair/s of homologous chromosomes or sister chromatids of a chromosome to separate and move at anaphase I so that one daughter cell gets one or few chromosomes more than the other cell.
- Free nuclear cell division The nucleus divides repeatedly without cytokinesis to make cell multinucleated (coenocytic/ syncytial) e.g., *Vaucheria, muscle cell, Opalina.*
- He La cells These are aneuploid human epithelial cells taken, from Miss Henrietta Lacks in 1951 suffering from cervix cancer -
- Synaptinemal complex It is a ribonucleoprotein complex developed beVween *Vwo* synapsed homologous chromosomes in zygotene stage. It persists upto pachytene and begins to disappear in diplotene stage except at chiasmata. It has a central element of ribonucleoprotein between

two homologous chromosomes and two lateral elements between sister chromatids of each chromosome. The central element contains mainly RNA and protein but the lateral elements are rich in DNA, RNA and protein

(3) M phase
(4) S phase

3. Number of daughter cells formed as a result of meiosis is
(1) 1 (2) 2 (3) 4 (4) 8

4.Division, where the nuclear envelope does not degenerate and there is no differentiation of chromosomes and spindle is
(I) Amitosis (2) Eumitosis
(3) Mitosis (4) Meiosis

5. The term 'Mitosis' was given by
(I) Strasburger (2) Farmer and Moore
(3) Boveri (4) Flemming

6. The process of nuclear division is termed as
(I) Cytokinesis (2) Karyokinesis
(3) Amitosis (4) Endomitosis

EXERCISE

1. Cell lineage theory was given by
(1) Prevost and Dumas
(2) Rudolph Virchow
(3) Strasburger
(4) Flemming

2. Which of these is not a part of Interphase ?
(1) G_1 phase
(2) G_2 phase

7. Which of these is an equational division ?
(I) Mitosis (2) Meiosis
(3) Amitosis (4) None of these

8. Unlimited division of cell results i in the disease
(I) Tumour (2) Tuberculosis
(3) Cancer (4) Pleurisy

9. Longest phase of cell cycle is

(I) G_1-phase (2) G_2-phase
(3) S-phase (4) M-phase

10.Cells which do not divide will not cross (1) M-phase (2) S-phase
(3) GI-phase (4) G?-phase

11. Replication of DNA and synthesis of histones occurs at
(1) Prometaphase (2) Metaphase
(3) Telophase (4) Interphase

12. Which of the following is not true for meiosis ?
(1) Two successive divisions without any DNA replication occuring between them
(2) Pairing and formation of chiasmata anti crossing over
(3) Segregation of homologous chromosomes
(4) None of these

13. At the end of mitosis, the number of chromosomes in daughter cells is
(1) Half of the parent cell
(2) Same as the parent cell
(3) Twice the parent cell
(4) Four times the parent cell

14. The term meiosis was coined by
(1) Prevost and Dumas
(2) Flemming
(3) RudolfVirchow
(4) Fanner and Moore .

15. Cell division by meiosis takes place in
(1) Haploid cells'
(2) Diploid cells
(3) Quadraploid cells
(4) Both (1) and (2)

16. Mitosis where spindle is extranuclear is' caned
(1) Amitosis (2) Premitosis
(3) Eumitosis (4) None of these

17. In both mitosis and meiosis, the cellular structure that disappears necessarily is
(1) Chloroplast
(2) Mitochondria
(3) Plasma membrane
(4) Chromatin network

18. Just before the division, amount .of DNA in a somatic cell is
(1) Halved (2) Doubled
(3) Quadrupled
(4) Remains unchanged

19. Meiosis is a
(1) Equational division
(2) Multiplicational division
(3) Disjunctional division
(4) Reductional division

20. Condition where large number of nuclei are present in a single cell is called as
(1) Synapsis
(2) Congression
(3) Syncytium
(4) None of these

21. In mitosis, metabolically most active stage is

(1) Interphase
(2) Prophase

ANSWERS

1.	(2)	6.	(2)	11.	(4)	16.	(3)	21.	(1)
2.	(3)	7.	(1)	12.	(4)	17.	(4)	22.	(3)
3.	(3)	8.	(3)	13.	(2)	18.	(2)	23.	(3)
4.	(1)	9.	(1)	14.	(4)	19.	(4)	24.	(3)
5.	(4)	10.	(3)	15.	(2)	20.	(3)	25.	(1)

(3) Metaphase
(4) Telophase

22. Each bivalent at zygotene stage is composed of
(1) One chromatid
(2) Two chromatids
(3) Four chromatids
(4) Variable number of chromatids in different species

23. The phenomena of crossing over occurs between
(1) Sister chromatids
(2) Non-sister chromosomes
(3) Non-sister chromatids
(4) Both (2) and (3)

24.Meiosis is evolutionarily significant due to
(1) Reduction division
(2) Formation of four daughter cells
(3) Recombinations during crossing over (4) All of these

25. If a cell increases in size, its surface-volume; ratio
(1) Decreases (2) Increases
(3) Remains unchanged
(4) Varies according to shap

CHAPTER-5
BALANCED DIET & CONSTITUENTS OF FOOD

Nutrition:

All the process which involves intake of food, its utilization and production of energy .

Food :

The substance which is required by living organism for the production of energy for life processes.

Balanced Diet:

The food which has optimum proportion and quantity of every substance required by living organism for proper growth and development of body.

Balance diet contains carbohydrates (6.0%), fats (25%), Proteins (15%), Vitamins minerals roughage and water.

Carbohydrates

(a) It contains carbon, hydrogen and oxygen. These are of following types :
Monosaccharides: Glucose, fructose.
Disaccharides : Sucrose,

lactose, Maltose
Polysacchrides : Glycogren, Starch, Cellulose.
Excess of glucose is stored in liver and muscles as glycogen, this process is called Glycogenesis.

(c) In case of lake of glucose, glycogen of liver converts into glucose by the process of Glycogenolysis.

(d) Exces glucose converts into fat by the process of Lipogenesis.

(e) Sources: Cereals, Sugarcane, milk, Fruits, Honey etc.

Lipids

(a) Fats and Oils are generally called lipids and provide double energy as compared to Carbohydrates.

(b) It is sotred in adipose tissue.

(c) Lipid by lipase enzyme converts into fatty acids which are two types :

(i) Saturated: Solid at room temperature.

(ii) Unsaturated: Liquid at room temperature. '

(d) Excess of saturated fat in diet cause heart attack and disease is known as hypercholesterocemia.

Protein

(a) Constituents of protein are C, N and O.

(b) Important for growth development and repair of body.

(c) Monomers of protein are amino acids which are of two types.

(i) Essential: not synthesized in our *body* so its intake is important. For example, Lysine, Methionine, Tryptophan etc.

ENERGY CHART:

CARBOHYDRATES=4.1 kcal/gm
Fats =9.45 kcal/gm
Proteins= 4.0 kcal/gm

(ii) Non-Essential: Synthesized in our body and need not to be taken from outside

(d) It is most important constituent of animal body. For example, hemoglobin, muscles protein, visual pigments, cytochromes etc.

(e) Sources: Soyal bean, Meat, Pulses, egg etc.

Minerals

Inorganic substance which are essential for proper functioning of organism body.

1. **Sodium and Potassium**: Help in absorption of glucose. nerve conduction. muscles action. Deficiency causes cramps and convulsion.
Source: Salt, Milk, Vegetables etc

2. **Chlorine:** Helps in synthesis of HCI and Make acid base balance in body.
Source: Salts, Vegetables.

3. **Magnesium:** Enzymes activator, Component of bones and Teeth. Deficiency causes convulsions.
Source: Green Vegatables.

4. **Calcium:** Main component of bones and teeth, take part in blood clotting, muscles contraction and heart functioning. Deficiency causes rickets.
Source: Milk, Green vegetables, gram, fish etc.
5. Sulphur: Constituents of protein, enzymes and co-enzymes.
Source: Green Vegetables.
6. **Fluorine:** Check dental and enamel decay. Excess of fluorine cause fluorosis.
Source: Salt, Vegetables etc.

7. **Phosphorus:** Occurs in bones and teeth, nucleic acid, phospholipids and A TP .
Source: Milk, Vegetables.

8**. Iron:** Main compound of respiratory pigment haemoglobin which is oxygen carrier in blood.
Source: Spinach, Chenopodium, Mathee, Fruits etc. ,
9. **Deficiency disease**: anaemis Iodine deficiency disease- goitre
Vitamins:
Required in very small quantitites for control and proper functioning of body metabolism,
Type: There are two types of vitamins :
(a) Water soluble: Band C
(b) Fat soluble: A, D, E and K

(a) **Vitamin A** : Commonly called Retional
Source: Milk, Buter, Ett and Vegetables. Function: From rhodopsin and odopsin (Visual pigments)
Deficiency disease: Night blindness,
Xerophthalmia

(b) Vitamin B : It is group of following
vitamins :
(i) **Vitamin B1** : Chemical name thiamine
Source: Yeat, peanuts, beans, wheat.

Function: Important for nervous system and metabolism.
Deficiency disease : Beri-Beri
(ii) **Vitamin B2:** Chemical known as Riboflavin
Source: Liver, Cheese, Milk, Green Vegetables.
Function: Maintain helthy skin and mouth micosa.
Deficiency disease: Cheilosis.

(iii) **Vitamin B3** : Chemically known *as* Niacin.
Source: Milk, Yeast, Tomatoes and Eggs- **Function:** Works in respiration and several other metabolic activities.

(iv) **Vitamin B5** : Panthothenic acid.
Source: Wheat, Penuts, yeast, meat. Function: Carbohydrates, metabolism. Deficiency disease: Pellagra.

(v) **Vitamin B1O :** Folic acid.
Source: Green Vegetables, Banana. Function: Maturation of R.B.C, Nucleic acid metabolism.
Deficiency disease: Pernicious Anemia.

(vi) Vitamin Bl2 : Cynocobalarnin.
Source: Eggs, Fish, Liver
Function: Promote, DNA synthesis and RBC maturation.
Deficiency Disease: Pernicious Anaemia.

(c) **Vitamin c** : Ascorbic Acid
Source: Citrus fruits, Green Vegetables Function: Collagen formation.
Deficiency disease: Scurvy .

(d) Vitamin D : Calciferol.
Source: Sunlight, Cod liver oil, Milk, Eggs.
Function: Ca and p metabolism to strengthen bones and teeth.
Dificiency Disease: Rickets (in children) and Osteomalacia (in adults)

(e) Vitamin E : Tocoferol.
Source: Leafy green Vegetables, Cereal grain etc.
Function: Maintain no. of R.B.C. and keeps skin healthy.
Deficiency Disease: Reproduction failure *(sterility)* - and less no. Of R.B.C.

(f) **Vitmin K :** Phyloquinone.
Source: Soya bean oil, Vegetable oil, Green vegetables.

Function: Works in blood clotting.
Dificiency Disease: Blood clotting becomes less.

(g) **Roughage:** Food fibre, which is not digested and does not take part in growth. The main function of roghasge is to maintain water proportion in body.
Source: Salted outer layer of grains Vegetables and porridge

DISEASE DUE TO:-
-Protein lack – KWASHIOR KOR
- At Age between 1 to 03

Protein & food calories
Lack – MARASMUS
- Below 1 year age

.

EXERCISE

1. Balanced diet should have (a) Protein 1/5, fat 3/5, carbohydrate 1/5 (b) Protein 3/5, fat 1/5, carbohydrate 1/5 (c) Protein 1/5, fat 1/14, carbohydrate Y4 (d) Protein 1/5, fat 1/5, carbohydrate 3/5

2 Tocoferol is the chemical name of

(a) vit B (b) vit. A
(c) vit. C (d) vit B

3. Calciferol is the chemical name of ;

(a) vit. D (b) vit. A
(c) vit. C (d) vit. B

4. Water soluble vitamins are;
(a) vit. A D (b) vit. E K
(c) vit. B C (d) none of these

5. Fluorosis is caused due to;
(a) excessive intake of fluorine
(b) excessive intake of fat
(c) deficiency of fluorine
(d) deficiency of fat

6. Which substance is known as building block?
(a) Water (b) fat
(c) carbohydrate (d) proteins

7. Osteomalacia is caused due to ;
(a) deficiency ofvit .A
(b) deficiency ofvit. B
(c) deficiencccy of vit. D
(d) none of these

8. Which vitamin is responsible for the formation of bones and teeth ?
(a) vit. A (b) vit. B
(c) vit. C (d) vit. D

9. Bleeding in guns is caused due to the deficiency of ;
(a) vit. B (b) vit. A
(c) vit. C (d) vit. D

10. Ascorbic acid is a;
(a) vitamin (c) fat
(b) protein (d) carbohydrate

11. The main source of carbohydrate is
(a) cellulose (b) starch
(c) both a and b (d) none of these

12. Perinicious anaemia is caused due to ;
(a) vit. Bl (b) vit. B2 (c) vit. B4 (d) vit. Bl2

13. Obesity is caused due to ;
(a) excessive intake of food
(b) deficiency of food
(c) both a and b
(d) none of the above

14. Xerophthalma is caused due to deficiency of ;
(a) vit. D (c) vit. C
(b) vit. A (d) vit. K

15. Fat soluble vitamins are ;
(a)A, Band C (b) Band c
(c) A, D, E and k (d) none of these

16. Deficiency of iodine causes ;
(a) pellagra (b) rickets
(c) goiter (d) none off these

17. Night blindness is due to deficiency of vitamin;
(a) D (b)B
(c) A (d) K

18. Which is the best source of vitamin E?
(a) peanuts (b) oranges
(c) meat (d) carrots

19. Deficiency of vitamin D in children causes
(a) ricket (b) beri-beri
(c) osteomalacia (d) scurvy

20. Sucrose is abundant in ;
(a) milk (b) oranges juice
(c) sugarcane (d) grapes

21. The essential fatty acid in the diet is ; (a) linoleic (b) stearic
(c) oleic (d) palmitic

22. A good sourve of vitamins of B group is
(a) carrot (b) fish oil
(c) germinated (d) egg yolk

23. Anaemia is caused in man due to
deficiency of ;
(a) folic acid (b) vit. B
(c) iron (d)all of these

24. The best source of vitamin thiamin is ;(a) cod liver oil (b) curd
(c) egg (d) wheat bread

25. Eating of raw fish can cause deficiency of vitamin ;
(a) D (b)B1
(c) B_4 (d) B_{l2}

26. Cow milk is more nutritious and slightly yellow due to presence of; .

(a) vit D (b)ascorbic acid
(c) riboflavin (d) tryptophan

27. One of the vitamin is antiviral ;
(a) A (b) D
(b) C (d) K

28. pyridoxine is vitamin ;
(a) B (b) B
(c) B (d) B

29. Liver does not store one of the following (a)vit. A (b) vit B
(c) fats (d) none of these

30. Which is not shown by vitamins ?
(a) Digestion (b) Metabolism
(c) Growth
(d) Release of energy

31. vitamin E is ;
(a) retinol
(c) calciferol
(b) tocopherol (d) thiamine

32. Which vitamin is essential for RBC formation?
(a) Thiamine c (b) Riboflavin
(c)Folic acid (d) Calciferol

33. Which vitamin is also known as vitamin B:
(a) Ribboflavin (b) Thiamine
(c) Niacine (d) None of these

34. Excessive thining of hair in man will be due to
(a) less blood supply (b) low proteins
(c) less fats (d) none of these:

35. Antixerophthalmi vitamin is :
(a) vit. A (b) vit.D (c) vit. E
(d) vit. K

36. The vitamins which we must consume should be :
(a) fat soluble
(b) water soluble
(c) ether soluble
(d) alcohol soluble

37 The essential mineral for synthesis of proteins in body is :
(a) sodium (b) iron
(c) sulphur (d) potassium

38 Pronged deficiency of nicotinic causes:
(a) pellagra (b) anaemia
(c) osteomalacia
(d) xerophthalmia

39. Who coined the tenn vitamin ?
(a) Calvin (b) A.G. Tansly
(c) Funk (d) None of these

40. Which is not an adequate protein ?
(a) Milk (b) Meat
(c) eggs (d) Corn

41. Which one of the following is not
correctly matched ?
(a) vit. B -Pernicious anemeia
(b) vit.B -Beri-beri
(c) Vit C - Scurvy
(d) vit. B -Pellagra

42 Which of the following is the best source body can synthesize is known as:of vitamin A ?
(a) essential amino acid
(a) Apple (b) Carrot
(c) Honey (d) Peanuts

43. During prolonged fasting fIrstly
(a) fats are usedup followed by carbohydrate form liver and muscles and protein in the end
(b) carbohydrates are used up followed by fats and protein towards end .
(c) lipids followed by protein and carbohydrate towards end.
(d) none of the above

44. Deficiency of proteins cause
(a) kwashiorkor (b) pellagra
(c) anaemia (d) goiter

45. Which is not available from plants
(a)Riboflavin (b) vitamin B
(c) Niacin (d) vitamin C

46. With reference to human nutrition consider the following statements:
1. Glycogen is store in liver
2. Coconut oil has the essential fatty acids.
3. Sprouted pulses are a source of folic acid.
4. Vitamin K is synthesized in the human body.
Which of these statements are correct?
(a) 1,2 and 3 (b) 2 and 4
(c) 1,3 and 4 (d) 1,2,3 and 4

47. Match List-1 with List -II and select the correct answer using the
codes given.below the Lists

List I (Nutrient)	List II (Food stuff)
A. Protein	1. Cheese
B. Fats	2. Butter
C. Minerals	3. Green vegetables
D. Starch	4. Maize

Codes :

A B C D	A B C D
(a) 2 1 3 4	(b) I 2 3 4
(c) 1 2 4 3	(d) 2 1 4 3

48. The type of amino acids that the humn
body can synthesize is known as:
(a) essential amino acid
(b) non- essential amino acid
(c) synthetic amino acids
(d) naturally occurring amino acids

49. About 80% of the body weight in most ;
organisms is: ,
(a) protein (b) minerals
(c) water (d) fat

Directions for Q. 50 -53: In each of the following questions two statements are given, one is Assertion (A) and second is
Reason (R). Of the statements, mark the answer as :
(a) If both Assertion (A) and Reason (R)
are true and Reason is the correc1 explanation of Assertion.
(b) If both Assertion (A) and Reason (R)
are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false.
(d) It Assertion (A) is false but Reason(R) is true.

50. **Assertion**: Balanced diet is one which gives us correct proportion ()f carbohyxdrates, proteins, fats, imineralsand vitamins to provide enough material for growth and other activities.
Reason: The amount of each substance required, depends on age, sex occupation of the individuals and on the climatic conditions of the place where one lives..

51 **Assertion:** Ascorbic acid is abundantly present in Amla.
Reason: Scurvy is caused by the deficiency of vit A.

52.Assertion: Essential amino acids can not be synthesized in the body.
R**eason**: Essential amino a.cids are lysine, methionine, valine, tryptophan, phenylalanine.

53. **Assertion:** Phosphorus is present in milk.
Reason: Alongwith calcium, it occurs in bones and teeth.

ANSWERS

1	(d)	12	(d)	23	(d)	34	(b)	45	(b)
2	(b)	13	(a)	24	(d)	35	(a)	46	(d)
3	(a)	14	(b)	25	(b)	36	(b)	47	(b)
4	(c)	15	(c)	26	(c)	37	(c)	48	(b)
5	(a)	16	(c)	27	(c)	38	(a)	49	(c)
6	(d)	17	(c)	28	(b)	39	(c)	50	(b)
7	(c)	18	(a)	29	(c)	40	(d)	51	(c)
8	(d)	19	(a)	30	(a)	41	(b)	52	(b)
9	(c)	20	(c)	31	(b)	42	(b)	53	(a)
10	(a)	21	(a)	32	(c)	43	(b)		
11	(c)	22	(c)	33	(a)	44	(a)		

CHAPTER-6
BLOOD

- Blood is a fluid connective tissue.
- Blood volume in a human being is 5-6 litre**.**
- pH of blood is 7.3 to 7.4 ~ Blood is salty in taste.
- Blood is heavier than water.
- **Haemotology :** Study of blood.
- Blood is made up of 3 main components :
  (i) Plasma
  (ii) Blood cells
  (iii) (iii) Platelets

PLASMA

- Represents matrix of blood Transparent
- Slightly alkaline
- Forms 55-60% volume of blood
- Contains water (91-92%) + Solid (8-9%).
- Solid part contains 7% protein (Albumin, globulin and fibrinogen).

BLOOD CELLS

- Blood cells also known as blood corpuscles.
- Forms 40-45% of blood by volume.
- Blood cells are of four types: RBC, WBC, platelets and Spindle cells. RBC

(Red Blood Corpuscles)

- Also known as erythrocytes.
- RBCs of vertebrates are nucleated except mammals.
- RBCs of mammals are non-nucleated
- except camel
- **Salamander** *(Amphiuma means)* has largest RBCs (about 80 *μm* in diametre).
- **Musk deer** *(Tragupus javanicus)* has the smallest RBCs (1.5 μm).
- Biconcave in shape.
- Life span in man is 120 days and no. Is 5000000/cu mm.
- Bone marrow is the main site for formation of RBC.
- Haemoglobin is filed in RBC which given
- red colour to it and acts as vasculatory or respiratory pigment.
- Amount of haemoglobin is measured/calculated by Shali's Haemometer.
- In male (15-16 gm%), female (13-14) gm%) and in child (16.5 gm%) haemoglobin is present.
- If Hb percentage falls anaemia arises. Its types are:
- **Pernicious anaemia** -Non genetic disorder due to deficiency of vitamin B12. number of RBCs decrease and size of RBCs increase but Hb content is less ill RBC.
- **Sickle cell anaemia** -It is genetic disorder and RBC becomes sickle shaped.
- **Pernicious anaemia** -Genetic disorder body does not prepare Hb or RBC.
- **Septicemia** -It is a sort of blood poisoning.

Erythropoiesis

- Process of formation of RBC.
- In man, RBC formation takes place with in 72 hrs.
- Stem cells (Myeloblast cells or haemocytoblast) responsible for RBC fonnation.

Functions of RBC

- Haemoglobin of RBCs readily combine$ f with oxygen to fonn oxyhaemoglobin.

- In the tissues, oxyhaemoglobin readily gives up its oxygen.
- Maintain pH of blood.
- RBCs transport CO_2.
- CO_2 combines with potassium carbonate of RBCs to form potassium bicarbonate.
- **WBC (White Blood Corpuscles)**
- Also called leucocytes.
- Larger than RBC and colourless.
- Nucleus is present in all WBCs.
- In blood 8000-9000/cu. rilm WBCs are present.
- WBC play an important role in defence system hence called soldier's of body.
- WBCs are of two types :
  (i)Granulocytes (Eosinophils Basophils,Neutrophils), and
  (ii)Agranulocytes (Monocytes, Lymphocytes)

-

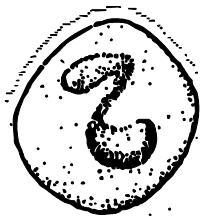
EOSINOPHILS (2.8%)

- Also known as acidophils
- Non-phagocytic.
- Life span is 10-12 hours.
- Stained with eosin dye.
- Nucleus is bilobed.
- Number of eosinophils increased in allergy condition. *(i.e.* asthma and hay fever) and worm infection *(e.g., Ascaris)*
- Play important role in hypersensitivity .

Eosinophil

BASOPHILS (2%)

- Minimum number in total WBC.
- Phagocytic in nature.
- Nucleus is usually tri lobed. Life span is 12-15 days.
- Number increase in chicken pox.
- Represents mast cells of connective tissue.



Basophil

NEUTROPIIILS/HETEROPHILS (65%)

- Maximum number in total WBC.
- Phagocytic in nature.
- Nucleus is multilobl1late.
- Number increase in bacterial infection

Neutrophil

MONOCYTES (6%)

- Largest WBC.
- Nucleus is horse shoe shaped.
- Life span 28 days.
- Macropolice man of blood.
- Number increase in TB (Tuberculosi

- Number is 2-5 lakhs/cu mm

Spindle Cells

Spindle Cells

LYMPHOCYTES (26%)

- Smallest WBC
- Nucleus is rounded and central.
- Life span is 3 days.
- Produce antibodies.

Lymphocyte

Lymphocyte

- Number increase in viral infection.

Platelets

- These are found in mammals only mammals.
- Also known as thrombocytes
- These are non-nucleated
- Size is irregular , oval or spherical.

- These are found in all animals except mammals
- Nucleus is present.

 Oval or spherical in shape.

 Help in blood clotting

Knowledge Update

- Blood = Blood cells + Plasma.
- Plasma = Blood -Corpuscles (BC + WBC)
- Serum = Blood -Corpuscles + Fibrinogen

*Lymph = Blood -RBC or Plasma + WBC

*Lymph act as middle man between blood and tissue. Lymph return blood proteins from tissue fluid again to blood

BLOOD PRESSURE

- It is the pressure created by the flow of blood on the walls of arteries and measured as millimeter of mercury by the instrument called Sphygmomanometer.
  It has a high systolic value (normal 120 mm Hg) and low diastolic value (normal 80 mm Hg).
- **Hypertension / High blood pressure -** Systolic more than 140 mm Hg and diastolic more than 90 mm Hg.
- Hypotension / Low blood pressure - Systolic below 110 mm Hg and diastolic below 70 mm Hg.

BLOOD GLUCOSE

- Usually blood glucose level is about 80- 100 mg per 100 ml of blood 12 hours after a normal meal but its concentration rise soon after a carbohydrate rich dite.

- If blood glucose level exceeds 180 mg per 100 ml it starts appearing in urine i.e. **glycosuria.**
- Fasting glucose is 70-110 mg/dl. glucose after breakfast (pp) is 100-140.

BLOODCHOLESTEROL

- Blood cholesterol is useful in limited amount while harmful in excess.
- It is used in the synthesis biomembrance, vit. D, bili salts steroid hormones.
- Its normal amount is 80-180 mg in ml of blood plasma.
- Increased blood cholesterol may lead its deposition in the internal' vessels like arteries and veins
  causes high blood pressure and heart problems.

BLOOD GROUPS

- Father of blood group is Karl Landsteiner (Australian pathologist).

- There are four types of blood goups A, B, AB and 0. A, Band 0 group was discovered by Landsteiner in 1900 while AB discovered by Decastello and Sturle in 1902.

- A, B, O system of blood goup is based upon antigens while AB on antibodies.

Antigens

- Also known as agglutinogens.
- Present on the surface of RBCs.
- **Antigens** are proteinaceous in nature.

- Antigens are A and B.

Antibodies

- **Also** known as agglutins.
- Present in blood plasma.
- Formed by globulin protein.
- Antibodies are a and b.

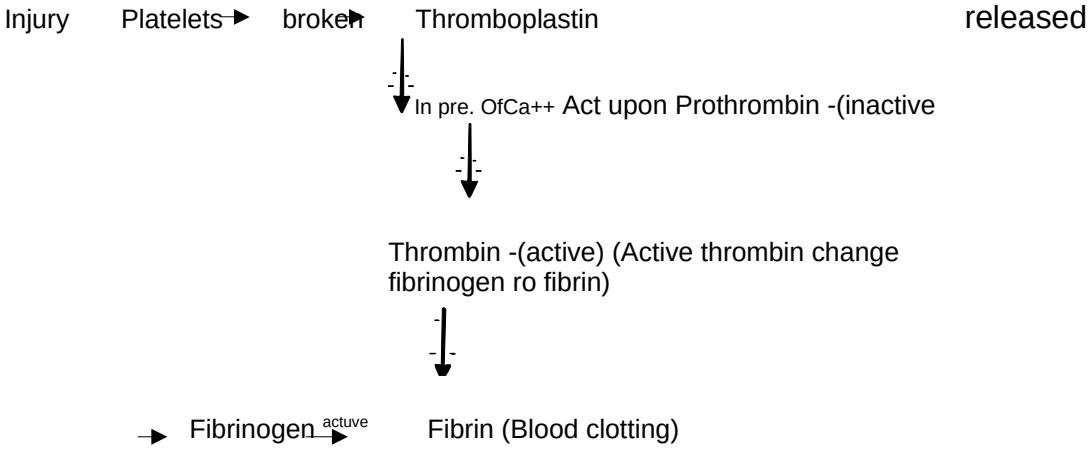
Blood group	Antigen Present	Antibody Present	Donate to	Receive From
A	A	b	A & AB	O, A
B	B	a	B & AB	O, B
AB	A & B	–	AB	O, A, B, AB
O	–	a & b	O, A, B, AB	O

- AB' blood group is universal recipient
- 'O' blood group is universal donor.

- Blundell in 1825 developed blood transfusion technique

BLOOD CLOTTING

- After injury, it is a process of formation of blood clot.
- 3-8 minute is normal time of blood clot.
- Blood clotting is checked in blood vessels by presence of anticoagulant *{e.g;,* Heparin).
- Anticoagulant remove the cations to check the coagulation.
- Important component of blood clotting are fibrinogen, prothrombin, thromboplastin, calcium ions and vitamin K.
- Important steps during injury to blood clotting are



Haemophilia is a genetic disease which blood clotting does not occur.

Rh-FACTOR

- Rh-factor is associated with Rh-antigen.
- Rh-factor was discovered by Landsteiru and Veiner in 1940 in Rhesus monkey.
- Genes which control Rh-factor are present on autosomes.
- No natural Rh antibodies are found in blood of man. But if Rh + blood is mixed with Rh- blood then antibodies formation starts *i.e.,* antibodies against Rh antigen, are produced in Rh- blood.
- Marriage of Rh + man and Rh -w()men s prohibited because due to this first birth :s safe while second is fatal. This disease :s 'known as erythroblastosis foetalis.
- Now-a-days IgG (Immunoglobulill preparation) is given to each Rh- women after first birth for prevention.

EXERCISE

1. Blood is a
(a) fluid
(b) solution
(c) connective tissue
(d) epithelial tissue.

2. Blood is
(a) salty (c) tasteless
(b) sweetish (d) all of these.

3. The lymph differs from blood in having
(a) more RBC less WBC
(b)more WBC less RBC
(c)more WBC no RBC
(d) no RBC no WBC.

4. pH of blood is
(a) 2.2-3.4 (c) 6.0-6.5
(b)7.3-7.4 (d) 10.0-10.2.

5. Nucleated RBC is present in
(a) Camel (b)Man
(c) Rabbit (d) Elephant.

6. Presence of hemoglobin in blood is i measure by
(a) Ganong's Potometer
(b) Lactometer
(c) Shali's Haemometer
(d) (d) Barometer .

7. Functions ofRBCs are
(a) carry the O2
(b)maintain pH of blood
(c) transportation of CO2
(d) all of these.

8. Blood groups are discovered by

(a) Landsteiner
(b)Robert Koch
(c) William Harvey
(d) none of these.

9. Nonnal blood glucose level is
(a) 50-80 mg/100 mi
(b)50-100 mg/IOOO ml
(c) 80-100 mg/IOO ml
(d) 80-300 mg/1000 ml.

10. Universal recipient blood group is
(a)O (b)AB
(c)A (d)none of these.

11. Universal donor blood group is
(a) AB (b)A
c)B (d) O.

12.A person of blood blood , group AB can giVe: to
(a) A **and** B **(c)A,** B **and** O
(b) **only** AB (d) all of these.

13. RBC is mammals have no nucleus because
(a) it has degenerated during developed
(b) it does not have nucleus since earl time
(c) haemoglogin is absent in RBC
(d) none of the above.

14. RBCs can burst is if they are kept in
(a) super saturated salt solution
(b) isotonic slat solution
(c) hypertonic salt solution
(d) hypotonic slat solution.

15. Anaemia due to deficiency of iron is
(a) pernicious anaemia
(b)nutritional anaemia
(c) sickle cell anaemia
(d) thalassemia.

16.Blood bank of body is
(a) liver (c) spleen
(b)kidney (d) heart.

17.A per son beside with blood group O receives blood transfusion, study of blood group is also helpful in
(a) personality estimation (b)health status
(c) forensic science (d) none of these.

18. Clotting of blood of a wound involves :
(a) evaporation of the plasma
(b) blood albumins dissolution
(c) conversion of fibrinogen to fibrin by thrombin
(d)haemolysis of the red corpuscles.
19.In blood largest corpuscles are
(a)monocytes (b)RBCs
(c) lymphocyte (d)neutrophils.

20.Which of the following is a genetic blood disease ?
(a) Cancer (b)T.B.
(c) Haemophilia (d) Syphilis.

21. The characteristic feature of pernicious anaemia is
(a) increase in size ofRBC
(b)deficiency of haemoglobin in RBC
(c) delay in maturation of crythtocytes
(d) all of the above.

22. Blood group that contains antigen A and antigen B is
(a) A (b)AB (c)B (d) 0

23. Antibodies are absent in blood group
(a) A (b)B (c)AB (d)A, Band 0,

24.Which of the following is required in coagulation ?
(a) Ca^{+2} (b)CO
(c)Na^{+} (d) none of these.

25. In leukemia
(a) no. ofWBC increases excessively
(b)no. ofRBC increases excessively
(c) no. ofWBC decreases excessively
(d)no. Of RBC decreases excessively.

26. Prothrombin is related with
(a) agglutination of blood
(b)clotting ofbJood
(c) blood pressure
(d) transport of gases through blood,

27. An antigen is a/an
(a) opposite of an antibody
(b) part of antibody
(c) stimulus for antibody formation
(d)all of the above.

28. Life of RBC in human blood is of

(a) 30 days (b)60 days
(c) 120 days (d) 1.5 days.

29. Formation of blood corpuscles is known as:
(a) haemolysis (b)rouleaux
(c) haemopoiesis (d) phagocytosis.

30. The volume of blood present in adult human is
(a) 10 litre (b)51itre
(c)2Iitre (d) I litre.

31.Which of the following is termed as
graveyard of RBC ?
(a) liver (b)spleen ,
(c) kidney (d) bone marrow.

32. Blood does not transport O2 in
(a) man (b)frog
(c) cockroach (d) earthworm.

33. Blood does not contain
(a) calcium (b) prothrombin
(c) fibrinogen (d) elastin.

34. Lymph differs from blood in absence of
(a) WBC (b)RBC (c)plasma (d) all.

35. Prothrombin which helps in clotting of blood is released by
(a) liver (b)blood corpuscles
(c)blood plasma (d) none of these.

36. In human blood, the normal number of blood platelets per cubic mm is
(a) 10000-200000 (b)20000-300000
(c)50000-800000 (d) 20000-500000.

37. Diapedesis is
(a) formation of WBC in bone marrow
(b)WBC shrinking
(c) formation of pus cells in injury
(d) movement of WBC to the site of injury.

38. The amount of blood supplied **to** brain per minute is
(a)450ml (b)550ml (c)750 ml (d) none of these.

39. Consider the following statements regarding blood pressure
1. It is the pressure exerted by the blood on the walls of any vessel
2. It decreases in the arerties as the distance from the heart increase
3. It is llower in the capillaries than irl the arteries

4. It is usually lower in women than in men.
Of these, the correct ones are
(a) 1 and 4 (b) 1,2 and 3
(c)2,3 and 4 (d)I, 2,3 and 4.

ANSWERS

1	(c)	9	(c)	17	(c)	25	(a)	33	(d)
2	(a)	10	(b)	18	(c)	26	(b)	34	(b)
3	(c)	11	(d)	19	(a)	27	(c)	35	(a)
4	(b)	12	(b)	20	(c)	28	(c)	36	(d)
5	(a)	13	(a)	21	(b)	29	(c)	37	(d)
6	(c)	14	(d)	22	(b)	30	(b)	38	(c)
7	(d)	15	(b)	23	(c)	31	(b)	39	(d)
8	(a)	16	(c)	24	(a)	32	(c)		

CHAPTER -7

ENDOCRINE SYSTEM

MAJOR ENDOCRINE GLAND, THEIR HORMONES AND THE CONTROL OF THEIR SECRETION

GLAND	BORMONE	FUNCTIONS	SECRETION CONTROL MECHANISM
Hypothalamus	Releasing and inhibiting hormones and factor	Control anterior pituitary hormones Posterior pituitary hormones produced here	Feedback mechanism involving metabolite and hormone levels ; Affected by environmental factors like: light, humidity, temperature etc.
Posterior pituitary gland		No hormones synthesized here; stores and release hormones secreted by hypothalamus	Feedback mechanism involving hormones and nervous system
	Oxytocin (Pitocin)	Ejection of milk from nipple, contraction of uterus during child birth	
	Antidiuretic honnone (ADH) vasopressin or Pitressin)	Reduction of urine volume	Blood osmotic potential
Anterior pituitary gland	Follicle stimulating hormone(FSH)	In male stimulates spennatogenesis. In female, growth of ovarian follicles	Plasma es1rogen.and testosterone via hypothalamus
	Luteinising honnone (LH) in females or interstitial cell stimulating honnone (ICSH) in male	In male testosterone secretion from cell ofLeyding. In female secretion of estrogen and progesterone ovulation and maintenance of corpus lateum)	Plasma testosterone via hypothalamus. Plasma estrogen level via. Hypothalamic

			hormones.
	Prolactin or Lactogenic or lactotrophic (LTH) or Mammotrophic hormone (MTH)	Stimulates milk production by mammary glands	
	Thyroid stimulating hornlone(TSH)	Synthesis and secretion of thyroid hormones. growth of , thyroid gland	Plasma T3 and T4 levels i via hypothalamus
	Adrenocorticotrophic I(hormone) ACTH or I corticotrophin	Synthesis and secretion of adrenal cortex hormones. Growth of gland	Plasma ACTH via hypothalamus
	Growth hormone (GH)	Protein synthesis, growth eciallv of bones of limbs	Hypothalamic hormones
Parathyroid Thyroid gland	Parathonnone (or Collips honnone)	Increases blood calcium level, decreases blood phosphate level	Plasma Ca^{2+} level and plasma PO_2^+ level TSH
	Triiodothyroxine (T 3) and thyroxin (T4)	Regulation of basal Metabolic rate, growth and development (physical and mental)	
	Calcitonin	Decreases bood phosphate level	Plasma Ca2+ level

GLAND	HORMONE	FUNCTIONS	SECRETION CONTROL MECHANISM
Adrena corte	Glucocorticoids {Cortisone)	Protein breakdown, glucose/ glycogen synthesis, adaptation to stress, anti-inflammatory/allergy effect	ACTH
	Mineralocorticoids (Aldosterone)	Na+ retention in kidney, Na+ and K+ ratios in extra cellular and intracellular fluids, raises blood pressure	Plasma Na+ and K+ levels and low blood pressure.
Adrenal medulla	Sex steroids	Development and maintenance of sex organ in foetus and prepuberty state. Increases rate and force of heart beat	
	Adrenaline (epinephrine)	Constriction of skin and visceral capillaries, dilationof arterioles of heart and skeletal muscles, raises blood glucose level. General constriction of	Sympathestic nervous system Nervous system

		small arteries, evevation of blood pressure	
Isletes of Langerhans	lnsuline (Beta cells)	Decreases blood glucose leve, increases glucose and amino acid uptake and utilization of cell	Plasma glucose and amino acid levels.
	Glucagon (alpha cells)	Increases blood Glucose level, breakdown of glycogen to glucose in liver	Plasma glucose level
	Somatostation (delta cells)	Establishes balance between insulin and glucagons	
Parotid salivary gland	Parotin	Helps in calcification of teeth	
Stomach	Gastrin	Secretion of gastric juices	Food in stomach
Duodenum	Chleocystokinin and Pancreozymin as CCK-PZ complex	Emptying of gall bladder and liberation of pancreatic juice	
	Secretin	Secretion of pancreatic juice	Acidic food in duodenum
	Enterocrinin	Stimulate secretion of intestinal juice	
	Enterogastrone	Inhibits gastric activities	
Kidney (J.G.cells)	Renin	Conversion of angiotensinogen into angiotensin	Plasma Na+ level decreased blood pressure
Kidney (interstitial cells of pertitubular capillary network)	Erythropo i etin/Erythrogeni n/REF(Renal Erythropoietic Factor)	Stimulates production of RBC's	Hypoxia
Ovarian follicle	Estrogens (17β-oestradiol)	Female secondary sex characteristics. estrous cycle	FSH and LH

1. Father of the Endocrinology is
(a) Thomas Addison
(b) Robert Hooke
(c)Antony yon Leeuwenhoek
(d) Pateur.

2. Honnones are produced by
(a) exocrine glands
(b) endocrine glands
(c)holocrine glands (
d) apocrine glands.

3. Endocrine glands are
(a) ductless glands
(b) non- ductless glands
(c) pour their secretion into blood
(d) both (a) and (c). I

4. Which of the following is not a endocrine gland ?
(a) pituitary (b)thyroid
(c) parathyroid (d) salivary gland.

5. Which glands acts as exocrinely as well as endocrinely ?
(a) pancreas
(b) sebaceous gland
(c)thyroid
(d)none of these.

6.Master endocrine gland is
(a)piturary (b)pancreas
(c)thyroids (d) kidney.

7. Diabetes insipidus is concerned with
(a) ADH deficiency honnone
(b) pituitary , s neurohypophysis
(c) pancreas
(d) both (a) and (b).

8. Diabetes mellitus is concerned with
(a) thyroxin hormone
(b)pitUitary
(c) pancreas
(d)both (a) and (c).

9.The honnone insulin is secreted by
(a) hypothalamus
(b) thymus
(c) β-cells of Langerhan s
(d) pituitary .

10. Islets of Langerhans are present in
(a) brain (b)stomach
(c) ovary (d) pancreas.

11. The male sex hormone is called
(a) vasopressin
(b) gonadotropic hormone
(c)FSH
(d) testosterone.

12. Deficiency of iodine in food or water leads to
(a) colour blindness
(b) simple goiter
(c) ophthalmic goiter
(d) cancer .

13.Diabetes mellitus is the result of
(a) undersecretionof insulin
(b) undersecretionof thyroxine
(c) undersecretionof oestrogne
(d) none of these.

14.What will happen if the thyroid is removed from a tadpole ?
(a) the tadpole will grow into a dwarf frog
(b) the larva will produce gain frog
(c) it will continue indefinitely in larval stage
(d) the larva will die.

15. Acromegaly is the result of
(a) hypersecretion of GH in children
(b) hypersecretion of GH in adults
(c)hypersecretion ofGH
(d) deficiency of vitamin D.

16.Testosterone is secreted by
(a) leydig's cells
(b) sertoli cells

(a) (a) ADH (b)GH
(b) (c) prolactin (d)FSH
(c) spennatogonia
(d) both (a) and (b).

17.Deficiency of adrenal cortex activity leads to
(a) Cushing disease
(b)Conn's disease
(c)Addison's disease
(d) Simmond's disease.

18. STH (Somatotrophic hormone) is also known as
(a)TSH (b)LTH
(c)ADH (d)GH.

19. Hormone that stimulates mild secretion, is
(a) prolactin
(b) luteinising hormone
(c) estrogen
(d)testosterone.

20. Which is not secreted by anterior pituitary?

24. Hyproglycaemic hormone is
(a) insulin (b)glucagons
(c) thyroxine (d) ACTH.

25. Hormope controlling contraction of uterus during parturition is
(a) luteinsing hormone
(b) extrogen
(c) progesterone
(d) oxytocin.

26. Cretinism is due to less secretion of
(a) thyroid
(b)pituitary
(c) parathyroid
(d) adrenal.

21. Intermediate lobe of pituitary secretes a hormone

(a) Oxytocine
(b) MSH
(c) conrticotropin releasing honnone

(d) thyrotropin releasing hormone .

22. Secretion of ductless glands are known. as
(a) hormones (b)pheromones
(c) enzymes (d) vitamins.

23. A woman may develop beard and moustaches due to
(a) hypersecretion of adrenal cortex
(b) hypersecretion of thyroxine
(c) hypersecretion of adrenaline
(d) hypersecretion of thyroxine.

27.Hormone oxytocin controls
(a) growth
(b) lactation
(c) child birth
(d) both (b) and (c).

28. Endocrine gland responsible for immunity is
(a) pineal (c) pituitary
(b)thymus (d) adrenal.

29. Parathorrnone deficiency disease is
(a) cretinism (b) hypercalcemia
(c)tetany (d)myxoedema.

30. Which one exclusively comprises endocrine glands ?
(a) pituitary, salivary, adrenals, ovary, testis
(b) pituitary, thyroid, adrenals, ovary, testis
(c) salivary , sweat glands, adrenals, ovary, liver
(d) adrenals, thyroid, salivary, liver, sebaceous.

31. Emergency gland is
(a) adrenals (c) liver
(b)pancreas (d) kidney.

32. 3F (Fear-fight-fight) gland is
(a) pituitary (b)thyroid (c) parathyroid
(d) adrenal.

Testosterone is responsible for
(a) deep voice
(b) enlargement of genital organs
(c) appearance of beard in male
(d) all of the above.

34. Kidney produces
(a) remin (b) vitamin
(c)testosterone (d) oxytocin.

35. Removal or absence of thymus in early life shall bring about
(a) lack of lymphocytes
(b) lack of antibodies
(c) lack of lymph nodes
(d) all of these.

36. Hormones differ from enzymes in being
((a) found in plants only
(b)found in animalsonly
(c) used up in metabolism
(d) not used in metabolism

37. A temporary endocrine gland formed ill ovary after ovulation is
(a) corpus uteri
(b) corpus albicans
(c) corpus callosum
(d) corpus luteum.

38.Diabetes insipidus is under control of
(a)ACTH (b)TSH
(c)ADH (d) Aldosterone.

39. Which hormone is mainly secreted *by* corpus luteum ?
(a) Thyroxine (b)progesterone
(c)HCG (d) Estrogen.

40 . Epinephrine is
(a) Andrenergic (b) cholinergic
(c) both (a) and (b) (d) none of the above.

41. GH controls growth through
(a)r-RNA (b)t-RNA
(c)m-RNA (d) all of these.

42.Undersecretion of corticoids produces a disease known as
(a) Addison's disease
(b)haemophilia
(c) anaemia
(d) mental retardation.

43. Insulin is secreted by
(a) a.-cells of pancreas
(b) r3-cells of pancreas
(c) spleen
(d) mucosa of oesophagous.

44. Pineal gland produces
(a) glucagons
(b aldosterone
(c) cortison
(d) melatonin.

45. Glucagon is produced by
(a) peptic cells (b)oxyntic cell
(c) alpha cells (d) beta cells.

46.Female sex hormone is
(a) estrogen (b)androgen
(c) insulin (d) adrenaline,

47. Neurohypopysis of pituitary secrets
(a) vasopressin and growth honnone
(b) oxytocin and estrogen
(c) vasopressin and oxytocin
(d) vasopressin and estrogen.

48. Parathyroid gland degeneration affect
(a) growth
(b) calcium concentration
(c) potassium concentration
(d) sodium concentration.

49. Cushing's disease is caused by hyperactivity of
(a)GH (b)thyroxine
(c) insulin (d) glucocorticoids.

50. Table salt is often iodised for certain area to prevent
(a) scurvy (b)goiter
(c) acromegaly (d) rickets.

51. The human honnone melatonin is secreted by the gland
(a) adrenal (b) hypothalamus
(c) pineal (d) thyroid.

52. Which of the following pairs is notcorrect
matched ?
(a) Holocrine: Thymus
(b)Merocrine: Salivary gland
(c)Apocrine: Mammary gland
(d)Endcrine: Ademal gland.

53. Which of the following pairs is/are correctly matched ?

(Gland)	(Hormones)
1. Pituitary ,	Follicle stimulating honnone

2. Thyroid Somatotropic honnone

3. Parathyroid Thyroxine
(a) 1 only (b) 2 and 3
(c) 3 only (d) 1,2 and 3.

54. Match List -I (Gland) with List -II (Honnones secreted by the glands) and
select and the correct answer using tIle codes given below the lists :

List-1 (Gland)	List-ll (Hormones secrete(by the glands)
	1. Insulin
A. Adrenal mediulla	
B. Pancreas	2. Adenocortiroid
C. Ovary	3. Epinephrine
D. Pituitary	4. Progesterone

Codes :

A B C D	A B C D
(a) 3 1 2 4	b) 3 1 4 2
(c) 1 3 4 2	(d) 1 3 2 4.

Question 55- 58: In each of the following question two statements are given, one is Assertion (A) and second is Reason (R). Of the statements, mark the correct answer.

57. **Assertion (A) :** Prolactin is also called the mild ejection hormone.
Reason (R) : Prolactin stimulates the smooth muscle contractions the mammary gland.
Codes
(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason ale false.

Assertion (A) : Glucagon is said to lower down the blood sugar level.
Reason (R) : Glucagon increases the utilization of glucose in the tissues and the synthesis of liver glycogen.
Codes
(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reasol1 (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

56. Assertion (A) : Hormones are similar to enzyme in their action and chemical nature.
Reason (R) : Hormones and enzymes are proteinaceous in nature and act as informational molecules. Codes
(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

58. **Assertion (A)** : Insulin is said to be n
anabolic hormone.
Reason (R) : Failure of insuline secretion causes diabetes.
Codes
(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason. (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

ANSWERS (CHAPTER-7)

1	(a)	13	(a)	25	(d)	37	(d)	49	(d)
2	(b)	14	(c)	26	(a)	38	(c)	50	(b)
3	(d)	15	(b)	27	(d)	39	(b)	51	(c)
4	(d)	16	(a)	28	(b)	40	(a)	52	(a)
5	(a)	17	(c)	29	(c)	41	(c)	53	(a)
6	(a)	18	(d)	30	(b)	42	(a)	54	(b)
7	(d)	19	(a)	31	(a)	43	(b)	55	(e)
8	(c)	20	(a)	32	(d)	44	(d)	56	(e)
9	(c)	21	(b)	33	(d)	45	(c)	57	(e)
10	(d)	22	(a)	34	(a)	46	(a)	58	(b)
11	(d)	23	(a)	35	(d)	47	(c)		
12	(b)	24	(a)	36	(c)	48	(b)		

CHAPTER-8
HEALTH DIEASES

Diseases and their causes

The condition of the body in which it's functioning gets disturbed due to various factors like malnutrition, environment, infections and heredity .

Types :

1. **Infectious diseases:** Spead from infected person to non infected one. Example: Chicenpox, Influenza, T.B., etc.

2. **Non Infectious diseases:** Disease which do not spread and caused due to some internal factors. Example: Cancer, Gotire, Anaemia etc.

Genetic Disease: Caused due to disturbance in genes. Example: Haemophilia, Albinism etc.

On the basis of causes, Disease are of the following types:

1. Bacterial: Caused by Bacterial infections :

Disease	Causing Bacteria	Means of Spread	Effects	Prevention
Cholera	Vibrio Cholerae	and water Contaminated food	Loose motions and vomiting dehydration and cramps in muscles	Sanitation and use of O.R.S. (Oral Rehydration solution
Whoping Cough (Pertusis)	Bacukkys oertysus	Droplets of cough spread through air	Inflammation in respiratory passage cold cough fiver	Vaccination of DPT and use of antibiotics
Tetanus	Clostridium	Bacterial spores enter	Musuclar rigidity in body through wounds and due to non sterilized surgical instrument	Vaccination of (DPT) and Injections of Antitetanus serum (ATS)
Diptheria	Corynebacterium diptherae	Through droplets suspended in air	Fever, sore throat	Vaccination (DPT)
Sanitation use of durgs and surgery.	Yersinia pestis	Through rat flea	High fever, haemorrhages swollen and painful buboes	Antiplague vaccination rat killing
Leprosy (Hansen's disease)	Mycobacterium Leprae	Skin and nasal, throat discharges	Nerves skin, lymphnodes eye, nose mouth larynx muscles and spleen damage, Number of body	Sanitation use of drugs and surgery

syphilis	Treponema pallidum	Through sexual contact and from mother to child	Ulcers in genital parts hair loss, swollen joints rashes	Use of antibiotics like pencillin tetracycline

1,.Viral Diseases: Spread thorugh Viruses:

Disease	Causing Bacteria	Means of Spread	Effects	Prevention
Measles	Polynosa morbillorum	Thorugh contact droplets	Itching rashes, spots on whole body	Vaccination (MMR) (Mumps Measles Rubella) and Vitamins A
Mumps	Paramyxo	Through contact and droplets	Difficulty in swallowing fever, bodyache	Vaccination (MMR)
Small box	Variola	Through oral, nasal, vassicular discharge	Reddish spot finally chage into scab and leave permanent marks	Vaccination
Chicken pox	Varicella zoster	Direct contact	Aches, high fever, dark spots turn into scab	Using boric acid OIl itching part
Polio	Enetro virus	Through faecus urine, nasal secretion, air water, through flies	Inflammatin of nervous system, inability to bend	Vaccination
Rabies	Rhadbo Virus	Through bitting saliva of cat, dog, monkey	Choked throat, high fever, hydrophobia, salivation	Vaccination
Hepatitis	HAV, HCV, HEV, HBV, HDV, HGV	Through faccal and oral route	Fever, nausea vomiting, urine becomes dark and stool pale, liver damage	Sanitation
Dengue	Den 1 4 virus	Through aedes mosquito	Fever, chill pain in joints	Paracetamol acid for blood platelets
Corona	SARS-COVID 19	Through contact and droplets	Fever, cogh, breathelessness	Sanitation, and social distanceing Regular hand wash

3. Protozoan
1. Bacterial: Caused by Bacterial infections

Disease	Causing Bacteria	Means of Spread	Effects	Prevention
Malaria	Plasmodim vivex	Female Anopheles	Chill, Fever, loss of RBC	Use of mosquito nets, remedy like chloroquine
African sleeping sickness	Trypanosoma	Tse-Tse fly	Fever with swollen glands brain damage and unconsciousness	Destruction of shrubs

Fungal Disease: Ringworm, Aspergillosis, Tineapedies etc.
Genetic Diseases:

1. **Albinism:** Caused due to inability to pr9oduce melanin that is the pigment of skin which prevents from harmful effects of solar radiations.
2. **Haemophilia:** Blood coagulation does not take place due to deficiency of anti-haemoglobirn factor
3. **Colour Blindness:** In this disease human cannot differentiate between green and red colur.

EXCERCISE

1. Extreme swelling on legs and feet is the main symptom of the disease
(a) food poisoning
(b) AIDS
(c) elephantiasis
(d)malaria.

2. Which one is a bacterial disease ?
(a) ringwonn (b) AIDS
(c) Malaria (d) Leprosy.

3. Diphtheria is related with
(a) liver
(b)blood
(c) throat
(d) spleen.

4. Haemophilia is a disease of
(a) heredity
(b) bacteria
(c) virus
(d)vit. C deficiency.

5. Excessive secretion of growth honnones causes
(a) diabetes
(b) asthma
(c) dwarfism
(d) gigantism.

6. Cretinism is a disease of
(a) bacteria
(b) virus
(c) hormone
(d) genetics.

7. Leukaemia is a
(a) bacterial infection
(b) fungal infection
(c) a type of cancer
(d) lung disease.

8. DPT is used to prevent
(a) tuberculosis (c)polio
(b) diphtheria (d) all of these

9. Ringworm is caused by
(a) fungi
(b)virus

(c) bacteria
(d)protozon.

10. BCG is used to prevent
(a) whooping cough
(b)cancer
(c) T.B.
(d) diabetes.

11. In our body the immune system is suppressed by this disease :
(a)AIDS (b)T.B.
(c) cancer (d) arthritis.

12. AIDS is a disease of
(a) bacteria
(b) virus .
(c) fungus
(d) hormone

13. Most. effective medicine for malaria is
(a) streptomycin (b)quinine
(c) penicillin (d) none of these.

14. Which one is a viral disease ?
(a) Cholera
(b)Tetanus
(c) Rabies
(d) none of these.

15. Which disease is called as disease?
(a) Haemophilia
(b)Cancer
(c) Diabetes
(d) Anaemia.

16. Silicosis is a disease of
(a)honnone
(b) occupational
(c) genetic
(d) none of these.

17. Name of malarial parasite is
(a) Plasmodium vivax
(b) Salmonella
(c) Aspergillus
(d) Trepanosoma.

18. Streptomycin is
(a) a pesticide
(b) a narcotic drug
(c) an antibiotic
(d) none of these.

19. Leukemia is a cancer of
(a) skin (b)blood
(c) breast (d) tongue.

20. Black death is the name given to
(a) Malaria (b) Cholera
(c) Cancer (d) Plague.

21. Ascaris is transmitted through
(a) house-fly
(b) contaminated food and water
(c) mosquito
(d) tse-tse fly.

22. Rats are known to transmit the germs for
(a) malaria (b)typhoid
(c)plague (d) rabies.

23. Infection of taeniasis usually occurs by
(a) mosquito
(b) roughly cooked food
(c) contaminated food and water
(d) none of these.

24. Kala azar is caused by
(a) Ascaris
(c) Salmonella
(d) Trepanosoma.
(b) Leishmania

25. Polio vaccine was first prepared by
(a)J. Salk (b)L. Pasteur
(c)G. J. Mendel (d) Watson.

26. The disease haemophilia, in human beings, is due to
(a) sex-linked recessivF gene

(b)sex-linked dominant gene
(c) autosomal recessive gene
(d) autosomal dominant gene.

27. Consider the following statements regarding human nutrition :
1. Iodine deficiency can cause mental disability .
2. Retinal deficiency leads to defective tooth formation.
3. Thiamine deficiency lead to waterlogging of the body tissues.

4. Niacin deficiency causes pellagra.
Which of these statements is/are correct?
(a) 1,2,3 and 4 (b) 1 only
(c) 4 only (d)3 only.

28. Which of the following is a generic disorder ?
(a) Bronchitis
(b) Night blindness (c) Osteoporosis
(d) Sickel cell anaemia.

29. Cerebral malaria is caused by
(a) Plasmodium falciparum
(b) Plasmodium malariae
(c) pPlasmodium ovale
(d) Plasmodium vivax.

30. Which of the following is bacterium?
(a) Escherichia coli (b) Neisseria gonorrhoeae
(c) Treponema pallidun (d) Wuchereria bancrofti.

31. Match List -I with List -II and select and the correct answer using the codes given below the lists :

List-I	List-ll .
A. Common cold	I. Haemophilus pertussis
B. Food poisoning	2. Rhino virus
C. Whooping cough	3. Streptococcus
D. Septic sore throats	4. Clostridium botulinum

Codes :

A B C D	A B,C D
(a) 2 4 1 3	(b) 2 4 3 I
(c) 4 2 1 3	(d) 4 2 3 I.

32. Consider the following pairs
1. Robert Koch - Anthx bacterium
2. Edward Jenner -Vaccine
3. Pasteur -Rabies
4. Emil Von Behring -Passive immunity

Which one of the following diseases is not prevalent in India ?
(a) 1 alone (b)2,3 and 4
(c)1,2and4 (d)1,2,3and4.

33. Which of the following diseases is not prevalent in India ?
(a) Hepatitis (b)Fluorosis
(c) Yellow fever (d) Meningitis.

34. Match List -I with List -II and select and the correct answer using the codes given below the lists :

List-I	List-1I
I. Angina pectori	A. Fat deposits in the lumen
II. Myocardial infarction	B. Clot formed in coronary artery
III. Hypertension	C. Significant narrowing of lumen of coronary artery
IV. Artherosclerosis	D. Increase in systolic / diastolic system

(a) I-B, II-c, III-A, IV-D (b) I-B, II-c, III-D, IV-A (c) I-C, II-B, III-A, IV-D (d) I-C,II-B, III-D, IV-A.

35. Match the following :

(Deficiency)	(Vitamin/ Hormones)
I Weakness	A. Adrenal
II Tetany	B. Vitamin B_{12}
III Beri-beri	C. Vitamin B_1
IV Addison's disease	D. Parathyrod
	E. Vitamin B_1

(a) I-E, II-C, m-A, IV-D
(b) I-B, lI-D, m-c, IV-A
(c) I-B, lI-E, m-c, IV-A
(d) I-D, II-A, m-B, IV-C.

36. Which of the following are. correctly matched ?

1. Tse-tse fly	-Following are correctly matched
2. Female Anopheles mosquito	-Malaria.
3. Sand fly	-Kala-azar

(a) 1 and 2 (b) 2 and 3
(c) 1 and 3 (d) 1,2and3.

37. Which of the following pairs is correctly matched ?

(Disease)	(Causative agent
a. Scabies	-Entamoeba histolytica
b. Pneumonia	Sarcoptes spp.
c Filarial	Wuchereria Bancrofti
d. Tetanus	Haemophilus pertussis

<u>Directions for Q. 38- 41</u> : The each of the following questions two statements are given, one is Assertion (A) and second is Reason (R). Of the statements, mark the correct answer is

(a) If both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.

(b) If both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.

(c) If Assertion (A) is true but Reason. (R) is false

(d) If Assertion (A) is false but Reason. (R) is true. ,

38. Assertion (A) : Haemophilia is a genetic disorder.

Reason (R) : Its genes are located in the differential segment of X-chromosome.

Codes :

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.

39. Assertion (A) : Malaria is caused by Plasmodium sp.
Reason (R) : Its genes are located in the differential segment of X-chromosome.

Codes
(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.

ANSWERS

1	(c)	10	(c)	19	(b)	28	(d)	37	(c)
2	(d)	11	(a)	20	(d)	29	(a)	38	(a)
3	(c)	12	(b)	21	(b)	30	(d)	39	(b)
4	(a)	13	(b)	22	(c)	31	(a)	40	(c)
5	(d)	14	(c)	23	(b)	32	(d)	41	(b)
6	(c)	15	(a)	24	(b)	33	(c)		
7	(c)	16	(b)	25	(a)	34	(d)		
8	(b)	17	(a)	26	(a)	35	(b)		
9	(a)	18	(c)	27	(c)	36	(d)		

(c) If Assertion (A) is true but Reason (R) is false

(d) If Assertion (A) is false but Reason (R) is true.

40. **Assertion (A) :** Rabies is a viral disease.

Reason (R) : Filariasis is transmitted by Aedes mosquito.

Codes

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.

(b) Both Assertion (A) and Reason (11.) are true and Reason is not correct explanation of Assertion.

(c) If Assertion (A) is true but Reason (R) is false

(d) If Assertion (A) is false but Reason (R) is true.

41 **Assertion (A) :** Gonorrhoea bacterial disease,

Reason (R) : It spreads through sexual contact, common toilets and under clothes.

Codes

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.

(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.

(c) if Assertion (A) is true but Reason (R) is false

(d) If Assertion (A) is false but Reason (R) is true.

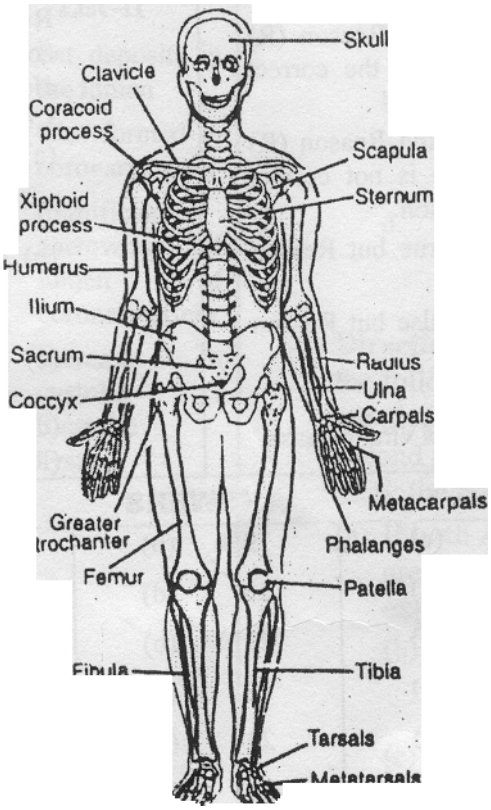
HUMAN SYSTEM

SKELETAL SYSTEM

- Osteology is the study of skeleton.
- Total bones in human endoskeleton are 206 while in newly born baby have 300.

Bone	Number
(A) Axial Skeleton	(total bones are 80)
(a) Skull	29 (Cranium 8, Face 14, Hyoid 01 and Ear Ossicles 06
(b) Vertebrae	26 (Sacruml-1 coccyx-1, cervical 7, thoracic 12 and lumbar 5)
(c) Ribs	24 (12 on each side)
(d) Sternum	01

Human Endoskeleton



(B) Appendicular Skeleton) (Total bones are 126)

(I) Upper extremity (Total bones are 64)

(a) Pectoral girdles	04 (two in each Pectoral girdle
(b) Upper arms	-02
(c) Lower arms	-04
(d) Wrists	-16
(e) Palms	-10
(f) Fingers	-28

(II) Lower extremity (Total bones are 62)

(a) Pelvic girdles	02 (one bone in each pelvic girdle)
(b) Thighs	02
(c) Knee caps.	02
(d) Lower legs	04
(e) Ankles	14
(f) Soles	10
(g) Toes	28

- Femur is longest bone and stapes is smallest bone
- Arthrology study of joints.
- Fibula is the thinnest bone.
- Tibia is shin bone. ..
- Sternum is absent in fishes.
- Tibia fibula is the longest bone of frog.
- Funny bone is a bone found in bend of the elbow.
- Spondylitis Inflammation of vertebrae.
- Synovitis an inflammation leading to selling at joint.

- Chondrology study of cartilages.
- Bone is the hardest tissue.
- Os-penis A bone found in the penis of rodents.
- Fibro cartilage is strongest cartilage.

MUSCULAR SYSTEM

Muscles contribute most of the total weight of the body (about 40%).
Muscle tissues are of 3 types-striated, non-striated and cardiac.

STRIA TED MUSCLES

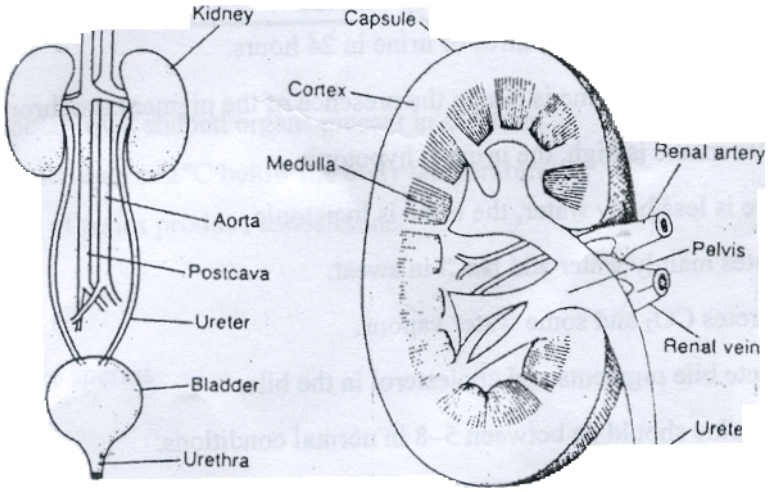
- Striated muscles are attached to bones by tendons and can be moved at will, so it is also
  called voluntary or skeletal muscle.
- Each muscle fibre has alternate dark (A) and light (I) bands.
- At the centre ofI-band, a fine dark Z-line is present.
- Sarcomere is the functional unit of a muscle fibre.
- Myofibrils are made up of thick myosin and thin actin filaments.
- Strained muscles are present in limbs, tongue, pharynx etc.

NON-STRIATED MUSCLES

- Uric acid is commercially extracted from bird droppings.

EXCRETORY ORGANS OF INVERTEBRATES

- Flame cells are the organs of excretion in tapeworm
- Sponges remove their wastes through water canal system
- In *Hvdra,* cells release waste into coelentreron
- **In** annelids, excretion takes place by Malpighian tubules
- **In** prawns, excretion takes place by green glands.



(i) **Kidney**

- Bean shaped and present in abdomen.
- Nephrons are the structural and functional units of kideny
- They form urine and drain it ultimately into the pelvis of the kidney from where the ureter arises.

(ii) This muscular tubes emerge out from the hilum of kidneys

- Urine enters the ureter from the renal pelvis.

(iii) **Urinary bladder**

Sac like structure which stores urine temporarily.

(**iv) Urethra**

- Membranous tube which conduct urine to the exterior .
- Urethral sphincters keep the urethra closed except during voiding of urine.
- The act of voiding urine is called micturition.

URINARY ELIMINATION IN MAN

Nephron

(A) **Bowman's capsule**

It has a network of blood capillaries called glomeruls which together form Malpighian body.

Blood enters glomerular capillaries through afferent arteriole and leaves through efferent arteriole.

(B) Renal tubule

It consists of 3 parts
(a) Proximal convoluted tubule(PCT) ,
(b) Loop of Henle thin descending and thick ascending limb.
(c) Distal convoluted tubule (DCT) open into collecting duct.

Knowledge Update

- An adult man secretes l-l.8litres ofurine in 24 hours.
- The yellow colour ofurine is due to the presence of the pigment urochrome.
- When water intake is high, the urine is hypotonic.
- When there is less body water, the urine is hypetonic.
- Skin excretes mainly water and NaCI in sweat.
- Lungs excretes CO2 and some water vapour .
- Lever excrete bile pigments and c4olesterol in the bile.
- The pH of urine should be between 5-8 in normal conditions.

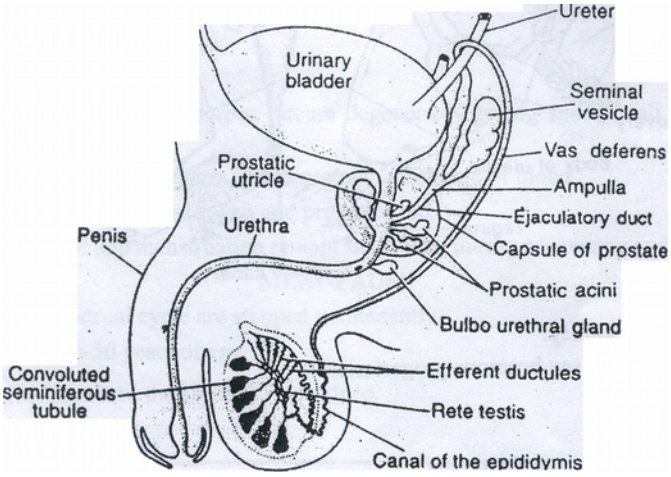
CHAPTER- 10 (c)

REPRODUCTIVE SYSTEM

A process by which living organisms produce young ones of their own type is called reproduction.

- Asexual reproduction without the formation and union of sex cells. *e.g.,* budding *(Hydra),* binarr fission *(Amoeba)* and multiple fission (malarial parasite).
- Sexual reproduction fusion of male and female gametes.

MALE REPRODUCTIVE SYSTEM



Testes

- A pair of glandular, oval shaped organs present in scrotum.
- Temperature of scrotum is 2°C below the body temperature,
- Endocrine tissue of testes produce testosterone.

Vas deferens

- **Conduct and store sperms**

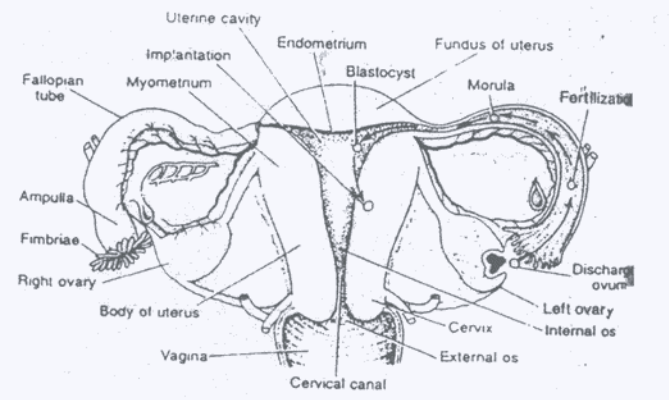
Urethra

- **It is** a **thick walled muscular duct,and it is** a **common passage for both urine and semen**
- **Also called urinogenital duct.**
- **It traverse and opens at the tip** of the **penis.**

Penis

- **It** is erectile copulatory organ.
- Helps in deposition of sperms into female genital tract.

FEMALE REPRODUCTIVE SYSTEM



Ovaries

- **Situated near kidney.**
- **Produce egg and sex hormone progesterone.**

Fallopian tube

- Extends from ovary to the uterus.
- conduct egg and provide site for fertilization.

Uterus

- It is situated above and behind the urinary bladder and remains attached to the body wall by ligaments.
- The wall of uterus is composed of smooth muscles fibres called myometrium.
- Lumen of the uterus is lined bya mucous membrane called endometrium.
- Receives ova or egg.
- In uterus. foetus gets attached by placenta.

Vagina

- Open to the exterior between the urethra and the anus.
- Receives semen from penis during mating.
- Serves as birth canal at ~e time of baby birth.

PAm OF SPERMS IN MAMMALS

Seminiferous tubules → rete testis → vas efferentia → epididymis → vas deferens → urinogenital sinus → urethra → vagina

GAMETOGENESIS

- Process of formation of gametes is in gonads.
- It includes spermatogenesis and oogenesis.
- Gemtogenesis is controlled by gonadotropic hormones (FSH, LH, ICSH etc.) secreted by pituitary gland.

MENSTRUALCYCLE

- Cyclic changes occurs in the uterus, extending approximately a month period (mesum).
- Menstrual cycle has three phases i.e. proliferative, secretory and menstrual phase.
- Proliferative Phase
- FSH stimulates follicle to secrete estrogens.

- Phase has duration of 10-12 days.
- It is also called follicular phase.
-

Secretary Phase

- Corpus luteum secretes progesterone.
- Phase has duration of 12-14 days.

Menstrual Phase

- If ovum is not fertilized, the corpus luteum degenerate causing sudden fall in the progesterone level.
- Break down of endometrium takes place results in discharge of blood.
- It is controlled by FSH, LH, estrogen and progesterone.
- The menstrual cycle and menstruation remain suspended during pregnancy and lactation.

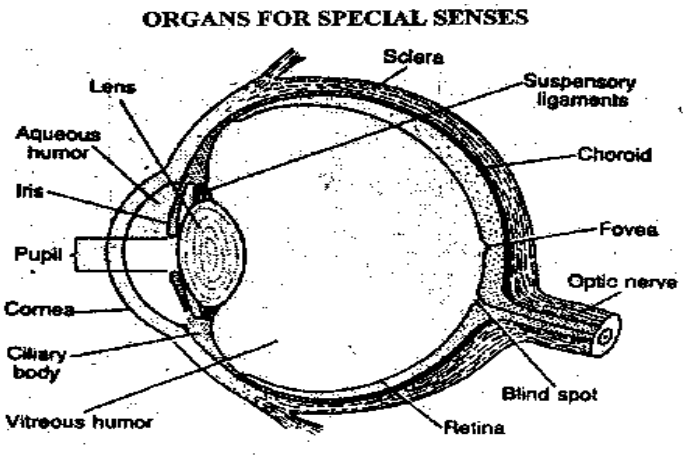
MENOPAUSE

- Ovulation and menstrual cycle are stopped permanently.
- It occurs around 45-50 years of age.
- In this stage, woman lose the ability to reproduce.

Knowledge Update

- **Amniocentesis :** A technique to detect the chromosomal abnormalities, if any, in the developing-
  foetus by analyzing the cells present in the amniotic fluid.
- Population explosion: Enormous increase in population n a short span of time.
- Test tube baby: A baby born form the ovum fertilized in vitro and then implanted in the woman's uterus.

CHAPTER- 10 (d)



- Sense organs for vision having photoreceptors, which convert the energy of specific
  wavelength of light into action potentials of nerve fibres.
- Eye located in bony cavity , orbit. ,.
- Each eye is a hollow spherical organ often caned eye ball.
- The wall of eye ball having 3 concentric layers-sclera, choroids and retina.

Sclera

- Outerlayer is made up of white fibrous tissue and have transparent cornea.
- Cornea covered by thin and transparent membrane is conjuctiva.

Choroid

- Iris has a small aperture in the centre called pupil.
- A transparent watery fluid called aqueous humour fills the space between the lens aId
  cornea.

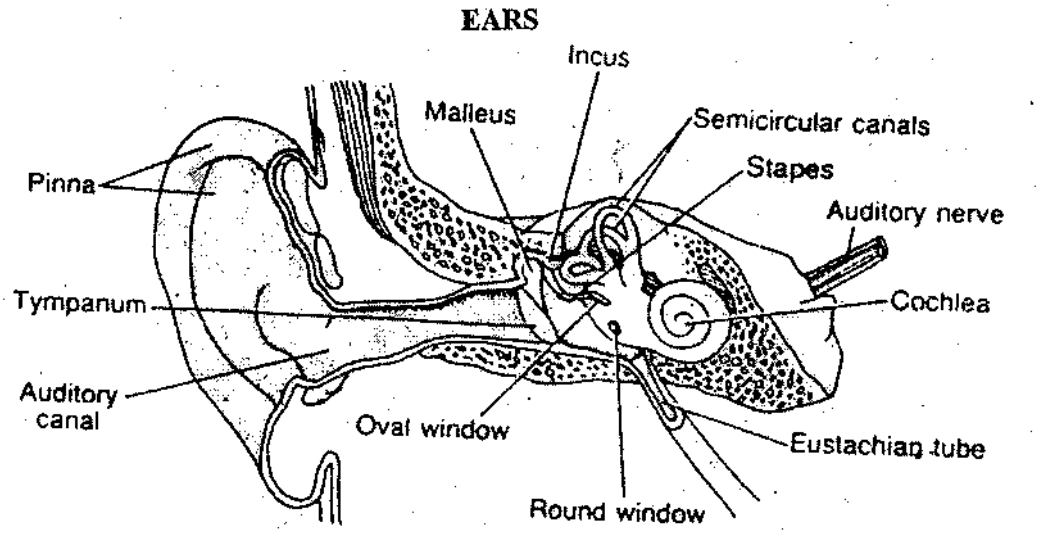
Retina

- It is the innermost light sensitive layer.
- It is made up of 2 types of cells-photoreceptors rods and cone cells.
- Rods contain a purple coloured photosensitive pigment rhodopsin (formed from vit. A)
  and are sensitive even in dim light and dark.
- Cones have a violet coloured photosenSitive pigment iodopsin and are sensitive to bright
  light and colour perception.

Knowledge Update

- Many domestic animals and sharks do not possess colour vision.
- Many nocturnal animals like owls have mainly rods in retina and are able to see in darkness.
- Human eyes are sensitive only to visible range of the spectrum (380-760 nm).

- Bees can sea ultraviolet light.
- Colour blindness (or daltonism) is caused due to the deficiency of.... .
- **Myopia (short sightedness)** : Image is formed in front of retina Corrected cy Concave lens-
- **Hypermetrop... (long sightedness) :** Image isformed behind the retina corrected by convex lense.
- .Retina of owl pontains rods and fowl can only ,cones.



It consists of 3 parts external, middle and internal ear.

External Ear

- It consists of an ear lobe or pinna and an external auditory canal.
- It collects and directs sound waves into the external auditory canal.

Middle Ear

- Middle ear having 3 small bones, called ear or auditory ossicles.
- These are hammer shaped malleus, anvil shaped incus and stirrup like stepes.

Internal Ear

- It consists of a bony labyrinth and a membranous labyrinth.
- The bony labyrinth has 3 bony semicircular canals, a bony cavity called vestibule and a coiled
- bony tube called cochlea and is filled with perilymph.

Knowledge Update

- Human ears can hear sounds of 60-80 decibel.
- Bats produce and hear ultrasonic sounds.
- Sound frequency is measured in decibels.

TONGUE

- Taste buds are the organs for taste sensation.

- Taste buds are present on the papillae of mucous membrane on the surface of tongue.
- The human tongue bears about 10,000 taste buds.
- A taste bud has taste receptor cells which act as chemoreceptors.
- The anterior part of the tongue is most sensitive to sweet taste, back to the bitter and sides to
  salty and sour.
- The taste of chillies is a sensation of burning pain of the pain receptors of the tongue.

- Receptors for smell occur in a modified form of pseudostraitified epithelium covering a part of the
  nasal mucosa. It is called olfactory epithelium. .
- The olfactory receptor cells function as chemoreceptors. They are stimulated by specific chemica-l
  substances and produce impulse of smell.
- Continuous smelling of an odour make the receptor cells immune to that odour and the receptor
  cells fail to respond to the sensation.

EXERCISE

1. Tendons are made up of
   (a) collagen (c) keratin
   (b) elastin (d) all of these.

2. Ligament is made up of
   (a) collagen
   (b) elastin yellow fibres
   (c) keratin
   (d) all of these.

3. Bone marrow is absent in
   (a) reptilia (b) amphibia
   (c) fishes (d) birds.

4. Osteoblasts are found in
   (a) blood (b)muscle
   (c)bone (d) cartilage.

5. Major macrophages are formed in
   (a) liver (b)spleen
   (c) pancreas (d) kidney.

6. Absorption of fatty acids and glycerol occurs in
   (a)neputic portal vein
   (b) abdominal vein
   (c) lymph vessel
   (d)hepatic artery

7. Bile acids are
   {a) carbohydrates (b)steroids
   { c) proteins (d) vitamins.

8. Fatty acids are absorbed in
   (a) duodenum (b)oesophagous
   (c) ileum (d) stomach.

9. The largest gland in the human body is
   (a) gall bladder (b)liver
   (c) pancreas (d) brain.

10. In reminants cellulose is digested by
   (a) warms (b) symbiotic
   (c) enzyme (d) protozoans.

11. Food after getting churned in stomach is called
   (a) bolus (b)chyle
   {c)chime (d) none of these.

12. Glycogen is stored in
(a) liver
(b)muscles
(c) both (a) and (b)
(d) blood.

13. The contraction of gall bladder is due to
(a) gastrin
(b) secretin
(c) cholecystokinin
(d) enterogastrone.

14. Oxyntic cells secrete
(a)HCl (b)NaOH
(c)pepsin (d) trypsin.

15. Maximum food absorption takes place in
(a) ileum (b)colon
(c)rectum (d) stomach.

16. Liver stores
(a) vitamin D (b)vitamin A
(c) vitamin K (d) all of these.

17. Digestion of both starch and protein is done by
(a) gastric lipase
(b) gastric juice
(c) pancreatic juice
(d) ptyalin enzyme.

18. Gall stones cause
(a) anaemia
(b) obstructive jaundice
(c) kidney failure
(d) dysentery .

19. Saliva has this enzyme :
(a) pepsin (c) trypsin
(b) ptyalin (d) rennin.

20. Major part of digestion is completed in
(a) the mouth
(b)stomach
(c) small intestine
(d) large intestine.

21. Respiratory quotient (R.Q.) for fat is
(a) more than one (b)zero
(c) asthma (d) epistaxis.

22. Stage when lung collapsed, specially the alveoli is
(a) atelactasis
(b) poliomyelitis
(c) asthma
(d) epistaxis.

23. Pouched gills are found in
(a) fishes
(b)cyclostomes
(c) amphibians mammals.
(d) aquatic

24. Biological oxidation in Krebs cycle involves
(a)N_2 (b)CO_2
(C)O_2 (d)SO_2

25. Total lung capacity is
(a) 1200 ml
(b) 2400 ml
(c) 500ml
(d) 5800ml.

26. Which of the following part of intestine is situated near to the stomach ?
(a) Ileum
(b)Duodenum
(c) Caccum
(d) Rectum.

27. Residual air can be traced in
(a) alveoli
(b)bronchi
(c) nasal chambers
(d) trachea.

28. If the skin of earthwonn becomes dry , it dies due to
(a) asphyxia
(b)starvation
(c) intoxication
(d) dehydration.

29. Larynx is also called
(a) glottis (b) epiglottis
(c) voice box (d) vocal chord.

30. Who discovered blood circulation ?
(a) Stephan Hales (b) William Harvey
(c) Staring (d) Aristotle.

31.Artery differs from vein in having
(a) narrow wall
(b)thick walls

(c) valves
(d) none of these.

32.The blood protein not involved in blood coagulation is
(a) fibrinogen
(b) cholecystokinin
(c) thrombin
(d) fibrin.

33. Blood pressure of a healthy person is
(a) 90/60
(b)200l/10
(c) 120/80
(d) 140/60.

34. Heart beat is initiated in man by
(a) SA node
(b) Pukinje fibres
(c)AV node
(d) bundle orHis.

35. The universal recipient blood group is
(a) AB (b)O
(c)A (d)B.

36. The mesodennal cavity where blood is present
(a) pseudocoel
(b)spongocoel
(c) haemocoel
(d) enterocoel.

37.Life span of human RBC is about
(a) 45 days (b)80 days
(c) 120 days (d) 180 days.

38. The human heart is
(a) two chambered
(b)Three chambered
(c) four chambered
(d) none of these.

39. Formation of blood
(a) haemolysis
(b) haemopoiesis
(c) plasmolysis
(d) anoxemia.

40. Functional unit of kidney is
(a) nephron (b) nephritis
(c) neuron (d)loop of HenIs.

41.Urea is transported by
(a) lymph
(b) blood plasma
(c) RBC
(d) WBC.

42. The yellow colour of urine is due to
(a) urochrome
(b)bilirubin
(c) bilivirdin
(d) xanthophil.

44. Water reabsorption in kidney is controlled by
(a)GH (b)ADH
(c)both (d) aldosterone.

45. Green glands, present in some arthropods help in
(a) respiration
(b) excretion
(c) digestion
(d) reproduction.

46. A condition of failure of kidney to form urine is called
(a) deamination (b)entropy
(c) anuria (d) none of these.

47. Waste material in Amoeba is taken out by
(a) plasmalemma
(b) Malpighian tubule
(c) nephron
(d)vacuole.

48. The excretory product of birds and reptiles is
(a) urea (b) ammonia
(c) uric acid (d) TMV

49. Ammonia is converted into urea in
(a) liver (b)stomach
(c) pancreas (d) intestine.

50. Sweating from body is related to
(a) thermal regulation
(b)water regulation
(c) excretion of salts
(d) all of these.

51. Total number of bones in man are

(a) 106 (b)206
(c) 306 (d) 406.

52. The total number of bones in huma1
skull are
(a) 26 (b)29
(c)30 (d) 107

53.Number of c vical vertebrae in camel are
(a) 9 (b)7
(c) 14 (d) 10.

54. The coccygenone in man, is found in
(a) pelvic girdle
(b) skull
(c) pectoral girdle
(e) vertebral column.

55. The number of vertebrae found in man is
(a) 26 (b)31
(c) 33 (d)46. ,

56. Total number of bones in the hind limb of a man is
(a) 14 (b)21
(c)24 (d)30.

57. Which of one is the voluntary muscle ?
(a) smooth (b)striated
(c) cardiac (d) none of these.

58. Wrist bone is
(a) carpels (c) pterigoid
(b)tibia fibula (d) gyrnnocoel.

59. Myoglobin is found in
(a) muscle (c) bone marrow
{b)blood (d) heart.

60. Human ear can hear sound of
(a) 60-80 decibel
(b) 60-80 million decibel
(c) 60-80 billion decibel
(d) 60-80 trillion decibel.

61. Ganglia are
(a) group of cytone
(b) group of axon
(c) cyton
(d) axon.

62.The nervous tissue develops from an embryonic
(a)ectodenn (b)mesodenn
(c) endodenn (d)mesenchyme.

63. Nissl's grangules are absent in
(a) dendrite
(b)cyto
(c) axon
(d) both (a) and (b).

64. Cavities of brain are called
(a) auricles (b)coelom
(c) ventricles (d) lumen.

65. Which nerve is exclusively motor ?
(a) Vagus (b)Facial
(c) Spinal accessory
(d) Maxillary .

66. Which of the following is the largest car ossicle ?
(a) Incus
(b)Stapes
(c) Stapedial plate
(d) Malleus.

67.Organs of Ruffini are receptors of
(a) heat (b)cold
(c) pressure (d) touch.

68. Suspensory ligaments are found in
(a} brain (b} eye
(c } ear (d} kidney.

69. Bat can travel with
(a) open eyes
(b)plugged eyes and open ears
(c) plugged ears and open eyes
(d) closed ears and plugged eyes.

70. Main hearing part is of an ear
(a) cochlea (b)canals
(c) utriculus (d) eustachian tube.

71. Cretinism is due to deficiency of
(a) thyroxine
(b)parathormone
(c) adrenaline
(d) growth hormone.

72. Male sex hormone releasing gland is
(a) Leydig cells
(b) seminiferous tubules
(c) prostrate gland
(d) testes.

73. During emergency one of these is essential
(a) thyroxine
(b) adrenaline
(c) aldosterone
(d) calcitonin.

74. The fight, fight and fright honnone is
(a)adrenaline
(b)oxytocin
(c) insulin
(d) gludagons.

75. Steroid is a
(a)thyroidacid
(b)vitaminA
(c) cholesterol
(d) easter and fatty acid.

76. Copper- T prevents
(a) ovulation
(b) fertilizaion
(c)both (a) and (b)
(d) implantation.

77. Failure of decent of testis in scrotal sacs is called
(a) vasectomy
(b)cryptorchidism
(c)impotency
(d) tubectomy.

78. Gynogenesis is shown by
(a) nematodes
(b)few annelids (c)both (a) and (b)
(d) none of these.

79. Human foetus has coat of hair called as
(a) fur (b) scutes
(c) libids (d) lanugo.

80.Corpus spongiosum is a part of
(a) ovary (b)testis
(c) uterus
(d) male copulatory organ.

81. With reference to human body which one of the following statements is correct?
(a) the first cervical vertebra is called axis
(b) the coccyx consists of five fused vertebrae
(c) out of the 12 pairs of ribs, the last four pairs have no anterior attachement
(d) there are five lumber vertbrea.

82. Match List -I (Bone Disease) with List -II (Characteristic) and select and the correct answer using the codes given below the lists :

List-I (Bone Disease)	**List-II (Characteristic)**
A. Gout	1. Bones fuse and joints become immovable
B. Rhyumatoid arthritis	2.Erosion of the joint cartilages and roughening of their articular surfaces
C. Osteoarthritis of	3. Accumulation uracacid crystals in

synovial joints

Codes : A B C A B C

(a) 3 2 1 b) 2 1 3

(c) 3 1 2 (d) 1 3 2.

83. With reference to human heart, which one of the following is not correct ?

(a) the left atrium receives oxygenated blood returned from lungs

(b) the right atrioventricular valve is called bicuspid value

(c) the ventricles have thicker mascular walls than the atria

(d) the wall of the right ventricle is thinner than that of the left ventricle.

84. Which one of the following is first utilized in human body for obtaining energy ?

(a) fat reserves (b) protein reserves

(c) vitamin reserves

(d) glycogen reserves**.**

85. With reference to a normal human being which one of the following statements is not correct ?

(a) compared with skeletal muscles, the tissues of intestine are much more affected by the shortage of oxygen

(b)in the arterial blood, haemoglobin is normally 97 percent saturated with oxygen

(c) the pulmonary artery contains deoxygenated blood

(d)about 70 percent of the carbon dioxide entering the erythrocytes reacts with the water to form carbonic acid.

86. Consider the following :

1. Blood 2. Bone

3. Ligaments 4. Tendons

Which of these are connective tissues ?

(a) 1,2,3 and 4

(b) 1 and2

(c) 1,3 and 4

(d) 3 and4.

87. Which one of the following enzymes is present in human uccal cavity ?

(a) Trypsin (b) Ptyalin

(c) Lipase (d) Gastrin.

88. Which one of the following parts of the brain has centres for maintenance of posture and equilibrium of the body ?

(a) Hypothalamus

(b) Parietal lobe of cerebrum

(c) Frontal lobe of cerebrum

(d) cerebellum.

89. Which one of the following groupings is not appropriate ?

(a) fallopian tube, uterus, clitoris, Cowper's gland

(b) epididymis, vas deferens, prostate gland, seminal vesicles

(c) oesophagus, duodenum, ileum, rectum

(d) nephron, glomerulus, bladder, Henle's loop.

90. Match List -I (Cranial nerves in man) with List -II (Function) and select and the correct answer using the codes given below the lists :

List-I (Cranial nerves in man)	**List-1I (Function)**
A. Trigeminal	1. Movement and secretion
B Vagus	2. Hearing and equilibrium
C. Auditory	3. Touch and taste
D. Olfactory	4. Smell

Codes:

A B C D	A B C D
(a) 3 1 2 4	(b) 2 1 3 4
(c) 3 2 4 1	(d) 1 2 3 4

91. The following layers are found in the structure of the eye

1. Conjunctive
2. Choroid
3. Retina
4. Sclerotic

The correct sequence of these layers from outer to inner layers is

(a) 4, 1,3,2 (b) 4, 1,2,3
(c) 1,4,2,3 (d) 1,4,3,2.

Directions for Question 92- 100 : In each of the following question two statements are given, one is Assertion (A) and second is Reason (R). Of the statements, mark the correct answer .

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

92. **Assertion (A) :** In the digestive system of human body, water is absorbed in the large intestine.
Reason (R) : Large intestine does not secrete enzymes.

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A)i is false but Reason (R) is true. ,
(e) If both assertion and Reason are false.

93. Assertion (A) : If a muscle is stimulated repeatedly, it does not respond to stimuli at all.
Reason (R) : Lactic acid accumulates in the muscle.

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.

(b)Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

94. Assertion (A) : Ball and socket joints are the most mobile joints.
Reason (R) : Synovial fluid is present here.

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

95. **Assertion (A) :** Arthritis or inflammation of a joint makes the joint painful.
Reason (R) : Some toxic substances are deposited at the joints.

(a) Both Assertion (A) and Reason (R) .are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason ;(R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) if both assertion and Reason are false.

96. **Assertion (A)** : Left ventricle of heart has a thinner well than that of the right ventricle.
Reason (R) : Left ventricle needs to pump blood to nearby lungs only.

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R-) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

97. Assertion (A) : Walls of ventricles are thicker than the auricles.
Reason (R) : This helps in preventing the back flow of the blood.

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true. .
(e) If both assertion and Reason are false.

98.Assertion (A) : A V node is also called as the pace maker of the heart.
Reason (R) : It is because of the fact that A V node determines the rate of heart beat.

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

99. Assertion (A) : Blind spot on the retina of the eye is devoid of the ability for vision.
Reason (R) : The photoreceptor cone cells are absent at the blind spot.

(a) Both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.
(e) If both assertion and Reason are false.

100. **Assertion (A)** : All the cranial nerves are said to be mixed nerve.
Reason (R) : All cranial nerves carry both sensory and motor nerve fibres simultaneously.

(a) Both Assertion (A) and Reason **(R)** are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason **(R)** are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason(R) is true.
(e) If both assertion and Reason are false.

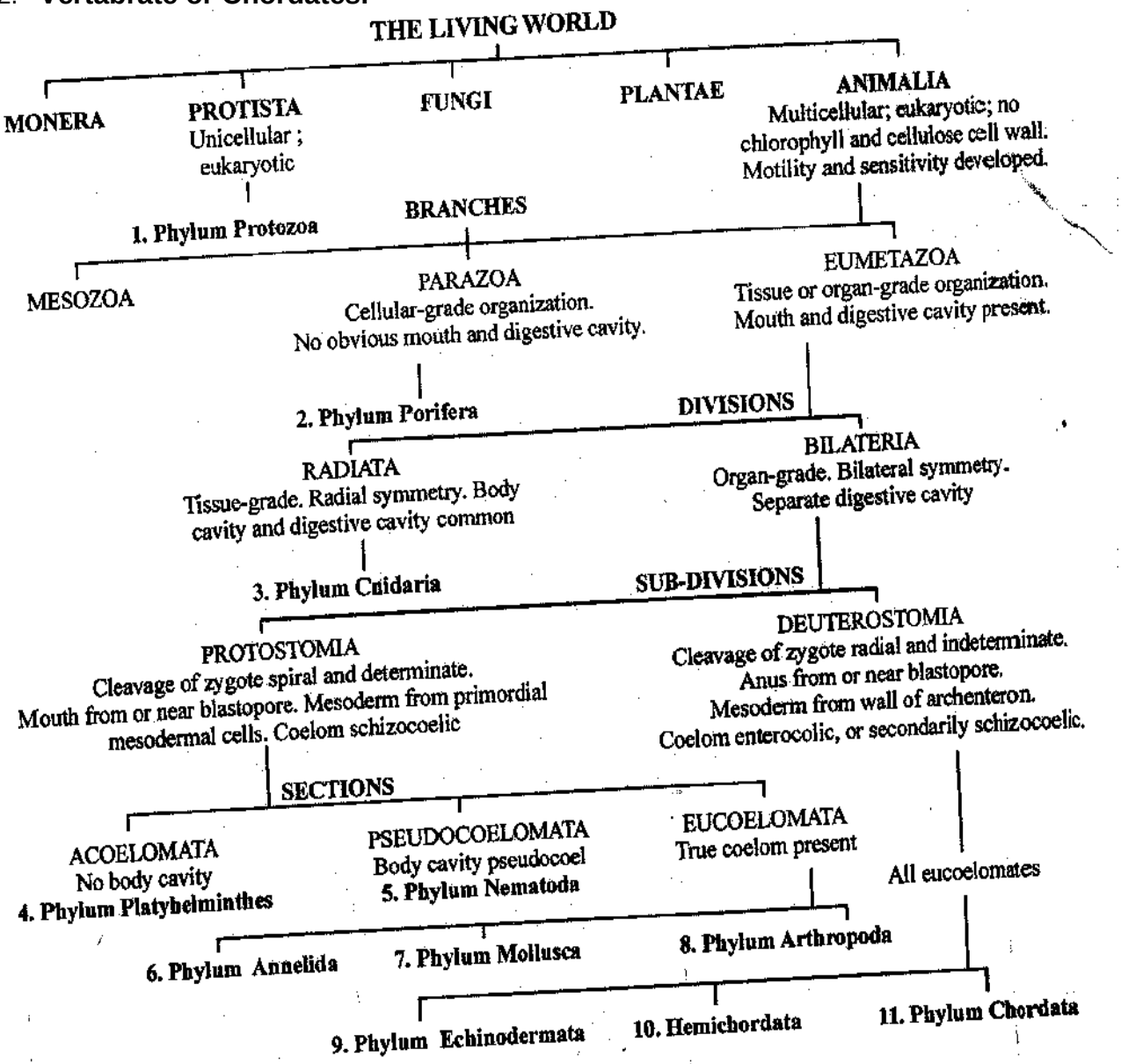
ANSWERS

1	(a)	21	(d)	41	(a)	61	(a)	81	(d)
2	(b)	22	(a)	42	(b)	62	(a)	82	(c)
3	(d)	23	(b)	43	(a)	63	(c)	83	(b)
4	(c)	24	(c)	44	(b)	64	(c)	84	(d)
5	(b)	25	(d)	45	(b)	65	(c)	85	(a)
6	(c)	26	(b)	46	(c)	66	(d)	86	(a)
7	(b)	27	(a)	47	(a)	67	(a)	87	(b)
8	(c)	28	(a)	48	(c)	68	(b)	88	(d)
9	(b)	29	(a)	49	(a)	69	(b)	89	(c)
10	(b)	30	(c)	50	(d)	70	(a)	90	(a)
11	(c)	31	(b)	51	(b)	71	(a)	91	(b)
12	(c)	32	(b)	52	(b)	72	(d)	92	(b)
13	(c)	33	(b)	53	(b)	73	(b)	93	(b)
14	(a)	34	(c)	54	(d)	74	(a)	94	(b)
15	(a)	35	(a)	55	(c)	75	(c)	95	(c)
16	(d)	36	(a)	56	(d)	76	(b)	96	(e)
17	(c)	37	(c)	57	(b)	77	(b)	97	(c)
18	(b)	38	(c)	58	(a)	78	(c)	98	(d)
19	(b)	39	(c)	59	(a)	79	(d)	99	(a)
20	(c)	40	(b)	60	(a)	80	(d)	100	(e)

CHAPTER -11
ANIMAL KINGDOM

Animal kingdom consist of all unicellular as well as multicelluar organisms which are heteotorphic in nature. Animal kingdom has two main classes.

1. **Invertabrate or Non chordates**
2. **Vertabrate or Chordates.**



Invertebrata: Invertebrates do not have fundamental characters of chordates like notochord, nervechord and pharyngeal gill slits. They account for 95% of total animals.

Invertebrates are further divided into following phylums.

1. Phylum Protozoa :

Goldfuss (1817) coined the term Protozoa.
Number of species: about 50,000.
Study of protozoa: Protozoology .

General Characteristics :

- Protozoans are small, generally microscopic organisms where single cell performs all the vital activities hence, also called as acellular organisms.
- Exhibit a great variety of shape.
- Cytoplasms differentiated into outer ectoplasm and inner endoplasm.
- Generally uninucleate but all ciliates and many amoeboid forms are multinucleate. Nucleus is vesicular and massive.
- Locomotory organs are pseudopodia in sarcodina, flagella in mastigophora, cilia in ciliata. and absent in Sporozoa (parasitic forms).
- Nutrition may be holophytic (plant-like), holozoic (animal-like), saprozoic or parasitic.
- Contractile vacuole is found in almost all freshwater protozoans for maintenance of osmoti~ concentration of cell body. It also helps in excretion.
- Reproduction is asexual or sexual. Most flagellates, rhizopods and ciliates show asexual reproduction by binary or multiple fission, budding or sporulation. Some ciliates eg- *Paramecium* reproduce by sexual means i.e. conjugation. In sporozoa, some stages of life cycle show formation of morphologically distinct gametes.
- Cyst formation during unfavourable conditions commonly occurs among the freshwater and parasitic protozoans.
- Life cycle often exhibits alternation of generation ie -includes both asexual and sexual phase-
- Protozoans show mainly 2 modes of life, free-living inhabiting fresh and salt water and damp places, parasitic living as ectoparasites or endoparasites on other animals and plants.

Example: Trypanosoma, Plasmodium, Amoeba

2. **Phylum -Porifera (phylum of sponges)**

General Characters :

- This phylum includes lowest of multicellular animals commonly called sponges.
- Term Porifera is coined by Robert Grant. Ellias placed sponges among animals. Robert Grant finally proved animal nature of sponges.
- Study of sponges is called Parazoology .
- Sponges are often placed under a separate group called "Parazoa" which means side animals.
- Sponges have not given rise to any higher phyla so these are considered to be on a blind branch of evolutionary tree.
- Sponges have originated from colonial choanoflagellates (protozoans) connecting link between protozoa & porifera is *Proterospongia* (protozoan)

- Classification of phylum "Porifera" is on the basis *of* skeletal elements.
- Sponges originated some 600 million years ago. About 10,000 species of sponges ire present' today. Sponges range from 1 cm to 1 m in size.

Example: Sycon, Spongilla, Euplectella etc.

3. **Phylum -Coelenterate (Cnidaria)**
   Leuckart (1847) -Coined the name 'coelentrata'.
   Hatschek (1888) -Called them cnidaria

General characters :

- Name was given by Leuckart. Study of cnidarians is called cnidology.
- Aristotle considered these animals as having plant like characters and called them Acalaphae.
- These are diploblastic, acoelomate animals having cnidoblasts, blind sac body plan and radial symmetry.

Important characters:

- **Coelenterata or Cnidaria** is the phylum j of diploblastic, acoelomate animals having cnidoblasts, blind sac body plan and radial symmetry .Number of species is about 9000.
- Most of the coelenterates are marine but a few of them are fresh water.
- Body form is various -vase-like, umbrella-like, branched or unbranched filament-
- Coelenterates are diploblastic, *i.e.,* develop from two germ layers.
- The coelenterates possess cell-tissue level of organization.
- Most of the coelenterates are colonial (e.g., *Physalia),* but some are solitary also *(e.g., Hydra).* Example: Hydra, Obelia Aurelia etc.

4**. Phylum Platyhelmenthes**

- The flat worms are mostly parasites but some are free living e.g., *Planaria*
- Acoelomate, triploblastic, bilaterally symmetrical and dorsoventrally flattened animals witlJc organ system level of organisation.
- Body segmented (false segmentation) except in Class Cestoda.
- Body covered with a cellular, syncytial one-layered partly ciliated epidermis; while in parasitic . trematodes & cestodes epidermis is lacking & the body is covered with cuticle.
- **Exoskeleton & endoskeleton** are completely absent. However hooks, spines, suckers, teeths may be present which act as adhesive organs.
- The space between the body wall, alimentary canal & other organs is filled with a peculiar connective tissue, called the parenchyma. It helps in transportation of food materials.
- **Digestive system is totally absent in tapeworms** but in other flatworms (Trematoda & Turbellaria) it consists ofmouth, pharynx & blind intestine (anus absent).
- Respiratory & circulatory systems are absent.
- Excretory system consists of single or paired protonephridia with flame cells-
- Nervous system is primitive. The main nervous system consists of a pair of cerebral ganglia or brain and one to three pairs of longitudinal nerve cords connected to each other by transverse commisures. This type of nervous system is called ladder type of nervous system.
- Sense organs are of common occurrence in Turbellaria but these are greatly reduced in parasitic forms.
- Sexes are united, i.e., hermaphrodite with very few exceptions.
- Asexual reproduction by fission occurs in many fresh water Turbellarians

- In majority of forms, eggs are devoid of yolk but provided with special yolk cells and are covered by egg shell
- **Cross fertilization in trematodes and self-fertilization in cestodes** is very common. Fertilization is intemal.Development incomplete.
- Life-cycle complicated, involves one or more hosts.

  Example: Dugesia, Taenia etc.

5. **Phylum -Aschelminthes (Nemathelminthes)**

   General Characters

- Bilaterally symmetrical, triploblastic, unsegmented, cylindrical worms.
- Organ-system level of organization.
- No appendages in roundwonns.
- The body wall consists of finn, non-living, resistant cuticle, epidennis and muscle layer. The cuticle is moulted (changed) four times during growth period. The epidennis is syncytial, but lacks cilia. The musculature contains longitudinal fibres only.
- There is no mineralized skeleton. High fluid pressure in the pseudocoelom maintains body
- shape. It is called hydroskeleton.
- There is a straight, one way digestive tract with mouth as well as anus. Such a digestive tract is said to be complete. Mouth is bordered with 3-6 lips having sensory papillae. Pharynx is muscular with 3-rayed cavity. It is used to suck the food. Intestine is non-muscular.
- Respiration occurs by diffusion through the body surface-
- The circulatory system is undeveloped.
- Nervous system consists of circumpharyngeal nerve ring & six longitudinal nerve cords.
- Excretory system consists of gland cells or canals or both. Some forms have protonephridia.
- They exhibit sexual dimorphism; males being smaller than females. Fertilization is internal. Development direct. There is no asexual reproduction.
- Cleavage is detenninate and spiral.
- **Example:** Ascaris, Wuchereria etc.

6. **Phylum -Annelida**

   General Characters

- The organisms are triploblastic, bilaterally symmetrical, coelomate, organ-system level of body organization & metamerically segmented-
- Body wall with an epidermis of columnar epithelium, coated externally by moist albuminous cuticle & with circular & longitudinal muscle fibres-
- Chitinous setae, aiding in locomotion, mayor may not be on fleshy parapodia; absent in leech.
- A true coelom is present. Annelids are first animals to have a true schizocoelic coelom.

  Coelom is divided by septa into compartments.
- The coelomic fluid acts as a hydrostatic skeleton.
- Digestive system is complete & digestion is extracellular.
- Respiration by moist skin (cutaneous respiration) or through gills (branchial respiration).
- Blood-vascular system is usually closed. Respiratory pigments either haemoglo bin or erythrocruorin dissolved in blood plasma. Free amoeboid blood corpuscles are present, but there are no RBC's. In leech, there is no true blood-vascular system.

- Nephridia is the excretory organ. Ammonia is chief excretory waste-
- The nervous system consists of a nerve ring & a solid, double, mid-ventral nerve cord with ganglia & lateral nerves in each segment.
- Sensory organs include tactile organs, taste-buds, statocysts, photoreceptor cells & eyes with lenses.
- The sexes may be separate (e.g., *Nereis)* or united (e.g., earthworm, leech).
- Development is mostly direct (e.g., earthworm). There is indirect development in *Nereis.* Larva, when present is trochophore.

  Example: Pheretima, Hirudinaria etc

7.Phylum -Arthropoda

General Characters:

- Triploblastic, bilaterally symmetrical, metamerically segmented animal
- Body covered with a thick chitinous cuticle forming an exoskeleton.
- Body segments usually bear paired lateral & jointed appendages.
- Body divisible into head, thorax & abdomen; head & thorax often fused to fom **cephalothorax.**
- The true coelom is reduced in adults; & is only represented by the cavities of the reproduction and excretory organs. The body cavity is a haemocoel.
- Digestive system is complete; mouth parts adapted for different modes of feeding. ne alimentary canal consists of stomodaeum (fore-gut), mesenteron (mid-gut) and proctodaeun (hind-gut).
- The respiratory organs are gills or book gills in aquatic forms and trachea or book lungs irI terrestrial forms.
- Circulatory system open with a dorsal heart, arteries & blood sinuses-
- Excretory organs are green glands or malpighian tubules. In some forms, coxal gla.nds ate excretory organs.
- Nervous system with a dorsal nerve ring & double ventral solid nerve cord.
- Sensory organs comprise simple eyes, compound eyes, chemoreceptors & tactile receptors. Some forms also have statocysts.
- Muscles are mostly striated-
- Endocrine glands are present. Insects secrete pheromones which are used for communicatioIl between two organisms of the same species.
- Sexual dimorphism is exhibited. Fertilization is internal; oviparous or ovo-viviparous; development direct or indirect. Parthenogenesis occurs in some forms.

  Example: Cancer, Cockroach

8. **Phylum: Mollusca**

- Soft body covered with shell, differentiated into head, foot and mantle.
- Aquatic, coelomate, hermaphrodite sometimes, but generally unisexual.
- Reproduction -through gills called stenidia.

  Example: Chiton, Pila, Octopus

9. Phylum -Echinodermate

- Marine, Carnivorus, Benthonic, coelomate having ciliated peritoneum.
- No head formation -tube feet locomotion. I
- Respiration -through dennal branchial, gills and tube feet.
- Dioecious and fertilization external.
- Shows autonomy, evisceration mid regeneration.
- Development -indirect

Example Asterias, Holothuria, Echinus.

VERTEBRATE OR CHORDATA

- Largest of the deuterostome phyla.
- All the chordates possess three unique characteristics at some stage in their life history .These three diagnostic features are:
  - (i) The dorsal hollow or tubular nerve cord.
  - (ii) A longitudinal supporting notochord.
  - (iii) A series of pharyngeal gill slits.

  Phylum chordata is divided into two groups: Acraniata (Protochordata) & Craniaa (Euchordata).
- Acraniata : All marine, small, primitive chordates. Lacking ahead, a skull or cranium, a vertebral column, jaws and brain. It is divided into three subphyla- Hemichordata~ Urochordata and Cephalochordata chiefly on the character of notochord present (Recellt opinion removes Hemichordata as a separate phylum of invertebrates). Example: Branchiostoma (Amphioxus)

- **Craniata** : Includes single subphyla -**Vertebrata.** Divided into two subdivisions:

  (a) **Agnatha (Jawless vertebrates) :** has two classes -Ostracodenni and Cyclostomata.

  (b) **Gnathostomata :** Further divided into two superclasses :
  (i) **Pisces :** Divided into three classes -Placodermi, Chondrichthyes anli Osteichthyes.
  (ii) **Tetrapoda :** Divided into four classes -Amphibia, Reptilia, Aves and Mammalia

EXCERCISE

1.Venus flower basket is common name of
(a) Sycon (b)Euplectella
(c)Euspongia (d) Leucosolenia.

2. Characteristics of sponges is
(a) aquatic
(b) disploblastic
(c) body has pores
(d) link between living and non-living.

3. Collar cells occur in
(a) sponge (b)Hydra
(c) sandwornl (d) starfish,

4- In Porifera, skeleton fonning cells are
(a) amoebocytes
(b) thesocytes
(c) sclerocytes
(d) archaeocytes.

5.Which is universal for sponges ?
(a) radial symmetry
(b) calcareous spicules
(c) marine
(d) high regenerative power.

6. Nematocyst is a
(a) organ (b) cell
(c) group of cell (d) part of a cell.

7. Hydra reproduces through
(a) parthenogenesis
(b)encystment
(c) polyembryony
(d) sexually and asexually.

8. Portuguese man of war is
(a) Physalia (b) Pennatula
(c)Obelia (d) Coral.

9.Hypnotoxin is produced by

(a) sponges (b) bath sponge
(c) nematocysts (d) Leucosolenia.

10. Organ pipe coral is
(a) Astraea (b) Tubipora
(c) Helipora (c) Fungia.

11. Body cavity of Hydra is called
(a) coelenteron
(b)enterocoel
(c) gastrovascular cavity
(d) both (a) and (c).

12. Jelly fishes belong to class
(a)scyphozoa
(b)hydrozoa
(c) anthozoa (d) none these.

13. Which is a coelenterate ?
(a) sea pen (b) sea fish
(c) sea urchin (d) sea cucumber .

14. Tape worms obtain their food from the host by
(a) sucking
(b)scraping
(c) absrption through integument
(d) autotrophic.

15. Intermediate host of liver fluke is
(a)man (b)pig
(c) snail (d) mosquito.

16. Flame cells occur in
(a) Porifera
(b) Coelenterata
(c) Platyhelminthes
(d) Aschelminthes.

17. Taenia solium is characterized by
(a) presence of hooks for adhesion
(b) absence of digestive tract
(d) all of the above.

18. Round worms differ from flat worms in possessing
(a) pseudocoelom
(b)flame cells
(c) segmented body
(d) production of anti-enzymes.

19. Pseudocoel occurs in
(a)Hydra (b)Ascaris
(c) Cockroach (d) Earthworm.

20. Common worm in children is
(a) Enterobius vermicularis
(b) Oxyuris vermicularis
(c) Drancunculus medinensis
(d) Brugia malayi and B. timori.

21. Whipworm is
(a) Ancylostoma . (b) Tricuris.
(c)Enterobius
(d)Trichinella

22. In earthworms heart is
(a) 6 pairs (c) 2 pairs
(b) 4 pairs (d) 1 pair.

23. Excretory organs of earthworm are
(a)flarne cells (b)coelom
(c) nephridia (d) gizzard.

24. Blood vessel in Pheretima having valvs is
(a) dorsal (b) lateral
(c)ventral
(d) integumentary.

25. Movement of coelomic fluid helps in. locomotion of
(a) starfish (b)Hydra.
(c) frog
(d) earthworm:

26. In earthworm, overies situated in segment
(a) 13 (c) 10
(b)9 (d) 26.

27. In earthwonn, testes occurs in segments
(a) 12 and 13 (b) 10 and 11
(c) 14 and 15 (d) 17 and 18.

28. Haemoglobin is dissolved in blood plasma of
(a) frog (b)rabbit
(c) cockroach (d) earthworm.

29. Major nitrogenous excretory material of earthworm is
(a) uric acid (b)ammonia
(c)urea (d)amino acids.

30. Housefly transmits all the diseases except
(a) dysentery (b)typhoid
(c) cholera (d)yellow fever.

31. Johnston's organ is found in
(a) head of cockroach
(b) antenna of mosquito
(c) abdomen of housefly
(d) abdomen of spider.

32. Arthiropods lack
(a) cilia
(b)jointed appendages
(c) respiratory organ
(d) segmented body.

33. Characteristic of insect is
(a) compound eyes
(b) chitinous exoskeleton
(c) segmented body
(d) three pairs of legs.

34. Maggot of housefly is
(a) pupa (b)larva
(c) chrysalis (d) imago

35. Dengue fever is spread by
(a) Anopheles
(b)Aedes
(c)Culex .
(d) Musca.

36. Wings are vestigial in
(a) female Anopheles
(b) male Anopheles
(c) male blatta
(d) female blatta.

37. In honey bee, barbless sting occurs in
(a) workers (b)queen bee
(c)drone (d)in all these three.

38.Which one belong to mollusca ?
(a) cuttle fish and musse
(b) silver fish and starfish
(c) sea urchin and pila
(d) feather star and sea cucumber.

39. Octopus, squid and cuttle fish belong to (a)scaphopoda
(b)apoda
(c) decapoda
(d) cephalopoda.

40. Tube feet occurs in
(a) cockroach (c) cat fish
(b) cuttle fish (d) star fish.

41. Radial symmetry occur in
(a) Anopheles
(b)cockroach
(c)Asterias (d) snail.

42. Starfish belongs to
(a) crinoidea
(b)asteroidean
(c) ophiuroidea
(d) holothuroidea.

43. Which is not a member Echinodennata
(a) star fish (b) sea lily
(c) ascaris (d) ophillthrix

44. Which is characteristic feature of echinodermata ?
(a) vascular system
(b) radial symmetry
(c) radial canal
(d) ambulacral system.

45. A chordate character is
(a) spiracles
(b)post anal tail
(c) gills
(d) chitinous exoskeleton

46. All chordates possess
(a) limbs

(b)skull
(c) axial skeletal rod of notochord
(d) exoskeleton.

47. Which is cold-doubled animal ?
(a) kangaroo (b)pigion

48. Which one is viviparous ?
(a) shark (b)frog
(c) lung fish (d) bony fish.

49. Sea horse is an example of
(a) reptilia (b) mammalian
(c)aves (d) pisces.

50. Ichthyophis belongs to
(a) Mollusca (b) Reptilia
(d) Amphibia (c) Annelida

51. Amphibian heart is
(a) three chambered
(b) four chambered
(c) two chambered
(d) one chambered.

52. Which is not a true amphibian ?
(a) Toad (b)Salamander
(c) Tortoise (d) Frog.

53. Flying frog is
(a) Hyla (b) Rhacophorus
(c)Pipa (d) Alytes.

54.A limbless amphibian is
(a) Ichthyophis (b)Alytes
(c)Buffo (d) Hyla.

55. Glands present in the skin of frog are
(a) sweat and sebaceous
(b) sweat and mammary
(c) sweat and mucous
(d)mucous and poisonous.

56.A non-poisonous snake is
(a) Viper (b)Bungarus
(c) Python (d) Sea snake.

57. Poison glands of snakes are modified
(a) sub-linguals (b) lignuals
(c) maxillaries
(d)parotids.

58. Venom of cobra affects
(a) nervous system
(b) respiratory system
(c) circulatory system
(d) digestive system.

59.Horn toad is a
(a) mammal (c) reptile
(b) amphibian (d) fish.

60. Which one is not a snake ?
(a) glass snake (b) rattle snake
(c) krait (d) viper .

61. The fastest flying bird is
(a) Emu (c) Psittacula
(b)Albatrross (d) Falcon.

62. Ovary and oviduct functional in birds is (a)right (b)left
(c) right ovary, left oviduct
(c) right ovary, both oviducts.

63. Archaeopteryx is
(a) extinct bird mammal
(c) starfish (b) extinct
(d) marine fish.

64. Bone marrow is absent in the bon.es
(a) birds (b) reptiles
(c) amphibians. (d) pisces.

65. A bird known to have earth is
(a) vulture (b)kiwi
(c) dodo (d) Archaeopteryx.

66. Which is a flightless bird ?
(a) Albatross (b) Emu
(c)Crane (d) Flemmingoes.

67. Flight muscles ofbird are attached to
(a) clavicle (b)cell of sternum

(c) scapula (d) coracoid.

68. Penguin possesses
(a) long legs
(b) flipper like wings
(c)pouch for holding eggs
(d)two forward and two backwardlr directed toes.

69. A mammal which lays eggs is
(a) scaly ant eater
(b) spiny ant eater
(c)hedgehog
(d)porcupine.

70. Kangaroo is
(a) viviparous (b) oviparous
(c) ovo-viviparous
(d)none of these.

71. Which one has become extinct from India?
(a) Lion (b)Dodo
(c)Tiger
(d) Two-homed rhino.

72. Rodents have
(a) long spine b)hooks
(c) long incisors (d) long canines.

73. A mammal in which both the sexes produced milk is
(a) Tachyglossus (Echidna)
(b) Omithorhyncus
(c) Marcropus
(d) Didelphis.

74. Horn of Rhino is
(a) bony
(b) cartilaginous
(c) keratinised bundle of hair
(d) partially bony and partially cartilaginous.

75. Which one of the following statements is not correct ?
(a) in the animals of Phylum Porifera, called sponges, the reproduction is only asexual by budding
(b) many forms of Coelenterata possess a hard exoskeleton of line to form corals.
(c) animal of Phylum Annelida occur in moist soil, fresh water and sea
(d) in the animals of phylum Echinodermata, body surface is cover allover by calcareaos spines.

76. In the evolution of living organisms, the correct chronological sequence in which Bat, Ostrich, Seahorse and Turtle appeared is
(a) Turtle, Ostrich, Seahorse, Bat
(b) Bat, Turtle, Ostrich, Seahorse
(c) Ostrich, Bat, Seahorse, Turtle
(d) Seahorse, Turtle, Ostrich, Bat.

77. In which of the following mammals do the ducts of the excretory system and genital tract have a common opening ?
(a) Porcupine
(b)Pangolin
(c)Hedgehog
(d) Echidna.

78. Match List -I (Animals) with List- n I (Development of heart) and select and the correct answer using the codes given below the lists :

List-I (Animals)	**List-ll (Development of** heart)
A. Fish	1. Four chambers
B. Snake	2. No heart
C. Crocodile	3. Three chambers
D. Starfish	4. Two chambers

Codes : A B C D **A B C D**
(a) 4 3 2 1 (b) 3 4 2 1
(c) 4 3 1 2 (d) 3 4 1 2.

79. Which one of the following statements s correct ?
(a) all chordates are vertebrates, but all vertebrates are not chordates
(b) all chordates are vertebrates and all vertebrates are also chordates
(c) all vertebrates are chordates, but all chordates are not vertebrates
(d) all invertebrates are chordates, but all vertebrates are chordates, but all vertebrates are not chordates.

80.Match List -I (Organism) with List – II (Category) and select and the correct answer using the codes given below the lists :

List-I (Organism)	**List-II (Category)**
A. Insect	**1. Cuttle fish**
B. Pisces	2. Silver fish
C. Mammal	3. Hipposarnpus
D. Mollusc	4. Blue whale

Codes :
A B C D A B C D
(a) 2 3 4 1 (b) 4 3 2 1
(c) 1 2 4 3 (d) 1 3 2 4.

81. Arrange the following in the order of the evolution
1. Amphibians 2. Fish
3. Reptiles 4. Birds

(a)1,2,3,4 (b)2,1,4,3
(c)2,1,3,4 (d) 4, 1,3,2.

82. Match the following

List-I (Characteristic)	**List-II (Animal)**
A. Wingless insect	1. Kiwi
B. Flightless bird	2. Silver
C. Limbless reptile	3. Turtle
D. Lungless animal	4.Snake
	5. fish

Codes :
A B C D **A B C D**
(a) 1 3 2 5 (b) 3 1 4 2
(c) 2 1 3 4 **(d)** 2 1 4 **5.**

Question 83- 98: In each of the following question two statements are given, one is Assertion (A) and second is Reason (R). Of the statements, mark the correct answer as
(a) If both Assertion (A) and Reason (R) are true and Reason is the correct explanation of Assertion.
(b) If both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.

83. **Assertion (A):** Protozonas are eukaryotic animals.
Reason (R): Protozoans are most primitive organism.

84. **Assertion (A) :** Protozoans show only heterotrophic (animal like) nutrition.
Reason (R) : Euglena can make their own food.

85. **Assertion (A) :** Sexual reproduction in protozoan is not a frequency occurrence.
Reason (R) : Sexual reproduction has no significance.

86. **Assertion (A) :** Sponges have tissue level of organization.
Reason (R) : Sponges are multicellular .

87. Assertion (A) : Sponges are henntlphrodite. **Reason (R)** Sponges show cross-fertilization.

88. **Assertion (A)** : Nematodes are different from flatworms.
Reason (R) : Nematodes are commonly called round worm

89. Assertion (A) Filarial worm is digenetic.
Reason (R) : Wuchereria is the dreaded parasite of human blood and lymph.

90. **Assertion (A) :** Coelenterates show alternation of generation.
Reason (R) : In coelenterates, asexwl generation is followed by sexUAl generation.

91. **Assertion (A)** : Scolex with hoods are present in Taenia.
Reason (R) : Stucture of scolex give Taenia more surface area for absorption.

92. **Assertion (A) :** Blood is red n Annelida.
Reason (R) : RBCs are absent in them.

93. **Assertion (A) :** Chloragogen cells behave like vertebrate liver.
Reason (R) : Chloragogen cells ~ present in Annelida.

94. **Assertion (A) :** Arthropods posses only true coelom.
Reason (R) : Haemocoel in Arthropods. is not lined by the mesodennal epithelium.

95. Assertion (A) : Amphibians are poikilothermic.
Reason (R) : Amphibian often under goes summer sleep.

96. **Assertion (A)** : The gangs of snake is the maxillary teeth.
Reason (R) : The poison apparatus in snake consists of poison gland, ducts and fangs.

97. Assertion (A) : Birds have no mammary gland.
Reason (R) : Pigeons secrete "pigeon milk".

98. **Assertion (A) :** Tapeworm cysts can enter the brain and can be the symptoms similar to epilepsy.
Reason (R) : Tapeworm cysts are often transmitted into human blood stream by insect bites.

ANSWERS

1	(b)	21	(b)	41	(c)	61	(b)	81	(c)
2	(c)	22	(b)	42	(b)	62	(b)	82	(d)
3	(a)	23	(c)	43	(c)	63	(a)	83	(b)
4	(c)	24	(a)	44	(d)	64	(a)	84	(b)
5	(d)	25	(d)	45	(b)	65	(d)	85	(c)
6	(d)	26	(a)	46	(c)	66	(b)	86	(d)
7	(d)	27	(b)	47	(c)	67	(b)	87	(b)
8	(a)	28	(d)	48	(a)	68	(b)	88	(b)
9	(c)	29	(c)	49	(d)	69	(b)	89	(b)
10	(b)	30	(d)	50	(d)	70	(a)	90	(a)
11	(d)	31	(b)	51	(a)	71	(d)	91	(c)
12	(a)	32	(a)	52	(c)	72	(c)	92	(b)
13	(a)	33	(d)	53	(b)	73	(b)	93	(b)
14	(c)	34	(b)	54	(a)	74	(c)	94	(d)
15	(c)	35	(b)	55	(d)	75	(a)	95	(a)
16	(c)	36	(d)	56	(c)	76	(d)	96	(b)
17	(d)	37	(b)	57	(d)	77	(d)	97	(b)
18	(a)	38	(a)	58	(b)	78	(c)	98	(c)
19	(b)	39	(d)	59	(c)	79	(c)		
20	(a)	40	(d)	60	(a)	80	(a)		

PLANT GROWTH AND DEVELOPMENT

GROWTH

All living organisms show various changes in their weight, shape, size and volume during their entire life cycle (birth to death). It is collectively known as growth.

PLANT GROWTH

The growth of plants are regulated by certain chemical substances which are synthesized by then and these are called growth hormones or growth regulations.

GROWTH HORMONES

Plant growth regulators are also called phytohorn1ones.

Auxins

- Auxins promote cell elongation.
- IAA is natural while mA, NAA and 2, 4-0 are synthetic auxins.

Gibberellins

- Isolated from a fungus *Gibbrella jujikuroi* (a causative agent of bakanae or foolish seedling disease in rice plants). .
- Gibberellins cause cell elongation and increase internodal length.
- Gibberellins are produce in embryos, roots and young leaves near the shoot tip.
- It is helpful in flowering, enzyme synthesis and fruit growth.

Cytokinins

- Cytokinins promote cytokinesis (cell division).
- Kinetin was first isolated from degraded sample of DNA.
- Zeatin was isolated from maize endospenn.
- It is responsible for cell division, cell enlargenient, prevention of senescence and enzyme
  synthesis.

Ethylene

- It is a gaseous honnone, the ripening mainly acts as an growth iriliibitor .
- Ethylene hastens ripening of fruits and promote ageing of plant organs.

Abscissic acid (ADA)

- It is a growth inhibitor by counteracting other hormones.
- It is responsible for dormancy in buds and seeds, ageing in leaves, inhibits mitosis, abscission of leaves, flowers and fruits.
- Zeatin was isolated from maize endosperm.
- It is responsible for cell division, cell enlargement, prevention of senescence and enzyme synthesis.

REPRODUCTION

- In order to perpetuate its own species, an organism must produce descendants of its own kind,
- Reproduction are of two types: asexual and sexual.

Asexual Reproduction

- Development of new individual from a single jJatent.
- It involves mitotic cell division.
- Asexual reproduction are of following types

1. **Fission**: Nucleus of the parent cell divides by amitosis into two daughter nuclei. EJ,-
   Binary fission in *Amoeba.*

2. **Budding:** The parent cell produces a small protuberance which produce anew organisms- Ex.- Yeast, *Hydra.*

3. **Fragmentation:** A fragment of the body forms the complete organism.. *Ex.- Spirogyra, Vlothrix.*

4. **Regeneration:** Similar to fragementation but occurs in animals. .Ex.- Earthworm.

5. **Vegetative Propagation:** Any part of plant body develops into new plant.. Vegetative propagation is of following types:

   (i) **Cuttings:** Cuttings of stem are put in moist soil, they produce adventitious roots and grow into new plants. Ex. -Sugarcane.

   (ii) Grafting: The cutting of a plnat (scion) is attached to the stem of another plant having root (Stock) Ex. Mango.

   (iii) Layering: One or more branches of a plant are bent close to the ground and covered with moist soil. Ex! Jasmine.

   (iv) Leaves: When leaves fall on the ground, each notch along the leaf margin can produce anew plant. .Ex. *Bryophyllum.*

Sexual Reproduction

- Sexual reproduction was firstly described in plants by R.Camerarius.
- Reproductive part ofplant is flower
- Male part is stamen (microsporophyll) and female part is carpel (megasporophyll).
- The fertile portion of stamen is called anther .
- A typical anther consists of four microsporangia (tetrasporangiate) and such anther is called dithecus *e.g.* mostly plants.
- Carpel has 3 parts swollen part is ovary, slender part is style and sticky head is stigma.
- Ovary contains ovules or megasporangia.
- Ovule is an integumented indehiscent megasporangium found is spermatophytes which develops into seed after fertilization.

Types of Ovules

(i) **Orthotropous :** The micropyle, chalaza and funicle are in straight line *e.g.* Betel, piper etc.

(ii) **Anatropous :** The ovule turns at 180° angle, thus, it is inverted ovule. Micropyle lies close to hilum or at side of hilum. *e.g.* most of the angiospermic families.

(iii) **Campylotropous :** Ovule is curved more or less at right angle to funicle. Micropylar end is bent down slightly *e.g.* members of family Leguminaceae and Cruciferae.

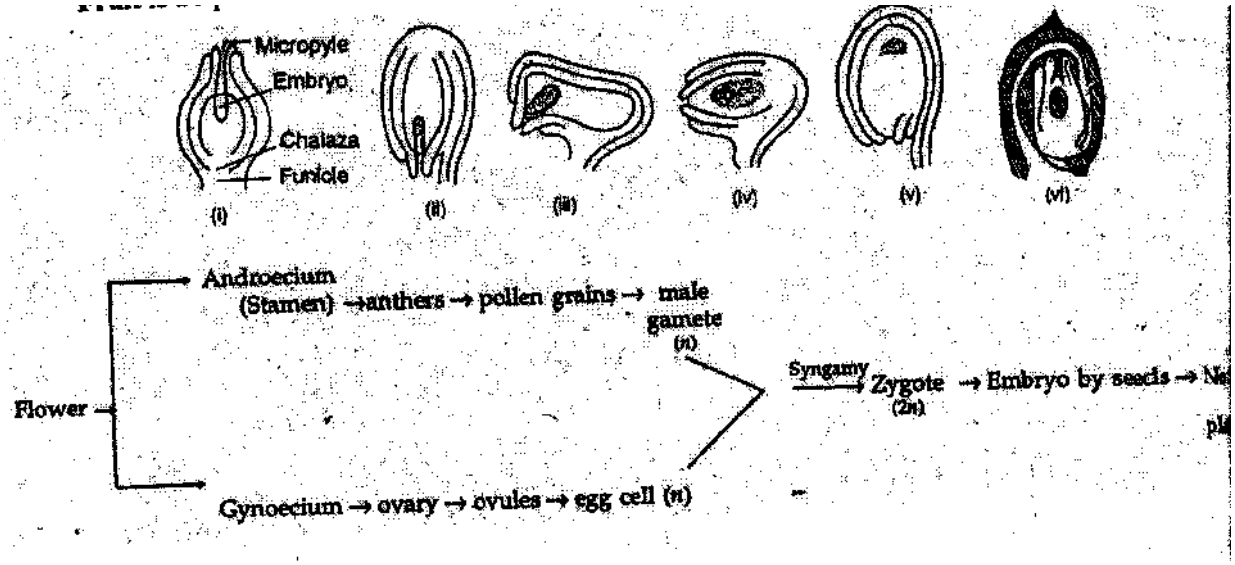
(iv) **Hemianatropous :** Ovule turns at 90° angle upon the funicle or body of ovule at right angle to the funicle *e.g. Ranunculus.*

(v)Amphitropous : Curvature of ovule is more and embryo sac become curved like horse-shoe e.g. Lemna, Papaya.

(vi)Circinotropous : Ovule turns at more than 360° *e.g., Opuntia.*

POLLINATION

- Transfer of pollen grains from stamen to carpel is pollination.
- Pollination is of two type: Self and cross.
- When pollen grains are transferred to the stigma of the same flower is called self **pollination**.
- When pollen grain are transferred to the stigma of another flower by an agent is called cross **pollination.**
- Cross pollination performing agents are wind **(Anaemophily),** birds **(Ornithophily),** bas **(Chiropterophily),** water **(Hydrophily)** and insects **(Entomophily).**
- Double fertilization is the fusion of two male gametes brought by a pollen tube to two differellt cells of the same. Female gametophyte in order to produce two different structures. It is found onlr in angiosperms, discovered by **Nawaschin** in 1898.
- **Endosperm :** It is a nutritive tissue. It is the product of triple fusion.
- **Seed:** The fertilized ovule is seed.
- **Spermology** study of seed.
- **Fruit** is a ripened ovary .



EXERCISE

1. Which of the following is a growth inhibitor ?
(a) Auxins (b)Ethylene
(c)GA (d) Cytokinins.

2.Auxins were first isolated from
(a) corn germ oil (b)Thizopus
(c)urine (d) Avena tip,

3.Which is the precursor ofIAA ?
(a) Acetic acid
(b) Tryptophan amoni aicd
(c) Glycine amino acid
(d) Alanine amino acid.

4. Auxins induce
(a) maleness
(b) faminization
(c) both (a) and (b)
(d) none of these.

5. Which one is antigibberellin ?
(a) Maleic hydrazide
(b)Phosphon-D
(c) Chlorocholine chloride
(d) all of these.

6. Phenomenon of bolting is caused by which plant honnone ?
(a) Auxins (b)Gibberellin
(c) Cytokinins (d) Ethylene.

7.Femaleness in plants is caused by
(a) auxins (b)cytokinins
(c) ethylene (d) all of these.

8. Fluorene ring In feature of
(a) GA (b)ethylene
(c) morphactines
(d) none of these.

9. A natural growth regulator is
(a) ethylene (b)NAA
(c) 2, 4-D (d) benzaldehye.

10. Honnone involved in phototropism is
(a)IAA (b)GAJ
{c)kinetin (d)2,4-D.

11. Dormancy is due to
(a) gibberellins (c)ethylene
(b)cytokinins (d) AHA.

12. Flowering in a short day plant is promoted by
(a) auxin (b)gibberellin
(c) ethylene (d) cytokinins.

13. Optimum temperature for growth generally is
(a) 0-10°C (b)10-20°C
(c) 20-25°C (d) 25-30°C,

14. The development of fruit without fertilization is
(a) parthenogenesis
(b) parthemnocarpy
(c) apomixes
(d)apogamy.

15. Mango and guava plants are propagated through
(a) stem cuttings (b) layering
(c) grafting
(d) tissue culture.

16. Presence of many embryos is a characterist
(a) citrus (b)mango
(c) banana (d) none of

17. Stem cuttings are commonly used for the propagation of
(a) banana (b)rose

(c)mango (d) cotton.

18. Vegetative reproduction in Cycas occurs by
(a) sporophyll (b)bulbils
(c) scaly leaves (d) fragmentation.

19. Vegetative reproduction by layering is found in
(a) jiasmine (b)mango
(c) rose (d) all of these.

20. Haploid plants can be obtained by culturing
(a) young leaves (b) endosperrn
(c) pollen grains (d) root tips.

21. The stem cuttings are commonly used for the propagation of
(a) sugarcane
(b)cotton
(c)banana (d) mango.

22. Vegetative propagation in Agave is by
(a) sucker (b) stolon
(c) rhizome (d) bulbils.

24. Tubers are used for vegetative reproduction in
(a)tomato (b) sweet potato
(c)onion (d) garlic.

25. Which type of asexual reproduction present in Hydra ?
(a) Fragmentation
(b) Budding
(c) Fission
(d) none of these.

26. Stamen of jowar is
(a) adnate (b) basifixed
(c) versatile (d) dorsifixed.

27. Hairs of maize are
(a) stigma (b) styles
(c) seed coats (d) stipules.

28. The horse-she shaped embryosac is
(a) orthotropus (b) circinotropus
(c) hemianotropus
(d) amphitropous.

29. The coloured part of Bougainvillea flower is
(a) corolla (b)calyx
(c) bracts (d) androecium.

30. The sexual reproduction in plants was first reported by
(a)Nawaschin
(b)Carnererius
(c) Hanstein (d) Amici.

31. Double fertilization lS characteristic of
(a) algae (b) angio sperms
(c) gymnospenns
(d) periodoophytes.

32. The endospenn is gymnospenns is
(a)haploid (b)diploid
(c)triploid (d) tetraploid.

33. Female gametophyte of angiosperms is mostly
(a) 5-celled (b)6-celled
(c) 7-celled (d) 8-celled.

34. Pollen tube leaves its inclusions in
(a) ova (b) synergids
(c) antipodals (d) central cells.

35. Endospermic nucleus is usually
(a) haploid (b)diploid
(c)triploid (d) tetraploid.

36. Which of the following is not a flower
(a) sunflower (b)passion flower
(c) rose (d) may flower.

37. Double fertilization was discovered by (a)Nawaschin
(b)Strasburger

(c) Hofmeister (d) none of these.

38. Embryo sac represents
(a) megasporophyll
(b)megagamete
(c)megaspore
(d) megagametophyte.

39. The pigment responsible for flower induction is ,
(a) carotene (b) riboflavin
(c) phytochrbme (d)xanthrphyll.

40. Consider the following statements
1. allows plant growth
2. retards the growth of lateral buds
3. enhances the growth of lateral buds Which of these statements is/are correct
(a) 1 alone (b)2 alone
(c)3alone (d) 1 and 2.

41. The age of a tree can be determined by
(a) measuring its height
(b) measuring its diameter
(c) analyzing its sap
(d) counting the annual growth rings of its stem.

42. Match List -I with List -II and select and the correct answer using the codes given below the lists :

List-I	**List-1I**
I. Edible banana	A. Vivipary
II. Mangrove plant	B. Aleurone
III. Proteins in the Endosperm grains	c.
IV. Reservoir of nutrients	D. Parthenocarpy

Codes:

	I II III IV		I II III IV
(a)	A D B C	(b)	D A C B
(c)	D A B C	(d)	A D C B.

43. A plant cell has the potential to develop into an entire plant. This property of the plant cells is known as
(a) gene cloning
(b) totipotency
(c) tissue culture
(d) pleuripotency.

44. A clone is produced
(a) asexually
(b) sexually
(c) by artificial insemination
(d) in vitro from a single sexually produced ancestor .

45. Match List -I with List -II and select and the correct answer using the codes given below the lists:

List-I (Mode of reproduction)	**List-ll, (plants) .**
A. Vegetative propagation by leaves	I. Rubber, mango, guava
B. Stem cuttings	2. Bryophylium, Begonia
C. Grafting	3. Potato, Tapioca
D. Tissue culture	4. Sugarcane, rose, Bougainvillea

Codes :

A B C D		A B C D
(a) 2 4 1 3	(b) 1 4 3 2	
(c) 3 2 4 1	(d) 4 2 1 3.	

46. Layering method of vegetative reproduction is found in
(a)jasmine (b)mango
(c)sugarcane (d) bryophyllum

Directions for Question 47 -50 : In each of the following question two statements are given, one is Assertion (A) and second is Reason (R). Of the statements. mark the correct answer as :

(a) Both Assertion (A) and ReaSon (R) are true and Reason is the correct explanation of Assertion.
(b) Both Assertion (A) and Reason (R) are true and Reason is not correct explanation of Assertion.
(c) If Assertion (A) is true but Reason (R) is false
(d) If Assertion (A) is false but Reason (R) is true.

48. **Assertion (A) :** Ethylene is a gaseous hormne.
Reason (R) : Ethylene hastens ripening of fruits.

48. **Assertion (A) :** Double fertilization is unique to angiosperms.
Reason (R) : Triple fusion occurs in both fertilization i.e.. first and second.

49. **Assertion (A) :** Most common type of ovule is anatropous.
Reason (R) : It is horse-shoe shaped.

50. **Assertion (A) :** Budding, regeneration, fragmentation are mode of asexual reproduction.

ANSWERS

1	(b)	11	(d)	21	(a)	31	(b)	41	(d)
2	(c)	12	(d)	22	(d)	32	(a)	42	(c)
3	(b)	13	(d)	23	(a)	33	(c)	43	(b)
4	(b)	14	(b)	24	(b)	34	(b)	44	(a)
5	(d)	15	(c)	25	(b)	35	(c)	45	(a)
6	(b)	16	(a)	26	(c)	36	(a)	46	(a)
7	(d)	17	(b)	27	(b)	37	(a)	47	(b)
8	(c)	18	(b)	28	(d)	38	(d)	48	(c)
9	(a)	19	(a)	29	(c)	39	(c)	49	(c)
10	(a)	20	(c)	30	(b)	40	(b)	50	(c)

Reason (R) : Conjugation is also a mode of asexual reproduction.

- It consists of a large hot ball of gaes.
- The sun rotates about 150 million kilometers away from the earth
- The mass of the sun is about *2.x* 103° kg
- The diameter of the sun is about 1.4 x 106 km.
- The average density of the sun is 1.4g cm^3

CHAPTER -14
SPACE SCIENCE

Astronomy:

The branceh of science that deals with the study of the universe, beyond earth's atmosphere.

Solar System :

- The sun has its own family, known as solar system.
- Solar system consists of the sun, the nine planets and other heavenly bodies like asteroids and comets etc.
- Nine planets are Mercury, Venus, Earth mars, Jupiter, Saturn, Uranus, Neptune and Pluto.
- The sun is at the centre of the solar system.
- Light year is the unit of distance and not the unit of time.
- Nearest star from the earth other than the sun is alpha centauri.

The Sun :

The Moon :

- It is the natural satellite of the earth.
- It revolves around the earth once in 27 .33 days.
- Diameter is 3476 km.
- Distance from the earth is 354,000 kIn.
- Mass of the moon is 0.0123 times the mass of the earth.
- Maximum temperature at day is 117°C and at night is -171°C.

Pulsars :

The fast rotating neutron stars are called pulsars.

Black Holes :

Black holes are collapsed stars, "vhicb have contracted.

Constellations :

- The group of stars which remain togetlter and form a definite shape are called constellations.
- These constellations appears to move in the sky from east to west-
- One of the most prominent constellatiolls in 'URSAMAJOR ,

4. A radio telescope is more advantageo1ls due to:
(a) its sensitivity to far off stars and galaxy
(b) its low cost
(c) its ability to work even in cloudy weather (d) all of these

5 Which are absent in solar system ?
(a) Meteoroids (b) Stars (c) Moon
(d) Asteroids

EXERCISE

1. A radio telescope uses:
(a) a metallic mirror
(b) nuclear photographic emulsions
(c) camera ofhigh resolving power
(d) all of these

2.The largest planet in the solar system is:
(a) Earth (B) Pluto
(c) Jupiter (d) Nine of these

3. Which of the following is international Telecommunication satellite:
(a)1NSAT -1 (b) NITELSAT
(c) ATLANTIS (d) None of these

ANSWER:

1. (a)
2. (c)
3. (b)
4. (d)
5. (b)