KATTAR NEET 2026

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Cell - The Unit of Life

Q1 Which of the following must be features of a unicellular organism for its survival?
A. Presence of a cell wall
B. Independent existence
C. Ability to perform all essential life functions
D. Presence of membrane-bound organelles
(A) A and B only (B) C and D only
(C) B and C only (D) A and D only

Q2 Identify the correct sequence of transport of a protein that is packaged and delivered to intracellular targets or secreted outside the cell.
(A) Nucleus → ER → *trans* face of GB → *cis* face of GB
(B) SER → *trans* face of GB → *cis* face of GB
(C) RER → *cis* face of GB → lysosome → *trans* face of GB
(D) RER → *cis* face of GB → *trans* face of GB

Q3 Which of the following organelles are double membrane bound and divide by fission?
A. Centrioles
B. Plastids
C. Mitochondria
D. Vacuoles
E. Lysosomes
Choose the **correct** answer from the options given below:
(A) B and C only
(B) A, B and C only
(C) C, D and E only
(D) A, B, C, D and E

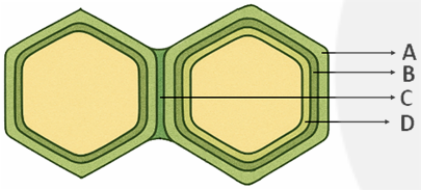
Q4 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: ER helps in the transport of substances, synthesis of proteins, lipoproteins and glycogen.
Reason R: The secretions of cells are packed in ER and transported out from the cell.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is NOT the correct explanation of A.

Q5 Which of the following is **correct** regarding chromatin?
(A) It contains DNA, histones, some non-histone proteins but no RNA.
(B) It appears as a loose and indistinct network of fibres throughout the cell division.
(C) It was stained by the acidic dyes and was given the name chromatin by Flemming.
(D) These are a type of nucleoprotein fibres.

Q6 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Larger and more numerous nucleoli are present in cells actively carrying out protein synthesis.
Reason R: Nucleolus is a site for active ribosomal protein synthesis.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is NOT the correct explanation of A.

Q7 Given below are two statements:
Statement-I: Both lysosomes and vacuoles are endomembrane structures, yet they differ in terms of their functions.
Statement-II: Polar molecules cannot pass through the nonpolar lipid bilayer, but water, despite being polar, can diffuse across the membrane.
In the light of the above statements, choose the **correct** answer from the options given below.
(A) Statement-I is correct and Statement-II is incorrect.
(B) Statement-I is incorrect and Statement-II is correct.
(C) Both Statement-I and Statement-II are correct.
(D) Both Statement-I and Statement-II are incorrect.

Q8 Identify A, B, C and D of the given diagram and select the correct option.



(A) A - Middle lamella, B - Primary cell wall, C - Plasma membrane, D - Secondary cell wall
(B) A - Primary cell wall, B - Secondary cell wall, C - Middle lamella, D - Plasma membrane
(C) A - Plasma membrane, B - Middle lamella, C - Secondary cell wall, D - Primary cell wall
(D) A - Secondary cell wall, B - Plasma membrane, C - Primary cell wall, D - Middle lamella

Q9 Which of the following is **not** a common feature between prokaryotes and eukaryotes?
(A) Plasma membrane is made up of lipids and proteins.
(B) Presence of ribosomes.
(C) Flagella arising from basal body with 9 + 2 arrangement of microtubule.
(D) Cytoplasm occupies the volume of the cell.

Q10 Which of the following is **incorrect**?
(A) Gram-positive and Gram-negative bacteria differ in composition of their cell envelopes.
(B) Gram-positive and Gram-negative bacteria differ in their response to the Gram staining procedure.
(C) Gram-negative bacteria take up the Gram stain.
(D) Glycocalyx differs in composition and thickness among different bacteria.

Q11 Identify the **correct** increasing order of size of following organelles or structures.
A. Ribosomes
B. Golgi apparatus
C. Chloroplast
Choose the **correct** answer from the options given below:
(A) A < B < C
(B) B < A < C
(C) C < A < B
(D) B < C < A

Q12 Identify the **incorrectly** matched pair.
(A) George Palade – Ribosomes
(B) Singer and Nicolson - fluid mosaic model of plasma membrane
(C) Matthias Schleiden - Presence of cell wall in plant cells is a unique character
(D) Antonie Von Leeuwenhoek – First saw live cells

Q13 Which of the following features are found in both animal and plant cells?
A. Presence of organelle having cartwheel like structure.
B. Cytoplasmic connections between two cells.
C. An outer membrane as the delimiting structure of the cell.
D. Double membrane bound structure that contains DNA and synthesise ATP
E. Extensive and continuous structure with the outer membrane of the nucleus.
Choose the **correct** answer from the options given below.
(A) A and B only

(B) D and E only
(C) A, C and D only
(D) A, D and E only

Q14 Identify the **correct** set of statements regarding plasma membrane.
A. Phospholipids are major lipids in plasma membrane.
B. The inward-facing hydrophobic tail protects the nonpolar hydrocarbon chain from the aqueous environment.
C. Integral proteins can be easily extracted from the membrane.
D. Lateral movement of proteins is possible due to quasi-fluid nature of lipid.
E. Glycoproteins and cholesterols are also found in plasma membrane.
Choose the **correct** answer from the options given below:
(A) A, B and C only
(B) D and E only
(C) A, B and D only
(D) A, B, D and E only

Q15 Which of the following is **incorrect** regarding facilitated transport?
(A) Require a carrier protein for transport
(B) Involves movement of polar molecules
(C) Movement of molecules is along the gradient
(D) Require energy for transport of molecules.

Q16 Identify the type of chromosome for each of the following structural features:
A. The centromere is located exactly in the middle, forming two equal arms.
B. The centromere is located close to one end, forming one very short and one very long arm.
C. The centromere is at the terminal end of the chromosome.
D. The centromere is slightly away from the middle, forming one short and one long arm.
Choose the **correct** answer from the options given below:
(A) A–Metacentric, B–Acrocentric, C–Telocentric, D–Sub-metacentric
(B) A–Sub-metacentric, B–Metacentric, C–Acrocentric, D–Telocentric
(C) A–Acrocentric, B–Telocentric, C–Sub-metacentric, D–Metacentric
(D) A–Metacentric, B–Sub-metacentric, C–Acrocentric, D–Telocentric

Q17 Ribosomes with 50S and 30S subunits are found in/on all, **except**:
(A) Chloroplast
(B) Mitochondria
(C) *Chlamydomonas*
(D) Rough endoplasmic reticulum

Q18 Which of the following is correct about intergranal thylakoid?
(A) It connects the thylakoids of the different grana.
(B) It contains thylakoids arranged in stacks called grana, like piles of coins.
(C) It contains stroma at centre.
(D) It is also known as stroma lamellae.

Q19 Which of the following features is not common in chloroplast and mitochondria?
(A) Presence of double membrane.
(B) Presence of circular DNA molecule and ribosomes.
(C) Their number can vary in different species.
(D) Called as powerhouse of the cell for producing ATP.

Q20 Which of the following is common between the structure of centrioles and cilia/flagella?
(A) Presence of 9 peripheral doublet microtubules.
(B) Presence of radial spokes
(C) A central sheath encloses central microtubules.
(D) Enclosed by plasma membrane

Q21 Which of the following statements correctly describes the organelle involved in the synthesis of steroidal hormones?
(A) It has ribosomes attached to its outer surface and is involved in protein synthesis.

(B) It is a double membrane-bound organelle with cristae and generates cellular ATP.
(C) It is the major site for synthesis of lipid.
(D) It contains cisternae, vesicles, and tubules involved in protein glycosylation and packaging.

Q22 Which of the following cellular processes would be most directly affected if the fluid nature of the plasma membrane were disrupted?
(A) Glycosylation process
(B) ATP synthesis in mitochondria
(C) Secretion, endocytosis, cell division
(D) DNA replication in the nucleus

Q23 Given below are two statements:
Statement-I: The structure that gives rise to spindle apparatus during cell division in animal cells is surrounded by amorphous pericentriolar material.
Statement-II: Centrioles form the basal bodies (centriole-like structures) from which cilia and flagella emerge.
(A) Statement-I is correct but Statement-II is incorrect.
(B) Statement-I is incorrect but Statement-II is correct.
(C) Both Statement-I and Statement-II are correct.
(D) Both Statement-I and Statement-II are incorrect.

Q24 For the formation of ribosomes, rRNA is transferred from:
(A) Nucleoplasm to cytoplasm
(B) Cytoplasm to extra-luminal compartment of ER
(C) Cytoplasm to nucleoplasm
(D) Golgi complex to peroxisome

Q25 Three of the following statements regarding cell organelles are correct while one is wrong. Which one is wrong?
(A) In vacuole, the membrane facilitates the transport of a number of ions and other materials against concentration gradients into it.
(B) Endoplasmic reticulum consists of a network of membranous tubules and helps in transport, synthesis and secretion.
(C) Leucoplasts are bound by two membranes, lack pigment, but contain their own DNA and protein-synthesizing machinery.
(D) Lysosomes are double-membraned vesicles budded off from the Golgi apparatus and contain digestive enzymes.

Q26 A scientist filters a solution containing a mixture of the following:
A. Typical bacteria
B. PPLO (Mycoplasma)
C, Viruses
D. Typical eukaryotic cells
The filter used has a pore size of 5 micrometres. Which of the following will be present in the filtrate?
(A) C and B only
(B) A, B and C only
(C) C only
(D) A, B, C and D

Q27 A bacterial cell loses its plasmid due to exposure to a certain chemical. Which of the following functions is most likely to be lost first?
(A) DNA replication
(B) Cell wall synthesis
(C) Antibiotic resistance
(D) Protein synthesis

Q28 Which of the following structures/organelles of a cell do not possess components required for synthesis of proteins?
A. Cytoplasm
B. Mitochondria
C. Nucleus
D. Lysosomes
E. Chloroplast
Choose the **correct** answer from the options given below:
(A) A, B and C only

(B) C and D only
(C) C, D and E only
(D) B, C and D only

Q29 Consider the following characteristics:
I. Presence of membrane-bound organelles.
II. A true nucleus enclosed by a nuclear envelope.
III. Genetic material is circular, naked DNA, not enveloped by a nuclear membrane.
IV. Presence of a cell wall in all members.
Which of the above characteristics are **exclusively** found in eukaryotic cells?
(A) I and II only
(B) II and III only
(C) I, II and IV
(D) I, II and III

Q30 Arrange the following in the increasing order of their size.
A. Virus
B. PPLO
C. Typical bacteria
D. A typical eukaryotic cell
Choose the **correct** answer from the options given below:
(A) A - B - C - D (B) B - A - D - C
(C) C - B - A - D (D) D - C - B - A

Q31 Which of the following would **not** be affected if the Golgi apparatus is removed from a plant cell?
(A) Formation of lysosomes
(B) Glycosylation of proteins
(C) Synthesis of ribosomal RNA
(D) Formation of secretory vesicles

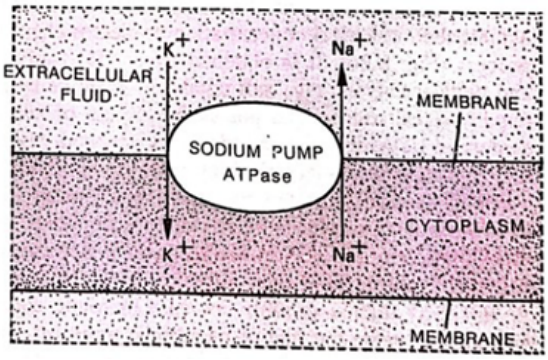
Q32 Both lysosomes and vacuoles are part of the endomembrane system, yet they exhibit significant functional differences. Which of the following best highlights this difference?
(A) Lysosomes are involved in waste removal, while vacuoles are only for storage.
(B) Lysosomes primarily perform intracellular digestion, while vacuoles in plant cells maintain turgor pressure and store sap.
(C) Lysosomes are exclusive to animal cells, while vacuoles are only in plant cells.
(D) Lysosomes are responsible for energy production, while vacuoles are involved in protein synthesis.

Q33 The inclusion bodies of a cell that lie freely in the cytoplasm and are not bound by any membrane include all the following, **except**;
(A) phosphate granules.
(B) cyanophycean granules.
(C) glycogen granules.
(D) microbodies.

Q34 A plant cell is treated with an enzyme that digests calcium pectate. Which of the following structures will be disrupted first?
(A) Primary cell wall
(B) Secondary cell wall
(C) Middle lamella
(D) Plasma membrane

Q35 Find the correct statements:
A. Cell is the structural and functional unit of life.
B. Anything less than a complete structure of a cell does not ensure independent living.
C. Unicellular organisms are not capable of performing the essential functions of life.
D. The compound microscope revealed all the structural details of the cell.
E. All living organisms are composed of cells and products of cells.
Choose the **correct** answer from the options given below:
(A) A, B and E (B) B, C and D
(C) C, D and E (D) A, C and D

Q36 Identify the type of transport demonstrated in the diagram below.



(A) Simple diffusion
(B) Osmosis
(C) Passive transport
(D) Active transport

Q37 Identify the number of true statements and choose the **correct** option:
(A) Cell wall helps in cell-to-cell interaction and provides a barrier to undesirable macromolecules.
(B) Algae have cell walls, made of cellulose, galactans, mannans and minerals like calcium carbonate.
(C) The cell wall of a mature plant cell, the primary wall, is capable of growth.
(D) The middle lamella is a layer mainly of calcium carbonate which holds the different neighboring cells together.
(A) Two (B) Three
(C) Four (D) One

Q38 Which of the following is **not** true for mitochondria and chloroplasts?
(A) Both contain DNA
(B) Both are double membrane bound
(C) Both contain enzymes for carbohydrate synthesis
(D) Both are present only in eukaryotic cells

Q39 Which of the following statements about chromosomes is **correct**?
(A) Chromosomes contain genetic information in the form of lipids, primarily involved in energy production.
(B) Chromosomes are composed of proteins only and do not play a role in cellular processes.
(C) Chromosomes carry genetic information in the form of DNA, serving as the blueprint for the cell's structure and function.
(D) Chromosomes are static structures within the cell and do not participate in cell division or replication.

Q40 Why is it essential to have a physico-chemical approach to understand the living phenomena?
(A) To describe organisms at a macroscopic level and their diversity.
(B) To analyze living tissues for their elemental composition only.
(C) To describe various biological processes in molecular terms using cell-free systems.
(D) To solely understand the evolutionary history of life forms.

Q41 The functions of lysosomes are not coordinated with;
(A) ER. (B) mitochondria.
(C) vacuoles. (D) golgi complex.

Q42 The usual axonemal arrangement of microtubules is;
(A) nine doublets of radially arranged peripheral microtubules, and a single centrally located microtubule.
(B) six doublets of radially arranged peripheral microtubules, and a single centrally located microtubule.
(C) six doublets of radially arranged peripheral microtubules, and a pair of centrally located microtubules.
(D) nine doublets of radially arranged peripheral microtubules, and a pair of centrally located microtubules.

Q43 Given below are two statements:
Statement I: The size of arms is unequal in sub-metacentric and acrocentric chromosomes.
Statement II: The nuclear pores are formed due to fusion of the two nuclear membranes.
In the light of the above statements, choose the **most appropriate** answer from the options given

below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

Q44 Identify the **incorrect** statements.
A. Glycocalyx gives sticky character to a prokaryotic cell.
B. Glycocalyx could be a thick and tough sheath called the slime layer in some bacteria, while in others it may be loose sheath, called the capsule.
C. Glycocalyx is the innermost layer of the cell envelope in prokaryotic cell.
D. The plasma membrane determines the shape of the cell and provides a strong structural support to prevent the bacterium from bursting or collapsing.
E. The plasma membrane in prokaryotes is structurally similar to that of eukaryotes.
Choose the **correct** option.
(A) A and B (B) B, C and D
(C) A, C and D (D) A and C

Q45 The true statements are;
A. Chloroplasts contain pigments like carotenoids and chlorophyll.
B. Chromoplasts store starch and proteins.
C. Leucoplasts are colourless and can store nutrients.
D. Grana are stacks of thylakoids in the stroma.
E. Aleuroplasts gives the part of the plant a yellow, orange or red colour.
(A) A and E only (B) A, C, and D
(C) A and D only (D) B, C, and E

Q46 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: The fluid mosaic model explains the quasi-fluid nature of the plasma membrane.
Reason R: According to this model, proteins and lipids are fixed rigidly in the membrane.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is NOT the correct explanation of A.

Q47 The number of radial spokes in the axoneme of a cilium is;
(A) two. (B) three.
(C) eighteen. (D) nine.

Q48 Which statements are **correct** regarding the cytoskeleton?
A. It is made up of microtubules, microfilaments, and intermediate filaments.
B. It provides mechanical support to the cell.
C. It is absent in prokaryotic cells.
D. It plays no role in maintenance of the shape of the cell.
(A) A, B and C (B) Only A and D
(C) Only C and D (D) A, B and D

Q49 Given below are two statements:
Statement I: Ribosomes and centrosomes are present in both prokaryotic and eukaryotic cells.
Statement II: Ribosomes and centrosomes are non-membrane bound organelles.
In the light of the above statements, choose the **most appropriate** answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

Q50 Given below are a few events occurring in a cell.

A. Glycosylation of proteins in Golgi apparatus.
B. Synthesis of protein by ribosomes on ER.
C. Release of modified proteins from *trans* face of Golgi apparatus.
D. Release of proteins outside the cell.
E. Entry of newly synthesized proteins into Golgi apparatus by it *cis* face.

The **correct** order of these events is;
(A) B → E → A → C → D
(B) B → D → A → C → E
(C) B → A → C → E → D
(D) B → C → E → D → A

Answer Key

Q1	(C)	Q26	(B)
Q2	(D)	Q27	(C)
Q3	(A)	Q28	(B)
Q4	(A)	Q29	(A)
Q5	(D)	Q30	(A)
Q6	(A)	Q31	(C)
Q7	(C)	Q32	(B)
Q8	(B)	Q33	(D)
Q9	(C)	Q34	(C)
Q10	(C)	Q35	(A)
Q11	(A)	Q36	(D)
Q12	(C)	Q37	(A)
Q13	(B)	Q38	(C)
Q14	(D)	Q39	(C)
Q15	(D)	Q40	(C)
Q16	(A)	Q41	(B)
Q17	(D)	Q42	(D)
Q18	(B)	Q43	(C)
Q19	(D)	Q44	(B)
Q20	(B)	Q45	(B)
Q21	(C)	Q46	(A)
Q22	(C)	Q47	(D)
Q23	(C)	Q48	(A)
Q24	(A)	Q49	(B)
Q25	(D)	Q50	(A)

Hints & Solutions

Q1 Text Solution:
(C)
A unicellular organism is a complete, independent living entity that performs all essential life functions within a single cell.
Presence of a cell wall is not essential for all unicellular organisms. Eukaryotic unicellular organisms possess membrane-bound organelles, whereas prokaryotes lack them.

Q2 Text Solution:
(D)
Proteins synthesised on ribosomes of the rough ER are transported to the *cis* face of the Golgi apparatus via vesicles. After processing and packaging, they exit from the *trans* face and are sent to intracellular targets or secreted outside the cell.

Q3 Text Solution:
(A)
Plastids and mitochondria are double membrane-bound organelles that contain their own DNA, enabling them to divide by fission, similar to bacteria.
Centrioles are non-membrane bound organelles.
Vacuoles and lysosomes are single membrane-bound organelles.

Q4 Text Solution:
(A)
The golgi apparatus principally performs the function of packaging materials, to be delivered either to the intra-cellular targets or secreted outside the cell.

Q5 Text Solution:
(D)
Chromatin contains DNA, histone proteins, non-histone proteins, and RNA. It appears as a loose and indistinct network of fibres in the interphase nucleus.
It was stained by the basic dyes and was given the name chromatin by Flemming. The interphase nucleus contains chromatin, which is a loose and indistinct network of nucleoprotein fibres.

Q6 Text Solution:
(A)
Nucleolus is a site for active ribosomal RNA synthesis.

Q7 Text Solution:
(C)
Both lysosomes and vacuoles are endomembrane structures, as their functions are coordinated with other organelles of the endomembrane system such as the Golgi apparatus and endoplasmic reticulum.

Q8 Text Solution:
(B)
A - Primary cell wall, B - Secondary cell wall, C - Middle lamella, D - Plasma membrane

Q9 Text Solution:
(C)
Eukaryotic flagella arise from basal bodies and have a 9 + 2 arrangement of microtubules.
Prokaryotic flagella do not have microtubules or a 9 + 2 arrangement.

Q10 Text Solution:
(C)
Gram-negative do not take up the gram stain.

Q11 Text Solution:
(A)
Ribosomes are about 15 nm by 20 nm in size
Golgi apparatus- 0.5µm to 1.0µm diameter
Chloroplast- length (5-10µm) and width (2-4µm)

Q12 Text Solution:
(C)
Theodore Schwann concluded that the presence of cell wall is a unique character of the plant cells.

Q13 Text Solution:
(B)

Both the centrioles in a centrosome lie perpendicular to each other in which each has an organisation like the cartwheel. It is found in animal cell but absent in plant cell. Plasmodesmata are cytoplasmic connections between two adjacent cells in plants. The outer and delimiting structure in animal cells is the plasma membrane. Mitochondria are double membrane-bound organelles that contain DNA and are involved in the synthesis of ATP; they are present in both animal and plant cells. The extensive and continuous structure associated with the outer membrane of the nucleus is the endoplasmic reticulum (ER), which is present in both animal and plant cells.

Q14 Text Solution:

(D)

Peripheral proteins can be easily removed, whereas integral proteins cannot be extracted easily.

Q15 Text Solution:

(D)

Facilitated transport is a passive process. It does not require energy.

Q16 Text Solution:

(A)

The metacentric chromosome has middle centromere forming two equal arms of the chromosome. The sub-metacentric chromosome has centromere slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm. In case of acrocentric chromosome the centromere is situated close to its end forming one extremely short and one very long arm, whereas the telocentric chromosome has a terminal centromere.

Q17 Text Solution:

(D)

70S ribosomes, composed of 50S and 30S subunits, are found in prokaryotes, mitochondria, and chloroplasts. RER contains 80S ribosomes made of 60S and 40S subunits.

Q18 Text Solution:

(B)

Thylakoids are arranged in stacks like the piles of coins called grana (singular: granum) or the intergranal thylakoids.

Q19 Text Solution:

(D)

Mitochondria are called the powerhouse of the cell because they produce ATP, the main energy currency of the cell, through cellular respiration. Although chloroplasts synthesize sugars via photosynthesis, they are not called the powerhouse of the cell.

Q20 Text Solution:

(B)

In cilium/flagellum, radial spokes connect one of the peripheral microtubules to the central sheath. In centriole, peripheral microtubules triples are connected with central sheath by radial spokes.

Q21 Text Solution:

(C)

Smooth Endoplasmic Reticulum (SER) is the major site for synthesis of lipid. Rough Endoplasmic Reticulum (RER) has ribosomes attached to its outer surface and is involved in protein synthesis. Mitochondrion is a double membrane-bound organelle with cristae and generates cellular ATP. Golgi Apparatus contains cisternae, vesicles, and tubules involved in protein glycosylation and packaging.

Q22 Text Solution:

(C)

The fluid nature of the membrane is also important from the point of view of functions like cell growth, formation of intercellular junctions, secretion, endocytosis, cell division etc. If fluid nature of the plasma membrane were disrupted, these functions would be affected.

Q23 Text Solution:

(C)

Centrosome is an organelle usually containing two cylindrical structures called centrioles. They

are surrounded by amorphous pericentriolar materials. The centrioles form the basal body of cilia or flagella, and spindle fibres that give rise to spindle apparatus during cell division in animal cells.

Q24 Text Solution:

(A)

rRNA is synthesised in the nucleolus and then transferred from the nucleoplasm to the cytoplasm for the formation of ribosomes.

Q25 Text Solution:

(D)

Lysosomes are single membrane-bound vesicular structures formed by the process of packaging in the Golgi apparatus.

Q26 Text Solution:

(B)

Viruses (0.02–0.2 µm), PPLO (~0.1 µm), and typical bacteria (1–2 µm) are all smaller than the 5 µm filter pore size, so they pass through. Typical eukaryotic cells are larger and get retained.

Q27 Text Solution:

In addition to the genomic DNA (the single chromosome/circular DNA), many bacteria have small circular DNA outside the genomic DNA. These smaller DNA are called plasmids. The plasmid DNA confers certain unique phenotypic characters to such bacteria. One such character is resistance to antibiotics. So, if plasmids are lost, the first affected trait would be resistance to antibiotics.

Q28 Text Solution:

Ribosomes are involved in protein synthesis. They are present in cytoplasm of all cells. The mitochondrial matrix also possesses single circular DNA molecule, a few RNA molecules, ribosomes (70S) and the components required for the synthesis of proteins. The stroma of the chloroplast contains enzymes required for the synthesis of carbohydrates and proteins.

Q29 Text Solution:

Eukaryotic cells have membrane-bound organelles and a true nucleus. Prokaryotes have circular, naked DNA and lack membrane-bound organelles. The presence of a cell wall is not exclusive to eukaryotes (e.g., bacteria have cell walls).

Q30 Text Solution:

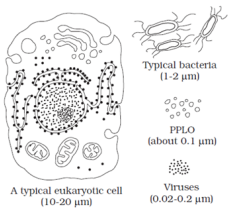


Diagram showing comparison of eukaryotic cell with other organisms

Q31 Text Solution:

The golgi apparatus principally performs the function of packaging materials, to be delivered either to the intra-cellular targets or secreted outside the cell. Materials to be packaged in the form of vesicles from the ER fuse with the *cis* face of the golgi apparatus and move towards the maturing face. Golgi apparatus is the important site of formation of glycoproteins and glycolipids. The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure. It is a site for active ribosomal RNA synthesis.

Q32 Text Solution:

Lysosomes primarily perform intracellular digestion, while vacuoles in plant cells maintain turgor pressure and store sap.

Q33 Text Solution:

Reserve material in prokaryotic cells are stored in the cytoplasm in the form of inclusion bodies. These are not bound by any membrane system and lie free in the cytoplasm, e.g., phosphate granules, cyanophycean granules and glycogen granules. Many membrane bound minute vesicles called microbodies that contain various enzymes, are present in both plant and animal cells.

Q34 Text Solution:

Algae have cell wall, made of cellulose, galactans, mannans and minerals like calcium carbonate, while in other plants it consists of cellulose, hemicellulose, pectins and proteins. The middle lamella is a layer mainly of calcium pectate which holds or glues the different neighbouring cells together. Therefore, enzyme that digests calcium pectate will disrupt it first.

Q35 Text Solution:

Unicellular organisms are capable of

(i) independent existence and

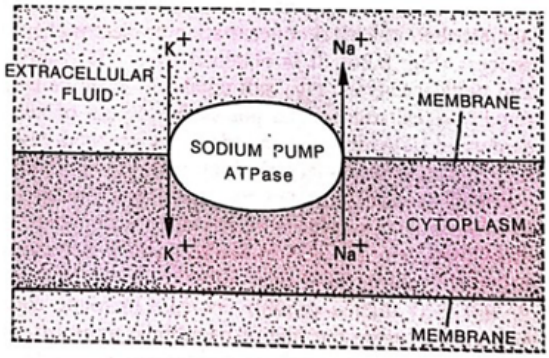
(ii) performing the essential functions of life. Anything less than a complete structure of a cell does not ensure independent living. Hence, cell is the fundamental structural and functional unit of all living organisms. Cell theory as understood today is:

(i) all living organisms are composed of cells and products of cells.

(ii) all cells arise from pre-existing cells.

Q36 Text Solution:

One of the most important functions of the plasma membrane is the transport of the molecules across it. The membrane is selectively permeable to some molecules present on either side of it. Many molecules can move briefly across the membrane without any requirement of energy and this is called the passive transport. Neutral solutes may move across the membrane by the process of simple diffusion along the concentration gradient, i.e., from higher concentration to the lower. Water may also move across this membrane from higher to lower concentration. Movement of water by diffusion is called osmosis. As the polar molecules cannot pass through the non-polar lipid bilayer, they require a carrier protein of the membrane to facilitate their transport across the membrane. A few ions or molecules are transported across the membrane against their concentration gradient, i.e., from lower to the higher concentration. Such a transport is an energy dependent process, in which ATP is utilised and is called active transport, e.g., Na^+/K^+ Pump.



Sodium Potassium Pump

Q37 Text Solution:

The cell wall of a young plant cell, the primary wall is capable of growth, which gradually diminishes as the cell matures and the secondary wall is formed on the inner (towards membrane) side of the cell. The middle lamella is a layer mainly of calcium pectate which holds or glues the different neighbouring cells together.

Q38 Text Solution:

The mitochondrial matrix possesses single circular DNA molecule, a few RNA molecules, ribosomes (70S) and the components required for the synthesis of proteins.

Q39 Text Solution:

Chromosomes carry genetic information in the form of DNA, serving as the blueprint for the cell's structure and function including cell division and replication of DNA.

Q40 Text Solution:

Cell theory created a sense of mystery around living phenomena, i.e., physiological and behavioural processes. This mystery was the requirement of integrity of cellular organisation for living phenomena to be demonstrated or observed. In studying and understanding the physiological and behavioural processes, one can take a physico-chemical approach and use cell-free systems to investigate. This approach enables us to describe the various processes in molecular terms. The approach is established by

analysis of living tissues for elements and compounds.

Q41 Text Solution:

While each of the membranous organelles is distinct in terms of its structure and function, many of these are considered together as an endomembrane system because their functions are coordinated. The endomembrane system include endoplasmic reticulum (ER), golgi complex, lysosomes and vacuoles. Since the functions of the mitochondria, chloroplast and peroxisomes are not coordinated with the above components, these are not considered as part of the endomembrane system.

Q42 Text Solution:

The electron microscopic study of a cilium or the flagellum show that they are covered with plasma membrane. Their core called the axoneme, possesses a number of microtubules running parallel to the long axis. The axoneme usually has nine doublets of radially arranged peripheral microtubules, and a pair of centrally located microtubules. Such an arrangement of axonemal microtubules is referred to as the 9+2 array.

Q43 Text Solution:

At a number of places the nuclear envelope is interrupted by minute pores, which are formed by the fusion of its two membranes. These nuclear pores are the passages through which movement of RNA and protein molecules takes place in both directions between the nucleus and the cytoplasm. The sub-metacentric chromosome has centromere slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm. In case of acrocentric chromosome the centromere is situated close to its end forming one extremely short and one very long arm.

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Q44 Text Solution:

Most prokaryotic cells, particularly the bacterial cells, have a chemically complex cell envelope. The cell envelope consists of a tightly bound three layered structure i.e., the outermost glycocalyx followed by the cell wall and then the plasma membrane. Glycocalyx differs in composition and thickness among different bacteria. It could be a loose sheath called the slime layer in some, while in others it may be thick and tough, called the capsule. The cell wall determines the shape of the cell and provides a strong structural support to prevent the bacterium from bursting or collapsing. The plasma membrane is selectively permeable in nature and interacts with the outside world. This membrane is similar structurally to that of the eukaryotes.

Q45 Text Solution:

The chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping light energy essential for photosynthesis. In the chromoplasts, fat soluble carotenoid pigments like carotene, xanthophylls and others are present. This gives the part of the plant a yellow, orange or red colour. The leucoplasts are the colourless plastids of varied shapes and sizes with stored nutrients: Amyloplasts store carbohydrates (starch), e.g., potato; elaioplasts store oils and fats whereas the aleuroplasts store proteins. The space limited by the inner membrane of the chloroplast is called the stroma. A number of organised flattened membranous sacs called the thylakoids, are present in the stroma. Thylakoids are arranged in stacks like the piles of coins called grana (singular: granum) or the intergranal thylakoids.

Q46 Text Solution:

An improved model of the structure of cell membrane was proposed by Singer and Nicolson (1972) widely accepted as fluid mosaic model. According to this, the quasi-fluid nature of lipid enables lateral movement of proteins within the

overall bilayer. This ability to move within the membrane is measured as its fluidity.

Q47 Text Solution:

The electron microscopic study of a cilium or the flagellum show that they are covered with plasma membrane. Their core called the axoneme, possesses a number of microtubules running parallel to the long axis. The axoneme usually has nine doublets of radially arranged peripheral microtubules, and a pair of centrally located microtubules. Such an arrangement of axonemal microtubules is referred to as the 9+2 array. The central tubules are connected by bridges and is also enclosed by a central sheath, which is connected to one of the tubules of each peripheral doublets by a radial spoke. Thus, there are nine radial spokes.

Q48 Text Solution:

An elaborate network of filamentous proteinaceous structures consisting of microtubules, microfilaments and intermediate filaments present in the cytoplasm is collectively referred to as the cytoskeleton. The cytoskeleton in a cell are involved in many functions such as mechanical support, motility, maintenance of the shape of the cell.

Q49 Text Solution:

Ribosomes are non-membrane bound organelles found in all cells – both eukaryotic as well as prokaryotic. Animal cells contain another non-membrane bound organelle called centrosome which helps in cell division.

Q50 Text Solution:

The correct sequence of events is;

B. Synthesis of protein by ribosomes on ER – Proteins are first synthesized by ribosomes on rough ER.

E. Entry of newly synthesized proteins into Golgi apparatus by its *cis* face – These proteins are packaged into vesicles and enter the Golgi apparatus through the *cis* face.

A. Glycosylation of proteins in Golgi apparatus – In the Golgi cisternae, proteins undergo modification, including glycosylation.

C. Release of modified proteins from *trans* face of Golgi apparatus Processed proteins are then sorted and released from the *trans* face.

D. Release of proteins outside the cell Finally, these vesicles fuse with the plasma membrane and the proteins are secreted outside.