ULTIMATE KCET

CRASH COURSE 2026

Botany | Lecture - 01

The living world; Cell : The unit of life Cell cycle and cell division

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Topics to be covered

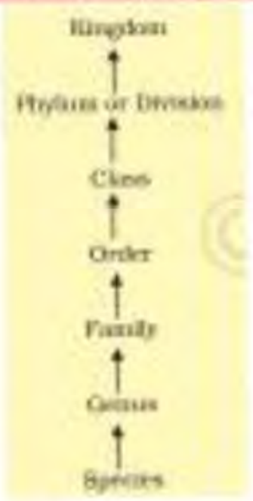
1. The living world - '1'
2. Cell - unit of life - 04-05
3. Cell cycle and division - '03' or '02'
4.

system of naming with two components is called binomial nomenclature. It is proposed by Linnaeus.

Rules of Binomial nomenclature

- Scientific names are in Latin or Latinised and written in italics. When handwritten, they are underlined separately.
- The first word is genus name (Generic name) and second word is the species name (specific epithet), e.g., Homo sapiens. Homo represents the genus name and sapiens represents the species name.
- The Genus name starts with capital letter and the species name starts with small letter.
- Name of the author (in abbreviated form) appears at the end of the biological name. E.g., Mangifera indica Linn. It indicates that this species was first described by Linnaeus

TAXONOMIC CATEGORIES



Common name	Man	Housefly	Mango	Wheat	Brinjal	Lion
Biological name	Homo sapiens	Musca domestica	Mangifera indica	Triticum aestivum	Solanum melongena	Panthera leo
Species	sapiens	domestica	indica	aestivum	melongena	leo
Genus	Homo	Musca	Mangifera	Triticum	Solanum	Panthera
Family	Hominidae	Muscidae	Anacardiaceae	Poaceae	Solanaceae	Felidae
Order	Primata	Diptera	Sapindales	Poales	Polymoniales	Carnivora
Class	Mammalia	Insecta	Dicotyledonae	Monocotyledonae	Dicotyledonae	Mammalia
Phylum/ Division	Chordata	Arthropoda	Angiospermae	Angiospermae	Angiospermae	Chordata
Kingdom	Animalia	Animalia	Plantae	Plantae	Plantae	Animalia

Kingdom
Phylum / Division
Class
Order
Family
Genus
species

- Similarities increase.

Eg.

Ph.
Chordata
Mammalia
Carnivora
Felidae
Canidae
Felis, Panthera

Di.
Angiospermae, Gymnospermae
Monocotyledonae, Dicotyledonae
Poales. Sapindales. Polymoniales
Anacardiaceae, Solanaceae
Convolulaceae
Mangifera Solanum

Question No. - 01

As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics

A Will decrease

B Will increase

C Remain same

D May increase or decrease

Question No. - 02

'ending'

Which of the following 'suffixes' used for units of classification in plants indicates a taxonomic category of 'family'

A -Ales

B -Onae

C -Aceae

D -Ae

Question No. - 03

The term 'systematics' refers to:

→ evolutionary relationships

A Identification and study of or of organ systems of plants and animals

B Identification and preservation of plants and animals

C Diversity of kinds of organisms and their relationship ✓

D Study of habitats of organisms and their classification

Question No. - 04

Genus represents:

A. An individual plant or animal

B. A collection of plants or animals

C. A group of closely related species of plants or animals

D. None of these

Question No. - 05

The taxonomic unit 'Phylum' in the classification of animals is equivalent to which hierarchical level in classification of plants

A Class

B Order

C Division

D Family

Question No. - 10

Match the following and choose the correct option:

Column – I	Column - II
(A) Family	(i) Tuberosum
(B) Kingdom	(ii) Polymoniales
(C) Order	(iii) Solanum
(D) Species	(iv) Plantae
(E) Genus	(v) Solanacea

(A) A-v, B-iv, C-ii, D-i, E-iii

(B) A-iv, B-iii, C-v, D-ii, E-i

(C) A-iv, B-iii, C-v, D-i, E-ii

(D) A-iv, B-iii, C-ii, D-v, E-i

Question No. - 11

Select the mismatched pair.

A Panthera – Mammalia

B Musca – Muscidae

C Triticum – Poales

D Solanum – Anacardiaceae

Question No. - 12

Order for Convolvulaceae

A Polymoniales

B Poales

C Sapinidales

D Diptera

Question No. - 13

Which of the following is the highest rank?

A Class

B Kingdom

C Family

D Sub species

Question No. - 21

In the hierarchical classification, the number of obligate categories is

A 7

B 8

C 6

D 12

British zoologist
- Plants cells have cell wall
- Gave Hypothesis that animals & plants are composed of cells.

- Schleiden & Schwann → cell theory.
- Rodolf Virchow → Modified cell theory (1855)
  - Omnis cellula-e cellula
  - new cells comes from pre-existing cells

④ TODAY CELL THEORY

- All living organisms are composed of cells and product of cells
- All cells arise from pre-existing cells.

⑤ OVERVIEW OF CELL

- Onion cell → Typical plant cell
- Human cheek cell → outer membrane as delimiting structure.
- Prokaryotic cells → lack membrane bound organelles (membrane-less)
- Eukaryotic cells → Membrane bound organelles ✓
  - Nucleus, ER, Golgi complex, lysosomes, mitochondria, microbodies, vacuoles.
- Cytoplasm
  - semi-fluid matrix in both prokaryotes & eukaryotes.
  - main arena of cellular activities in both plant & animal cell.
  - various chemical reaction occur to keep the cell in living-state.
- Ribosome
  - present in both pro-K & eu-K.
  - Also in: cytoplasm, chloroplast (70S), mitochondria (70S), RER

★ Animal cells contain centrosome
- non membrane bound organelle.
- Helps in cell division.

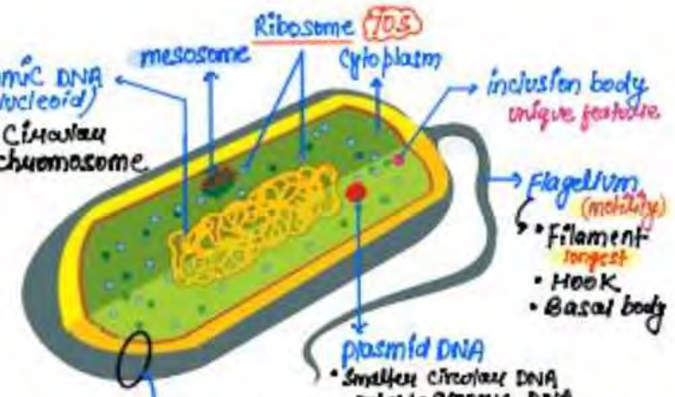
Recall their two characteristic

⑧ PROKARYOTIC CELLS

- Bacteria, Blue-green algae, mycoplasma, PPLO
- Smaller, multiply more rapidly than Eukaryotes
- Vary in shape, size, function
  - ↳ Bacillus, coccus, Vibrio, Spirillum
- Organisation of prokaryote is fundamental similar.

imp point → except mycoplasma
- → cell wall ✓, cell membrane ✓
- → No well defined Nucleus
- → Naked Genome
- → Nucleus envelop ✗
- → Plasmid DNA

★ Classification of Bacteria on the Basis of cell envelop & staining
- → Gram +ve : take up strain
- → Gram -ve : do not take up strain



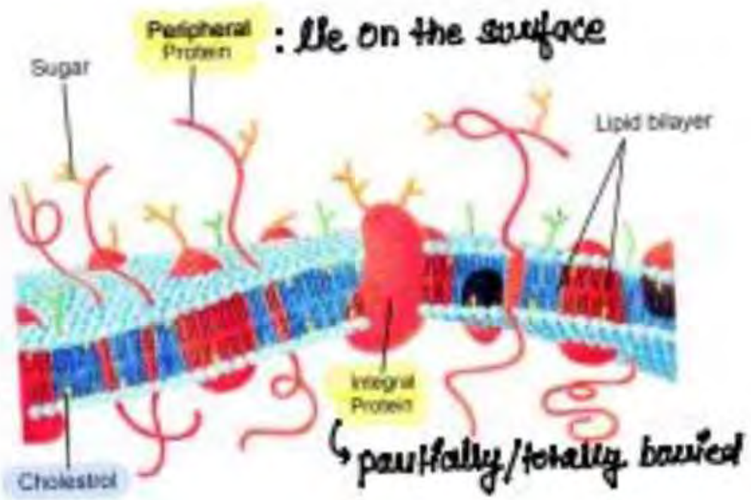
each layer have distant function but act as single protective unit.

* Surface structure
- Flagella → Filamentous extension, motility.
- Pili → elongated tubular str, made of protein
- Fimbriae → small Bristle like fibre

→ Help bacteria to attach → Rocks, Host tissue

(12) CELL MEMBRANE

- Lipid + protein + cholesterol
  - Lipid → Phospholipid → Bilayer
    - outer: polar Head — Hydrophilic
    - inner: Non polar tail — Hydrophobic



* Biochemical investigation

- cell membrane also have protein and carbohydrate
- Ratio of protein & lipid vary in different cells

* RBC membrane → 52% protein, 40% lipid

- Depending on ease of extraction membrane protein → Integral, peripheral

* Fluid mosaic modal — Singer & Nicolson — 1972

↳ Quasi fluid nature of lipid → lateral movement → measured as fluidity.

* Fluidity functions

- Cell growth, secretion, endocytosis, cell division
- Formation of intercellular junctions
- * Transport of molecule across membrane (most imp)

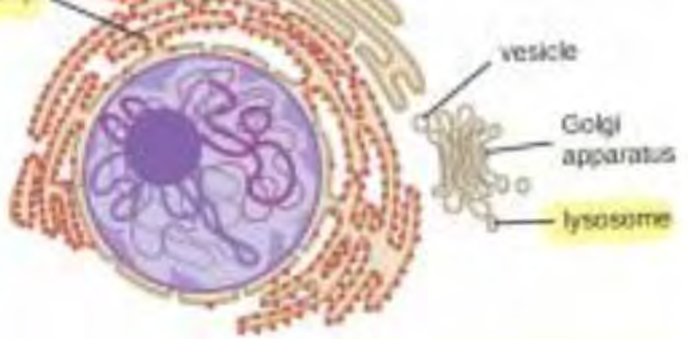
* Plasma membrane selectively permeable

∴
- passive transport → No energy need for transport
  - Osmosis / Diffusion → Flow of water along gradient
- Active transport → Energy required: transport against gradient — Na^+/K^+ pump

→ ER Intercellular space → luminal (inside ER)
→ extra luminal (cytoplasm)

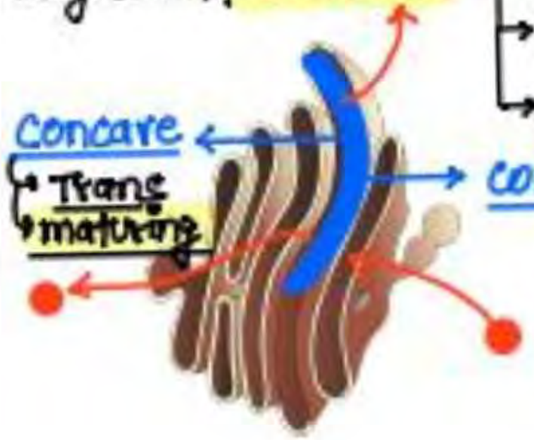
RER [Ribosome ✓] → protein synthesis & secretion

SER [Ribosome ✗] → Lipid synthesis
→ Steroid hormone synthesis [Animal cells]



(b) Golgi apparatus → camillo golgi, 1898

→ Densely stained reticular str near nucleus
→ They consist Cisternae → Flat, disc shape sacs
→ Stacked parallel to each other.
→ Concentrically arranged near nucleus



Ⓐ Golgi remain close association with ER
Ⓡ packaging material from ER, fused with cis face of golgi & move toward maturing face.

★ Golgi functions

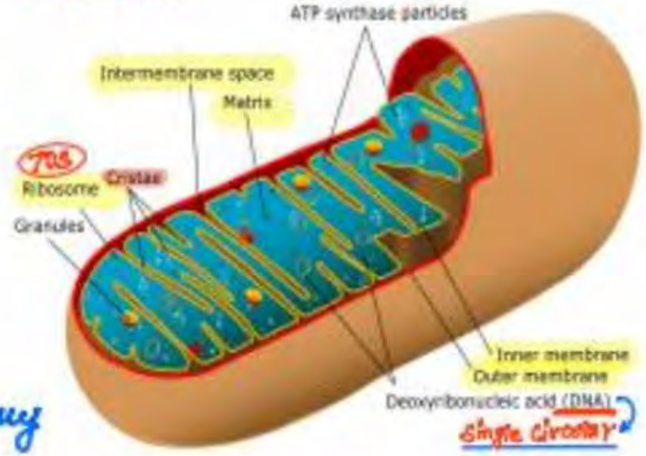
→ packaging, Modification transport
→ Glycoprotein & Glycolipid formation
→ Lysosome formation

vacuole (High conc^n)

⑮ MITOCHONDRIA (Sausage-Shape/Cylindrical)

- Unless specific stained, not visible under microscope
- no of mitochondria per cell depend on physiological activity of cell
- Size: Diameter = 0.2 - 1.0 μm (≈ 0.5 μm) length = 1.0 - 1.4 μm

Imp point
- Site of aerobic Respiration
- produce cellular energy in the form of (ATP)
- Known as power house of cell
- Divide by fission



- **Double membrane** → Divides lumen into two aq. compartment

Outer compartment
- outer membrane → Forms limiting boundary
- inter membrane space
- inner membrane → Forms infolding toward matrix (Cristae)
  - Perform ETS
- Cristae → increase surface area
- Matrix
  - Dense Homogeneous substance
  - perform Kreb cycle
  - have → Single circular DNA
    - Few RNA, Ribosomes (70S)
    - components for protein synthesis

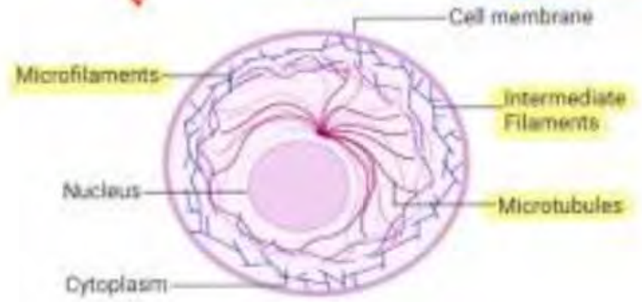
inner compartment

mRNA ⟶ protein

↳ indirect measure of size & density.

(18) CYTOSKELETON

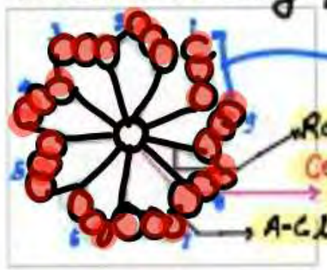
- Elaborate network of Filamentous proteinaceous fibres
- Function: mechanical support, motility, cell shape maintenance
- contain: microtubules, microfilament, intermediate filament



(19) CENTROSOME AND CENTRIOLES

- Centrioles : lie perpendicular
- microtubules
- Amorphous pericentriolar material.

* Centriole : - cartwheel like organization
- Forms basal body of cilia / flagella & Spindle fibres.



- 9 peripheral triplet
  - (Tubulin protein)
- Radial spoke (protein)
- Central Hub → Proteinaceous
- A-C linkers → proximal region

- contain various enzymes
- present in both plants & animals

eg: peroxisomes, glyoxysomes, etc

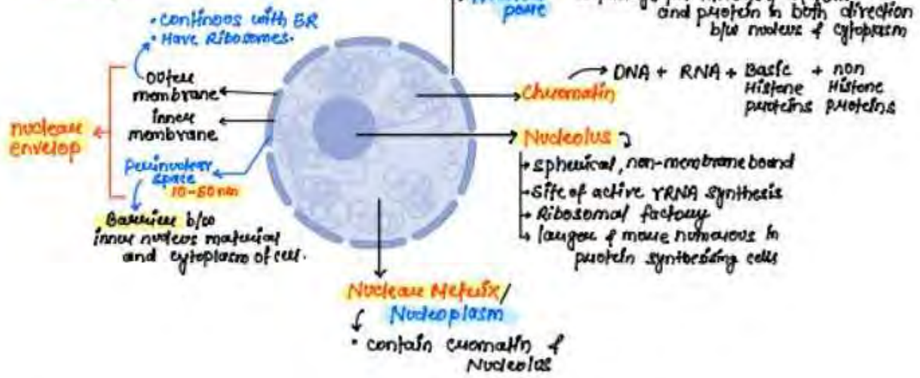
(22) NUCLEUS

- Robert Brown, 1831 → discovered
- Flemming : • stained nucleus with basic dye & Give name chromatin

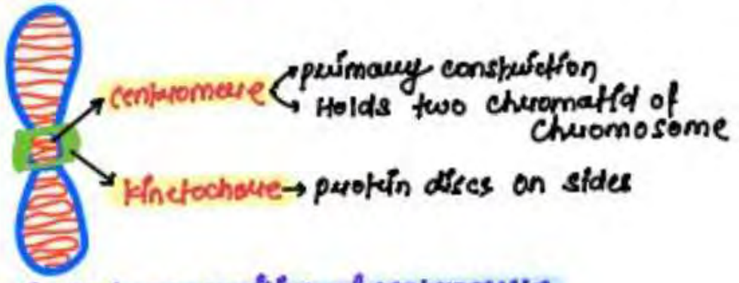
* Interphase nucleus
  - → when nucleus is not dividing
  - → Highly extended, elaborate, loose, indistinct network of nucleoprotein fibres → Chromatin

* Generally there is 1 nucleus/cell but variation can be observed
* Nucleus absent : RBC, Sieve tube

* Diagram

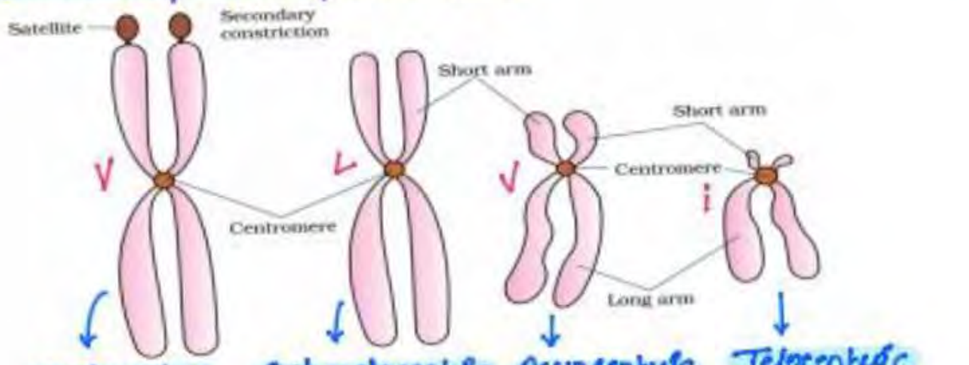


(23) CHRONOSOME (visible only in dividing cells)



* SAT chromosome
- Satellite chromosome
- non-staining secondary constriction
- location constant

* Based on position of centromere



Metacentric
- Centromere in middle
- Two equal arm

Submetacentric
- Slightly away from centre
- one short arm
- one long arm

Acrocentric
- Centromere close to end
- one extremely short
- one very long arm

Telocentric
- Centromere at terminal

VVimp

*** Non-membrane bound**
- Prokaryotes
- Ribosomes (both)
- Nucleolus
- Centrosome
- Inclusion body

membrane-bound
- Eukaryotes (1)
- Endomembranous system (1) → ER, GA, L, V
- Microbodies (1)
- mitochondria
- Chloroplast

(2) NNC

Question No. - 01

A common characteristic feature of plant sieve tube cells and most of mammalian erythrocytes is

(A) Absence of mitochondria

(B) Presence of cell wall

(C) Presence of haemoglobin

(D) Absence of nucleus

Question No. - 02

Select one which is not true for ribosome

A Made of two sub-units

B Form polysome

C May attach to m_+ RNA

D Have no role in protein synthesis

Question No. - 03

Which one of these is not a eukaryote?

A Euglena

B Anabena

C Spirogyra

D Agaricus

Question No. - 04

Which of the following stains is not used for staining chromosomes?

A Basic Fuchsin

B Safranin

C Methylene green

D Carmine

Question No. - 05

Different cells have different sizes. Arrange the following cells in an ascending order of their size. Choose the correct option among the followings

i) Mycoplasma - smallest

ii) Ostrich eggs - largest

iii) Human RBC

iv) Bacteria -

A i, iv, iii & ii

B i, iii, iv & ii

C ii, i, iii & iv

D iii, ii, i & iv

i → iv → iii → ii

Question No. - 06

Which of the following features is common to prokaryotes and many eukaryotes?

A Chromatin material

B Cell wall present

C Nuclear membrane present

D Membranes bound sub-cellular organelles present

Question No. - 07

Who proposed the fluid mosaic model of plasma membrane?

A Benda

B Schleiden and Schwann

C Singer and Nicolson

D Robert Brown

Question No. - 08

Which of the following statements is true for a secretory cell?

A Golgi apparatus is absent

B Rough Endoplasmic Reticulum (RER) is easily observed in the cell

C Only Smooth Endoplasmic Reticulum (SER) is present

D Secretory granules are formed in nucleus.

Question No. - 09

What is a tonoplast?

A. Outer membrane of mitochondria

B. Inner membrane of chloroplast

C. Membrane boundary of the vacuole of plant cells

D. Cell membrane of a plant cell

Question No. - 10

Which of the following is not true of a eukaryotic cell?

A Cell wall is made up of peptidoglycans

B 80S type of ribosomes are present in the cytoplasm

C Mitochondria contain circular DNA

D Membrane bound organelles are present

Question No. - 11

Which of the following statements is not true for plasma membrane?

A. It is present in both plant and animal cell

B. Lipid is present as a bilayer in it

C. Proteins are present integrated as well as loosely associated with the lipid bilayer

D. Carbohydrate is never found in it

Question No. - 12

Plastid differs from mitochondria on the basis of one of the following features. Mark the right answer

A Presence of two layers of membrane

B Presence of ribosome

C Presence of thylakoids

D Presence of DNA

Question No. - 13

Which of the following is not a function of cytoskeleton in a cell?

A Intracellular transport

B Maintenance of cell shape and structure

C Support of the organelle

D Cell motility

Question No. - 14

The stain used to visualise mitochondria is

A Fast green

B Safranin

C Acetocarmine

D Janus green

Question No. - 15

Who for the first time saw and described a live cell?

A. Robert Hooke - dead cells

B. A.V. Leeuwenhoek ✓

C. Robert Brown

D. Matthias Schleiden

Question No. - 16

The non-membrane bound cell organelle common in both prokaryotic and eukaryotic cell is

A Centriole

B Lysosome

C Mesosome

D Ribosome

Question No. - 17

In prokaryotes genetic material is

A Circular DNA

B Enveloped by nuclear membrane

C Confined in nucleus

D Single stranded DNA

Question No. - 18

The plasmid DNA

A. Is found in all eukaryotes

B. Confers certain unique phenotypic characters to organism

C. Is the genetic material of prokaryotes

D. Is larger than genomic DNA

normal = Main

Question No. - 19

The outermost layer of bacterial cell envelope is

A Glycocalyx

B Cell wall

C Cell membrane

D Composed of peptidoglycan · cell wall

Question No. - 20

Select the incorrect statement

A. In bacteria cell wall determines its shape

B. Glycocalyx protects cell from bursting and collapsing

C. Loose sheath outermost protecting layer of bacterial cell envelop is slime layer

D. Glycocalyx differs in composition among different bacteria

Question No. - 21

Mesosomes

A. Help in replication and respiration process

B. Are found in eukaryotes

C. Are extensions of slime layer

D. Contains pigments for photosynthesis

Question No. - 22

Which of the given structures provides motility to bacterial cells?

A Cilia

B Pili

C Flagella

D Fimbriae

Question No. - 23

Small bristle like structures that help bacteria to attach to host tissue is

a) Called fimbriae

b) Longer than flagella

c) Composed of protein

Choose the correct one(s).

A (a) and (b)

B (b) and (c)

C (a) only

D (a) and (c)

Question No. - 24

Several ribosomes may attach to a single m-RNA and form a chain called

Only in prok

(A) Polysome

(B) Mesosome

(C) Chromatophores

(D) Glyoxysome

Question No. - 25

Read the statements and choose the correct option.

A. Gas vacuoles are found in purple photosynthetic bacteria.

B. Prokaryotic ribosome contains 50S and 30S subunits.

(A) Only A is correct

(B) Only B is correct

(C) Both A and B are correct

(D) Both A and B are incorrect

Question No. - 26

Inclusion bodies

A. Are found in eukaryotes

B. Store reserve food material

C. Are single membrane bound

D. Include gas vacuoles and sap vacuoles (plants)

Question No. - 27

Select the incorrect statement for lipids of plasma membrane

A Heads are polar situated towards outer side

B Mainly consist of phosphoglycerides

C Nonpolar tails are situated towards inner side

D Tails are hydrophilic in nature

Question No. - 28

Fluid mosaic model of cell membrane was proposed by

A Singer and Nicolson

B Schleiden and Schwann

C R. Virchow

D R. Brown

Question No. - 29

State the following statements as true (T) or false (F) and select the correct option.

a. Integral proteins are partially or totally buried in the membrane. T

b. Human RBC membrane has approximately 40% proteins. F

c. Proteins move laterally within overall bilayer of membrane. T

(A) a – T; b – T; c – T

(B) a – F; b – T; c – F

(C) a – T; b – F; c – T ✓

(D) a – F; b – F; c – T

Question No. - 30

Na^+/K^+ pump

A Is ATP driven

B Shows facilitated diffusion

C Transports ions along the concentration gradient

D Is energy independent

Question No. - 31

Cell wall

(A) Protects cell from mechanical damage ✓

(B) Is a non-living structure

(C) Is inner covering of plasma membrane ✗

(D) Is absent in algae ✗

Question No. - 32

Choose the odd one w.r.t. cell organelle of endomembrane system

A Endoplasmic reticulum

B Golgi body

C Lysosome

D Peroxisome

Question No. - 33

The component of endomembrane system that have ribosomes

A. Is major site for synthesis of lipids

B. Is involved in protein synthesis and secretion ✓ RER

C. Is double membrane bound

D. Was discovered by Camillo Golgi

Question No. - 34

Identify the wrong match

A	Golgi body	–	Dense reticular structure found near nucleus
B	Lysosome	–	Formed by packaging in Golgi body
C	RER	–	Forms SER
D	Vacuole	–	Found in plants only

Question No. - 35

The cis face of Golgi cisternae is

A Also called forming face

B Concave shaped

C Also called maturing face to which vesicles coming from ER fuses

D Similar to trans face

Question No. - 36

Important site for synthesis of glycoproteins is

glycolipids too

(A) Golgi body

(B) Ribosome

(C) Nucleus

(D) RER

Question No. - 37

hydrolases

The cell organelle capable for digesting carbohydrates, proteins, lipids etc.

a) Is lysosomes

b) Contains enzymes which are optimally active at acidic pH

c) Is a type of microbody → peroxisomes

Choose the correct one(s)

A (a) and (b)

B (b) and (c)

C (a) and (c)

D All (a), (b) and (c)

Question No. - 40

Which of the given is not found in matrix of mitochondria?

A RNA

B Proteins

C 80 S ribosomes

D DNA

Question No. - 41

Which of the following types of plastids stores protein as reserve food material?

A Aleuroplast

B Elaioplast

C Amyloplast

D Chromoplast

Question No. - 42

Select the wrong statement for plastids

A All types of plastids have carotenoids and chlorophyll

B These are found in plants and euglenoids

C They trap light energy during photosynthesis - chloroplasts

D They give plant parts yellow, orange or red color

Question No. - 44

Ribosomes are found in/on all of the following structures, except

A Chloroplast

B RER - 80s

C Mitochondria

D Golgi body

70s

Thank You