

**BIO · BIOLOGY****01. Cell**

Official PMDC Solved Past Paper Topical Booklet · High-Yield Examination Series

🕒 143 Solved Questions

📅 2014 to 2024 Archive

🏛️ Boards: BUMHS, DUHS, KMU, MDCAT, NUMS, PMDC

📊 Weightage: 34% of MDCAT (68 MCQs)

Curated by Ibrahim for fellow bees. Every question in this chapter has been verified against official UHS, NUMS, SZABMU, DUHS, and KMU answer keys. Propolis cognitive autopsies are provided at the end of this booklet to explain core concepts and break down common distractor traps.

OFFICIAL SOLVED EDITION**Q1.**

SZABMU 2024

Middle lamella is composed of: (SZABMU-2024-Reconduct)

- (A) Magnesium + sodium salts + pectin
- (B) Magnesium + calcium salts + pectin
- (C) Calcium + sodium salts + pectin
- (D) Magnesium + potassium salts + pectin

Q2.

SZABMU 2024

In which type of cells, cell wall is **not** present? (SZABMU-2024-Reconduct)

- (A) Fungal cells
- (B) Bacterial cells
- (C) Plant cells
- (D) Liver cells

Q3.

SZABMU 2024

The cells in our body are all genetically identical, apart from the: (SZABMU-2024-Reconduct)

- (A) Reproductive cells
- (B) Muscle fibers
- (C) Somatic cells
- (D) White blood cells

Q4.

KMU 2024

Plasma membrane is differentially permeable membrane due to the presence of: (KMU-2024)

- (A) Lipids
- (B) Proteins
- (C) Carbohydrates
- (D) Vitamins

Q5.

SZABMU 2024

Amoeba engulfs liquid food across its membrane by a process: (SZABMU-2024)

- (A) Exocytosis
- (B) Endocytosis
- (C) Pinocytosis
- (D) Phagocytosis

Q6.

NUMS 2024

Which function cannot be attributed to plasma membrane lipids? (NUMS-2024)

- (A) Control of metabolic reaction across cell membrane
- (B) Maintaining cell membrane flexibility
- (C) Binding ligands for intracellular response
- (D) Recognition of cells having non-self-surface markers

Q7.

NUMS 2024

Which one is the function of plasma membrane proteins? (NUMS-2024)

- (A) Prevention of freezing during cold weather
- (B) Restrict entry of polar molecules
- (C) Movement of ions in and out of the cell
- (D) Maintenance of membrane flexibility

Q8.

SZABMU 2024

Choose the correct sequence for permeability of molecules across the plasma membrane: (SZABMU-2024-Reconduct)

- (A) Water / Glucose > Lipids > Sodium
- (B) Sodium > Lipids > Water / Glucose
- (C) Lipids > Water / Glucose > Sodium
- (D) Sodium > Water / Glucose > Lipids

Q9.

KMU 2024

The active mass movement of mitochondria in the cytoplasm is due to: (KMU-2024)

- (A) Endoplasmic streaming movements
- (B) Transfer RNA
- (C) Cyclosis
- (D) Golgi apparatus

Q10.

UHS 2024

The nucleus takes dyes due to the presence of: (UHS-2024)

- (A) Lipid
- (B) Metal ions
- (C) Chromatin
- (D) Thylakoids

Q11.

KMU 2024

Chromosome is typically made up from a combination of: (KMU-2024)

- (A) DNA and RNA
- (B) DNA and proteins
- (C) RNA and proteins
- (D) RNA and lipids

Q12.

KMU 2024

Where are spindle fibres attached during cell division on a chromosome? (KMU-2024)

- (A) Histone proteins
- (B) Telomere
- (C) Nucleolus
- (D) Centromere

Q13.

SZABMU 2024

The exchange of materials between nucleus and cytoplasm takes place through: (SZABMU-2024)

- (A) Nuclear pores
- (B) Nucleoplasm
- (C) Nuclear lamella
- (D) Nucleolus

Q14.

KMU 2024

Which organelle contributes towards steroid production? (KMU-2024)

- (A) Endoplasmic Reticulum
- (B) Golgi apparatus
- (C) Lysosome
- (D) Ribosomes

Q15.

UHS 2024

Which of the following is the function of Golgi Complex? (UHS-2024)

- (A) Autophagy
- (B) Intracellular digestion
- (C) Processing of cell secretions
- (D) Autolysis

Q16.

NUMS 2024

Follow the route of pepsinogen secreted by zymogen cells: (NUMS-2024)

- (A) SER → RER → Golgi complex → Secretory vesicles
- (B) RER → SER → Golgi complex → Secretory vesicles
- (C) SER → Mitochondria → Golgi complex → Secretory vesicles
- (D) Golgi complex → RER → SER → Secretory vesicles

Q17.

SZABMU 2024

Cristae in mitochondria serve as a site for: (SZABMU-2024-Reconduct)

- (A) Calvin cycle
- (B) Glycolysis
- (C) Electron transport chain
- (D) Photophosphorylation

Q18.

SZABMU 2024

Golgi complex is responsible for: (SZABMU-2024-Reconduct)

- (A) Synthesis of proteins
- (B) Detoxification of alcohol
- (C) Processing of cell secretions
- (D) Oxidation of glucose

Q19.

KMU 2024

The lysosomes found in eukaryotes contain: (KMU-2024)

- (A) Meiotic enzymes
- (B) Oxidative enzymes
- (C) Hydrolytic enzymes
- (D) Mitotic enzymes

Q20.

SZABMU 2024

Tay–Sach's is related to the malfunctioning of which of the following organelle? (SZABMU–2024)

- (A) Endoplasmic reticulum
- (B) Lysosomes
- (C) Golgi complex
- (D) Glyoxysomes

Q21.

SZABMU 2024

Which enzyme is missing in the patient of Tay–Sach's disease? (SZABMU–2024–Reconduct)

- (A) Carbohydrate digesting enzyme
- (B) Protein digesting enzyme
- (C) Lipid digesting enzyme
- (D) Fatty acid digesting enzyme

Q22.

SZABMU 2024

Which one of the following describes best the autophagy? (SZABMU–2024–Reconduct)

- (A) Intracellular food digestion
- (B) Decomposition of hydrogen peroxide
- (C) Self-eating process
- (D) Disintegration of cell

Q23.

UHS 2024

Chloroplast are membrane bound bodies containing: (UHS–2024)

- (A) Cisternae
- (B) Linear ds-DNA
- (C) Pigments
- (D) Cristae

Q24.

SZABMU 2024

Which of the following type of plastids is involved in dispersal of seed and pollination? (SZABMU–2024)

- (A) Chromoplast
- (B) Chloroplast
- (C) Leucoplast
- (D) Amyloplast

Q25.

KMU 2024

Which cytoplasmic organelles make their own proteins? (KMU–2024)

- (A) Golgi apparatus
- (B) Chromosomes
- (C) Mitochondria
- (D) Smooth endoplasmic reticulum

Q26.

SZABMU 2024

In the inner membrane of mitochondria which has many folds called cristae, there are granular particles called: (SZABMU–2024)

- (A) Cytochrome c
- (B) ATP Synthetase
- (C) Porins
- (D) Ubiquinone

Q27.

SZABMU 2024

A group of ribosomes attached to mRNA is known as polysome and the attachment is controlled by: (SZABMU–2024–Reconduct)

- (A) Mg^{+2}
- (B) Na^{+}
- (C) Ca^{+2}
- (D) K^{+}

Q28.

UHS 2024

The organelles found only at seeding stage in oil seed plants are: (UHS–2024)

- (A) Glyoxysomes
- (B) Peroxisomes
- (C) Microbodies
- (D) Vacuoles

Q29.

NUMS 2024

A lizard detaches its tail when attacked by a predator. This is an example of: (NUMS–2024)

- (A) Autolysis
- (B) Autophagy
- (C) Phagocytosis
- (D) Intracellular digestion

Q30.

NUMS 2024

Choose the correct set of characteristics for intermediate filaments: (NUMS–2024)

- (A) Diameter: 8–10nm, Composition: Tubulin, Function: Muscle contraction
- (B) Diameter: 0.2–25 μ m, Composition: Vimentin, Function: Cilia, flagella
- (C) Diameter: 8–10nm, Composition: Vimentin, Function: Mechanical support
- (D) Diameter: 7nm, Composition: Tubulin, Function: Cyclosis

Q31.

NUMS 2023

Secondary cell wall in plants is present: (NUMS-2023)

- (A) In between two primary cell walls
- (B) Between the primary cell wall and plasma membrane
- (C) Inner to plasma membrane
- (D) Outer to primary cell wall

Q32.

NUMS 2023

What distinguishes prokaryotic cell wall from fungal cell wall? (NUMS-2023)

- (A) Prokaryotic cell wall contains silica
- (B) Prokaryotic cell wall contains peptidoglycan
- (C) Prokaryotic cell wall contains cutin
- (D) Prokaryotic cell wall contains cellulose

Q33.

NUMS 2023

Which of the following is absent from membrane of prokaryotes? (NUMS-2023)

- (A) Phospholipid
- (B) Cholesterol
- (C) Glycolipid
- (D) Glycoprotein

Q34.

NUMS 2023

Cell membrane also contain ____ through which movement of substances take place by active and passive transport. (NUMS-2023)

- (A) Carbohydrates
- (B) Carrier Proteins
- (C) Charged pores
- (D) Lipids

Q35.

NUMS 2023

According to the fluid mosaic model of cell membrane, which zone is embedded inside? (NUMS-2023)

- (A) Hydrophilic
- (B) Hydrophobic
- (C) Globular
- (D) Filamentous

Q36.

SZABMU 2023

Which part of plasma membrane controls the fluidity of the membrane? (SZABMU-2023)

- (A) Glycoprotein
- (B) Carbohydrates
- (C) Carrier protein
- (D) Lipid

Q37.

SZABMU 2023

Many enzymes are secreted in inactive form to protect: (SZABMU-2023)

- (A) Cell membrane
- (B) Cell DNA
- (C) Mitochondria
- (D) Vacuole

Q38.

KMU 2023

Where do phospholipids arrange themselves in a cell? (ETEA-2023)

- (A) Inside the plasma membrane
- (B) Inside the nucleus
- (C) Inside the cytoplasm
- (D) Inside the mitochondrial matrix

Q39.

KMU 2023

An additional covering surrounds the cell wall of some bacteria that either prevents the bacteria from being phagocytosed by host cells or helps them to make biofilm, which of the following term used for the covering? (ETEA-2023 Retake)

- (A) Capsule
- (B) Glycocalyx
- (C) Slime
- (D) Spore

Q40.

KMU 2023

_____ regulates the selective permeability of the plasma membrane, allowing movement of molecules according to the needs of the cells. (ETEA-2023 Retake)

- (A) Membrane cholesterol
- (B) Membrane carbohydrates
- (C) Membrane glycolysis
- (D) Membrane proteins

Q41.

SZABMU 2023

Peripheral parts of cell are often like a: (SZABMU-2023)

- (A) Sol
- (B) Gel
- (C) True solution
- (D) Colloidal

Q42.

KMU 2023

The cytoplasm contain/s: (ETEA-2023)

- (A) Insoluble waste only
- (B) All A, B, C
- (C) Storage products only
- (D) Cell organelle only

Q43.

KMU 2023

Function of the nucleus is to form: (ETEA-2023 Retake)

- (A) Chromosomes
- (B) Cytoplasm
- (C) rRNA
- (D) Nuclear envelope

Q44.

NUMS 2023

Sarcoplasmic reticulum for muscle fibers is mainly responsible for: (NUMS-2023)

- (A) Calcium storage
- (B) Storing cell wastes
- (C) Protein synthesis
- (D) Lipid metabolism

Q45.

NUMS 2023

Select the one which is not a function of smooth endoplasmic reticulum? (NUMS-2023)

- (A) Processing of glycoproteins
- (B) Transmission of impulses
- (C) Transport of materials
- (D) Metabolism of lipids

Q46.

KMU 2023

Lipid synthesis occurs in which one of the following organelles of the cell? (ETEA-2023)

- (A) Golgi bodies
- (B) Endoplasmic Reticulum
- (C) Ribosomes
- (D) Mitochondria

Q47.

SZABMU 2023

Outer membrane of mitochondria and chloroplast resembles as both are: (SZABMU-2023)

- (A) Freely permeable to small molecules
- (B) Semipermeable
- (C) Freely permeable to large molecules
- (D) Impermeable

Q48.

SZABMU 2023

In mitochondria, ATP synthase is located on its: (SZABMU-2023)

- (A) Inter membrane space
- (B) Inner membrane
- (C) Outer membrane
- (D) Matrix

Q49.

NUMS 2023

The folds of inner mitochondrial membrane of mitochondria are called: (NUMS-2023)

- (A) Infolds
- (B) Cristae
- (C) Mesosome
- (D) Cisternae

Q50.

KMU 2023

Which of the following organelle is regarded as self-replicating organelle? (ETEA-2023)

- (A) Golgi bodies
- (B) Mitochondria
- (C) Vacuoles
- (D) Endoplasmic reticulum

Q51.

KMU 2023

Mitochondria is usually absent in: (ETEA-2023)

- (A) Mature RBCs
- (B) Muscle cells
- (C) Cardiac cells
- (D) WBCs

Q52.

UHS 2023

Proteins and lipids are modified into glycolipids and glycoproteins by which cell organelles? (UHS-2023)

- (A) Smooth endoplasmic reticulum
- (B) Golgi complex
- (C) Rough endoplasmic reticulum
- (D) Ribosomes and chromosomes

Q53.

KMU 2023

_____ consists of units called dictyosomes. (ETEA-2023)

- (A) Golgi complex
- (B) Lysosomes
- (C) Glyoxysomes
- (D) Ribosomes

Q54.

SZABMU 2023

Which of the following is **not** the function of lysosomes? (SZABMU-2023)

- (A) Autophagy
- (B) Intracellular digestion
- (C) Processing of cell secretions
- (D) Autolysis

Q55.

NUMS 2023

_____ are spherical sacs, surrounded by a single membrane and contain hydrolytic enzymes. (NUMS-2023)

- (A) Lysosomes
- (B) Golgi bodies
- (C) Chloroplast
- (D) Mitochondria

Q56.

KMU 2023

Tay-Sach's disease particularly results from the malfunctioning of: (ETEA-2023)

- (A) Nucleus
- (B) Cell membrane
- (C) Vacuole
- (D) Lysosomes

Q57.

KMU 2023

Storage diseases are caused by the excessive accumulation of substances within the cell, due to defects (mutations) in one of the _____ enzymes. (ETEA-2023 Retake)

- (A) Lipase
- (B) Amylase
- (C) Lysosomal
- (D) Lyase

Q58.

NUMS 2023

Pollination is facilitated by: (NUMS-2023)

- (A) Chromoplast
- (B) Chloroplast
- (C) Amyloplast
- (D) Leucoplast

Q59.

KMU 2023

The process of photophosphorylation takes place in: (ETEA-2023)

- (A) Chloroplast
- (B) Nucleolus
- (C) Golgi bodies
- (D) Nucleus

Q60.

KMU 2023

Which is the factory for the synthesis of sugar in autotrophic eukaryotes? (ETEA-2023 Retake)

- (A) Chloroplast
- (B) Mitochondria
- (C) Amyloplastic
- (D) Ribosome

Q61.

SZABMU 2023

The membrane separating the vacuole from cytoplasm is called: (SZABMU-2023)

- (A) Vacuolar membrane
- (B) Cisternae
- (C) Tonoplast
- (D) Cristae

Q62.

NUMS 2023

Tonoplast is the membrane separating: (NUMS-2023)

- (A) Cytoplasm and nucleoplasm
- (B) Vacuole and nucleoplasm
- (C) Vacuole and cytoplasm
- (D) Vacuole and stroma

Q63.

UHS 2023

Cell wall of prokaryotic cell is composed of: (UHS-2023)

- (A) Carbohydrates
- (B) Carbohydrates & Proteins
- (C) Proteins
- (D) Proteins & Lipids

Q64.

UHS 2023

Cyclosis and amoeboid movements are due to: (UHS-2023)

- (A) Microtubule
- (B) Microfilaments
- (C) Cilia
- (D) Intermediate filaments

Q65.

NUMS 2023

Each centriole is composed of _____ microtubules. (NUMS-2023)

- (A) Seven triplets
- (B) Nine triplets
- (C) Eleven triplets
- (D) Five triplets

Q66.

KMU 2023

Cell death due to tissue damage is called? (ETEA-2023 Retake)

- (A) Apoptosis
- (B) Necrosis
- (C) Cancer
- (D) Metastasis

Q67.

UHS 2022

Cell wall may be absent in which of the following? (UHS-2022)

- (A) Bacteria and archaea
- (B) Algae and fungi
- (C) Fungi and archaea
- (D) Plant and algae

Q68.

UHS 2022

The cell wall of bacteria is made up of: (UHS-2022)

- (A) Cellulose
- (B) Hemicellulose
- (C) Murein
- (D) Chitin

Q69.

NUMS 2022

Which of the following is correct for cell wall? (NUMS-2022)

- (A) Permeable
- (B) Semi-permeable
- (C) Differentially permeable
- (D) Not permeable

Q70.

SZABMU 2022

Chemically, cell wall of fungi is made up of: (SZABMU-2022)

- (A) Lignin
- (B) Murein
- (C) Cellulose
- (D) Chitin

Q71.

BUMHS 2022

Cell without cell wall would burst in: (BUMHS-2022)

- (A) Hypertonic solution
- (B) Isotonic solution
- (C) Hypotonic solution
- (D) Solution having more electrolytes

Q72.

DUHS 2022

Plant cell wall is mainly made up of: (DUHS-2022)

- (A) Cutin
- (B) Cellulose
- (C) Lignin
- (D) Murein

Q73.

DUHS 2022

Cell become dead due to the deposition of: (DUHS-2022)

- (A) Lignin
- (B) Chitin
- (C) Cellulose
- (D) Cutin

Q74.

UHS 2022

Movement of molecules against the concentration gradient is: (UHS-2022)

- (A) Facilitated diffusion
- (B) Passive transport
- (C) Active transport
- (D) Filtration

Q75.

NUMS 2022

Why it is said that plasma membrane is asymmetrical? (NUMS-2022)

- (A) Proteins are not fixed at their position
- (B) Hydrophobic tail facing inward and hydrophilic head facing outward
- (C) The two surface and halves are not identical
- (D) Cholesterol molecules are only present inside

Q76.

NUMS 2022

The ____ part of plasma membrane controls the fluidity of the membrane. (NUMS-2022)

- (A) Carrier proteins
- (B) Glycoprotein
- (C) Lipids
- (D) Carbohydrates

Q77.

NUMS 2022

Which molecules do **not** contribute to the formation of biological membranes? (NUMS-2022)

- (A) Phospholipids
- (B) Glycoproteins
- (C) Glycolipids
- (D) Nucleoproteins

Q78.

NUMS 2022

A group of ribosomes attached to mRNA is known as polysome and the attachment is controlled by: (NUMS-2022)

- (A) K^+
- (B) Ca^{+2}
- (C) Mg^{+2}
- (D) Na^+

Q79.

SZABMU 2022

Adenylate cyclase, in the cell membrane acts as: (SZABMU-2022)

- (A) Carrier protein
- (B) Channel protein
- (C) Receptor
- (D) Enzyme

Q80.

KMU 2022

The statement 'the membrane is like a sea of lipids in which proteins are floating' represents: (ETEA-2022)

- (A) Gortel and Grendel model
- (B) S. J. Singer and Nicholson model
- (C) J. F. Danielle and Davison model
- (D) Robertson model

Q81.

BUMHS 2022

Facilitated diffusion involves carrier molecules. The carrier molecules are chemically ____ in nature. (BUMHS-2022)

- (A) Proteins
- (B) Glycolipids
- (C) Carbohydrates
- (D) Lipids

Q82.

BUMHS 2022

Who proposed fluid mosaic model? (BUMHS-2022)

- (A) Singer and De-Duve
- (B) Singer and Nicolson
- (C) Lorenz Oken and Brown
- (D) Robert Brown and Palade

Q83.

DUHS 2022

Plasma membrane is: (DUHS-2022)

- (A) Selective permeable
- (B) Permeable
- (C) Sub-permeable
- (D) Impermeable

Q84.

UHS 2022

Which of the following are single membranous organelles? (UHS-2022)

- (A) Mitochondria and ribosomes
- (B) Golgi bodies, lysosome and ER
- (C) Cytosol, mitochondria and ribosomes
- (D) Golgi bodies, lysosome and mitochondria

Q85.

SZABMU 2022

Glycogen, lipid droplets form the most important ____ of the cell. (SZABMU-2022)

- (A) Cell organelles
- (B) Non-membranous organelles
- (C) Cell inclusions
- (D) Cytoplasmic matrix

Q86.

NUMS 2022

Within the nucleus, ____ are made by the nucleolus. (NUMS-2022)

- (A) Ribosomes
- (B) Enzymes
- (C) Proteins
- (D) mRNA

Q87.

SZABMU 2022

The organelle which provides neurotransmitters in the nervous pathway is: (SZABMU-2022)

- (A) Golgi apparatus
- (B) Glyoxisome
- (C) Endoplasmic reticulum
- (D) Peroxisome

Q88.

BUMHS 2022

What is true about smooth endoplasmic reticulum? (BUMHS-2022)

- (A) Involved in intracellular digestion
- (B) Involved in transmission of impulses
- (C) Involved in removal of storage and waste products
- (D) Involved in protein metabolism

Q89.

NUMS 2022

Which organelles would be more abundant in a secretory cell than non-secretory cell? (NUMS-2022)

- (A) Golgi complex
- (B) Centrioles
- (C) Lysosomes
- (D) Vacuoles

Q90.

BUMHS 2022

When and who discovered Golgi apparatus?
(BUMHS-2022)

- (A) 1888–Camillo Golgi
- (B) 1998–Camillo Golgi
- (C) 1898–Camillo Golgi
- (D) 1988–Camillo Golgi

Q91.

BUMHS 2022

Which of the following cell does **not** possess Golgi apparatus? (BUMHS-2022)

- (A) Fungal cell
- (B) Bacterial cell
- (C) Plant cell
- (D) Animal cell

Q92.

UHS 2022

The digestive vacuoles and autophagosomes are also known as: (UHS-2022)

- (A) Phagocytosis
- (B) Peroxisomes
- (C) Primary lysosomes and autophagy
- (D) Secondary lysosomes

Q93.

NUMS 2022

_____ are spherical sacs surrounded by a single membrane and contain hydrolytic enzyme. (NUMS-2022)

- (A) Mitochondria
- (B) Lysosomes
- (C) Golgi bodies
- (D) Chloroplast

Q94.

SZABMU 2022

Intracellular digestion of food is done by the organelle: (SZABMU-2022)

- (A) Ribosome
- (B) Golgi apparatus
- (C) Lysosome
- (D) Vacuole

Q95.

KMU 2022

The chloroplasts contain: (ETEA-2022)

- (A) Proteins, Ribosomes and small circular DNA
- (B) Ribosomes only
- (C) Small circular DNA only
- (D) Proteins only

Q96.

DUHS 2022

Power house of the cell is: (DUHS-2022)

- (A) Endoplasmic reticulum
- (B) Mitochondria
- (C) Chloroplasts
- (D) Ribosomes

Q97.

NUMS 2022

The structure which disappears during cell division is: (NUMS-2022)

- (A) Endoplasmic reticulum
- (B) Nucleolus
- (C) Lysosome
- (D) Vacuole

Q98.

NUMS 2022

Except during nuclear division, nucleus has the chromosomes in loosely coiled state known as: (NUMS-2022)

- (A) Chromatin
- (B) Ribosome
- (C) Genes
- (D) DNA

Q99.

KMU 2022

The colloidal mixture of ions, organic and inorganic salts present in the nucleus is called: (ETEA-2022)

- (A) Nucleoplasm
- (B) Chromosome
- (C) Nucleolus
- (D) Nuclear membrane

Q100.

UHS 2022

Structure formed by invagination of plasma membrane and involved in cell division and DNA replication of prokaryotic cell: (UHS-2022)

- (A) Lysosome
- (B) Mesosome
- (C) Golgi bodies
- (D) Phragmoplast

Q101.

UHS 2022

Which one is common in both prokaryotic and eukaryotic cell? (UHS-2022)

- (A) Binary fission
- (B) Nuclear envelope
- (C) Cytoplasmic streaming movement
- (D) Ribosome

Q102.

PMDC 2020

In which type of cells, cell wall is **not** present? (PMC-2020)

- (A) Bacterial cells
- (B) Liver cells
- (C) Plant cells
- (D) Fungal cells

Q103.

PMDC 2020

According to the fluid mosaic model of cell membrane, which zone is embedded inside? (PMC-2020)

- (A) Filamentous
- (B) Hydrophobic
- (C) Hydrophilic
- (D) Globular

Q104.

PMDC 2020

70S sized ribosomes are found in the cells of: (PMC-2020)

- (A) Fungi
- (B) Bacteria
- (C) Protozoans
- (D) Algae

Q105.

PMDC 2020

Select the one which is **not** a function of smooth endoplasmic reticulum: (PMC-2020)

- (A) Transport of materials
- (B) Processing of glycoproteins
- (C) Transmission of impulses
- (D) Metabolism of lipids

Q106.

PMDC 2020

Which of the following organelles are involved in the synthesis of plant cell wall? (PMC-2020)

- (A) Peroxisomes
- (B) Endoplasmic reticulum
- (C) Golgi complex
- (D) Lysosomes

Q107.

MDCAT 2019

Passive processes for the movement of molecules across cell surface membrane are: (MDCAT-2019)

- (A) Osmosis and phagocytosis
- (B) Pinocytosis and facilitated diffusion
- (C) Facilitated diffusion and osmosis
- (D) Diffusion and exocytosis

Q108.

SZABMU 2019

The fluid mosaic model of cell membrane is: (AJK-2019)

- (A) Carbohydrate chains are attached with phospholipid bilayer
- (B) In which protein molecules are free to move about in a fluid bilayer of phospholipid molecules
- (C) Phospholipid bilayer is enclosed in protein layer
- (D) Protein layers having scattered phospholipids

Q109.

PMDC 2019

Cell permeability and transport processes of cell membrane depend upon its ____ component. (NTS-2019)

- (A) Cellulose
- (B) Carbohydrate
- (C) Polysaccharide
- (D) Phospholipid

Q110.

PMDC 2019

When plant cell receives a signal for death, it commits suicide by rupturing: (NTS-2019)

- (A) Nucleus
- (B) Cell membrane
- (C) Tonoplast
- (D) Chloroplast

Q111.

SZABMU 2019

Glycolysis is the common stage in both aerobic and anaerobic respiration and it occurs in ____ of the cell. (AJK-2019)

- (A) Chloroplast
- (B) Inner membrane of mitochondria
- (C) Mitochondrial matrix
- (D) Cytoplasm

Q112.

SZABMU 2019

The cytoplasmic organelle commonly found both in prokaryotes and eukaryotes is: (AJK-2019)

- (A) Ribosome
- (B) Nucleoid
- (C) Flagellum
- (D) Mitochondria

Q113.

MDCAT 2019

Smooth endoplasmic reticulum is responsible for the metabolism of: (MDCAT-2019)

- (A) Nucleic acids
- (B) Proteins
- (C) Lipids
- (D) Carbohydrates

Q114.

SZABMU 2019

Which of these is solely present in plant cell **only**? (AJK-2019)

- (A) Cytoskeleton
- (B) Smooth endoplasmic reticulum
- (C) Central vacuole
- (D) Peroxisomes

Q115.

MDCAT 2019

The finger like infoldings which are formed by inner membrane of mitochondria are called: (MDCAT-2019)

- (A) Cristae
- (B) Ribosomes
- (C) Matrix
- (D) Porins

Q116.

MDCAT 2019

The structure present in a eukaryotic cell but absent in prokaryotic cells is: (MDCAT-2019)

- (A) Ribosomes
- (B) Cell surface membrane
- (C) Nucleus
- (D) DNA

Q117.

MDCAT 2018

Ribosomes are made up of ____ and _____. (MDCAT-2018)

- (A) RNA and lipids
- (B) RNA and carbohydrates
- (C) RNA and proteins
- (D) Proteins and carbohydrate

Q118.

MDCAT 2018

The cisternae break up into vesicles from ____ and ____ of Golgi complex. (MDCAT-2018)

- (A) Concave, forming face
- (B) Convex, maturing face
- (C) Concave, maturing face
- (D) Convex, forming face

Q119.

MDCAT 2018

These structures are involved in the breakdown of old organelles: (MDCAT-2018)

- (A) Lysosomes
- (B) Leucoplasts
- (C) Peroxisomes
- (D) Glyoxysomes

Q120.

MDCAT 2018

Which statement is correct about mitochondria and chloroplast? (MDCAT-2018)

- (A) Number of mitochondria and chloroplast are same in all cells
- (B) Chloroplast and mitochondria are single membrane structure
- (C) Chloroplast and mitochondria cannot live independently
- (D) 70S ribosome is attached with the inner membrane of mitochondria and chloroplast

Q121.

PMDC 2018

The membrane separating the vacuole from cytoplasm is called: (MDCAT-2018, PMC-2020)

- (A) Vacuolar membrane
- (B) Tonoplast
- (C) Cisternae
- (D) Cristae

Q122.

PMDC 2018

Which organelle is required for aerobic respiration? (NTS-2018)

- (A) ER
- (B) Mitochondria
- (C) Plastids
- (D) Nucleus

Q123.

PMDC 2017

Which features do animal cells share with plant cells? (NTS-2017)

- (A) Chloroplast (Present), Cytoplasm (Present), Nucleus (Present), Mitochondria (Present)
- (B) Chloroplast (Absent), Cytoplasm (Present), Nucleus (Present), Mitochondria (Present)
- (C) Chloroplast (Present), Cytoplasm (Absent), Nucleus (Present), Mitochondria (Absent)
- (D) Chloroplast (Absent), Cytoplasm (Absent), Nucleus (Absent), Mitochondria (Present)

Q124.

MDCAT 2017

Select the organelle which is **only** present in animal cells: (MDCAT-2017)

- (A) Microtubules
- (B) Ribosomes
- (C) Centrioles
- (D) R.E.R

Q125.

MDCAT 2017

Which of the following structure is present in both plant and animal cells but is absent in prokaryotic cells? (MDCAT-2017)

- (A) Microtubule
- (B) Centrioles
- (C) Plastids
- (D) Sieve tubes

Q126.

MDCAT 2017

Taking in of solid particle by cell is called: (MDCAT-2017)

- (A) Pinocytosis
- (B) Phagocytosis
- (C) Endocytosis
- (D) Exocytosis

Q127.

MDCAT 2017

Self-eating ability of the cells by using lysosomes is called: (MDCAT-2017)

- (A) Autophagy
- (B) Phagocytosis
- (C) Exocytosis
- (D) Pinocytosis

Q128.

MDCAT 2017

Ribosomes present in prokaryotes are: (MDCAT-2017, MDCAT-2019)

- (A) 80S
- (B) 50S
- (C) 70S
- (D) 60S

Q129.

MDCAT 2017

Group of ribosomes attached to mRNA is called: (MDCAT-2017)

- (A) Polysome
- (B) Polysaccharide
- (C) Polyploid
- (D) Polynucleotide

Q130.

MDCAT 2017

Which of the following organelle consist of two subunits? (MDCAT-2017)

- (A) Mitochondria
- (B) Plastid
- (C) Ribosome
- (D) Golgi body

Q131.

MDCAT 2017

Nuclear membrane is continuous with: (MDCAT-2017)

- (A) Endoplasmic reticulum
- (B) Peroxisome
- (C) Golgi Body
- (D) Lysosome

Q132.

MDCAT 2017

Functionally, mesosomes can be compared with: (MDCAT-2017)

- (A) Polysomes
- (B) Ribosomes
- (C) Golgi bodies
- (D) Mitochondria

Q133.

MDCAT 2017

Ribosomal RNA is synthesized in: (MDCAT-2017)

- (A) Nucleolus
- (B) Nucleoplasm
- (C) Peroxisome
- (D) Golgi body

Q134.

MDCAT 2017

DNA molecule in prokaryotes is: (MDCAT-2017)

- (A) Single, circular, double stranded molecule not bound by membrane
- (B) Linear, double stranded molecule
- (C) Double, circular molecule
- (D) Single, circular, double stranded and membrane bound

Q135.

MDCAT 2016

Out of the given options, choose the one which shows the structures found **only** in plants? (MDCAT-2016)

- (A) Chloroplast, cell wall, mitochondria
- (B) Vacuole, chloroplast, ribosomes
- (C) Chloroplast, microtubules, peroxisomes
- (D) Chloroplast, cell wall, large vacuole

Q136.

MDCAT 2016

Presence of large central vacuole is the characteristic of: (MDCAT-2016)

- (A) Fungi
- (B) Protists
- (C) Prokaryotes
- (D) Plants

Q137.

MDCAT 2015

Fluid mosaic model of plasma membrane states that protein molecules float in a fluid like ____ layer. (MDCAT-2015)

- (A) Carbohydrate
- (B) Phospholipid
- (C) Glucose
- (D) Galactose

Q138.

MDCAT 2015

Which one of the following cell structures is involved in the synthesis of lipids? (MDCAT-2015)

- (A) Endoplasmic reticulum
- (B) Mitochondria
- (C) Centriole
- (D) Golgi complex

Q139.

MDCAT 2015

Which organelle is bounded by two membranes? (MDCAT-2015)

- (A) Mitochondria
- (B) Lysosome
- (C) Nucleolus
- (D) Ribosome

Q140.

MDCAT 2014

The intake of liquid materials across the cell membrane is: (MDCAT-2014)

- (A) Phagocytosis
- (B) Exocytosis
- (C) Pinocytosis
- (D) Endocytosis

Q141.

DUHS 2014

Which substance from the following is important for the mechanical stability of cell membranes, as without it membranes quickly break and cells burst open? The hydrophobic region of these molecules help to prevent ion or polar molecules from passing through the cell membrane? (KMDC-2014)

- (A) Cholesterol
- (B) Glycolipids
- (C) Phospholipids
- (D) Protein

Q142.

MDCAT 2014

Which cell organelle is responsible for cell secretion? (MDCAT-2014, 2019)

- (A) Mitochondrion
- (B) Ribosomes
- (C) Golgi body
- (D) Chloroplast

Q143.

MDCAT 2014

Peptidoglycan or murein is a special or distinctive feature of cell wall in: (MDCAT-2014)

- (A) Fungi
- (B) Algae
- (C) Bacteria
- (D) Plants

RAPID 5–COLUMN ANSWER KEY

Official PMDC verified answer keys for 01. Cell.

beambeprep.com

Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD
1	B	SZABMU 2024	30	C	NUMS 2024	59	A	KMU 2023	88	B	BUMHS 2022	117	C	MDCAT 2018
2	D	SZABMU 2024	31	B	NUMS 2023	60	A	KMU 2023	89	A	NUMS 2022	118	C	MDCAT 2018
3	A	SZABMU 2024	32	B	NUMS 2023	61	C	SZABMU 2023	90	C	BUMHS 2022	119	A	MDCAT 2018
4	A	KMU 2024	33	B	NUMS 2023	62	C	NUMS 2023	91	B	BUMHS 2022	120	D	MDCAT 2018
5	C	SZABMU 2024	34	B	NUMS 2023	63	B	UHS 2023	92	D	UHS 2022	121	B	PMDC 2018
6	A	NUMS 2024	35	B	NUMS 2023	64	B	UHS 2023	93	B	NUMS 2022	122	B	PMDC 2018
7	C	NUMS 2024	36	D	SZABMU 2023	65	B	NUMS 2023	94	C	SZABMU 2022	123	B	PMDC 2017
8	C	SZABMU 2024	37	A	SZABMU 2023	66	B	KMU 2023	95	A	KMU 2022	124	C	MDCAT 2017
9	C	KMU 2024	38	A	KMU 2023	67	A	UHS 2022	96	B	DUHS 2022	125	A	MDCAT 2017
10	C	UHS 2024	39	A	KMU 2023	68	C	UHS 2022	97	B	NUMS 2022	126	B	MDCAT 2017
11	B	KMU 2024	40	D	KMU 2023	69	A	NUMS 2022	98	A	NUMS 2022	127	A	MDCAT 2017
12	D	KMU 2024	41	B	SZABMU 2023	70	D	SZABMU 2022	99	A	KMU 2022	128	C	MDCAT 2017
13	A	SZABMU 2024	42	B	KMU 2023	71	C	BUMHS 2022	100	B	UHS 2022	129	A	MDCAT 2017
14	A	KMU 2024	43	C	KMU 2023	72	B	DUHS 2022	101	D	UHS 2022	130	C	MDCAT 2017
15	C	UHS 2024	44	A	NUMS 2023	73	A	DUHS 2022	102	B	PMDC 2020	131	A	MDCAT 2017
16	B	NUMS 2024	45	A	NUMS 2023	74	C	UHS 2022	103	B	PMDC 2020	132	D	MDCAT 2017
17	C	SZABMU 2024	46	B	KMU 2023	75	C	NUMS 2022	104	B	PMDC 2020	133	A	MDCAT 2017
18	C	SZABMU 2024	47	A	SZABMU 2023	76	C	NUMS 2022	105	B	PMDC 2020	134	A	MDCAT 2017
19	C	KMU 2024	48	B	SZABMU 2023	77	D	NUMS 2022	106	C	PMDC 2020	135	D	MDCAT 2016
20	B	SZABMU 2024	49	B	NUMS 2023	78	C	NUMS 2022	107	C	MDCAT 2019	136	D	MDCAT 2016
21	C	SZABMU 2024	50	B	KMU 2023	79	D	SZABMU 2022	108	B	SZABMU 2019	137	B	MDCAT 2015
22	C	SZABMU 2024	51	A	KMU 2023	80	B	KMU 2022	109	D	PMDC 2019	138	A	MDCAT 2015
23	C	UHS 2024	52	B	UHS 2023	81	A	BUMHS 2022	110	B	PMDC 2019	139	A	MDCAT 2015
24	A	SZABMU 2024	53	A	KMU 2023	82	B	BUMHS 2022	111	D	SZABMU 2019	140	C	MDCAT 2014
25	C	KMU 2024	54	C	SZABMU 2023	83	A	DUHS 2022	112	A	SZABMU 2019	141	C	DUHS 2014
26	B	SZABMU 2024	55	A	NUMS 2023	84	B	UHS 2022	113	C	MDCAT 2019	142	C	MDCAT 2014
27	A	SZABMU 2024	56	D	KMU 2023	85	C	SZABMU 2022	114	C	SZABMU 2019	143	C	MDCAT 2014
28	A	UHS 2024	57	C	KMU 2023	86	A	NUMS 2022	115	A	MDCAT 2019			
29	A	NUMS 2024	58	A	NUMS 2023	87	A	SZABMU 2022	116	C	MDCAT 2019			

TOTAL
MCQS

143

CORRECT

INCORRECT

BLANK

ACCURACY

%

Scan the booklet QR code to enter answers in
BeambePrep Grind Mode for automated error
 autopsies.

PROPOLIS COGNITIVE ERROR AUTOPSIES

Step-by-step conceptual derivations, formula working, and distractor autopsies for every question.

Question #1 Key: (B)

SZABMU 2024

Middle lamella is composed of: (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

Plant cells are glued together by a sticky extracellular layer.

Solution: The middle lamella is the first layer formed during cell division, acting as a cement between adjacent plant cells. It is primarily composed of sticky pectates, specifically **calcium and magnesium salts of pectic acid (pectin)**.

Distractor

DISTRACTOR AND ERROR AUTOPSY

Sodium and potassium are highly soluble monovalent cations and do not form the rigid, insoluble cross-links required for plant cell adhesion.

Question #2 Key: (D)

SZABMU 2024

In which type of cells, cell wall is not present? (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

The presence or absence of a cell wall is a fundamental characteristic dividing major kingdoms of life.

Solution: **Liver cells** (hepatocytes) are animal cells. Animal cells universally lack a rigid cell wall, utilizing only a flexible plasma membrane to allow for varied shapes and motility.

Distractor

DISTRACTOR AND ERROR AUTOPSY

Plants (cellulose), Fungi (chitin), and Bacteria (peptidoglycan) all obligately possess cell walls.

Question #3 Key: (A)

SZABMU 2024

The cells in our body are all genetically identical, apart from the: (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

Meiosis introduces genetic variation and reduces chromosome number, distinguishing germline cells from somatic cells.

Solution: All somatic (body) cells are produced via mitosis and are genetically identical clones (diploid). However, **reproductive cells** (gametes like sperm and egg) undergo meiosis, making them haploid and genetically unique due to crossing over and independent assortment.

Distractor

DISTRACTOR AND ERROR AUTOPSY

Muscle fibers and white blood cells are somatic cells and share the identical diploid genome of the organism (though B/T cells undergo genetic rearrangement, "reproductive cells" is the broad, fundamental answer expected here).

Question #4 Key: (A)

KMU 2024

Plasma membrane is differentially permeable membrane due to the presence of: (KMU-2024)

CORE CONCEPT AND DERIVATION

The baseline barrier property of the plasma membrane restricts the movement of most biological molecules.

Solution: The plasma membrane is differentially permeable primarily because of its continuous **lipid** bilayer (phospholipids). The hydrophobic fatty acid tails create a highly non-polar core that naturally repels ions and large polar molecules, restricting their passage.

Distractor

DISTRACTOR AND ERROR AUTOPSY

While proteins provide specific pathways for molecules to cross, it is the lipid bilayer that establishes the fundamental restriction (differential permeability) in the first place.

Question #5 Key: (C)

SZABMU 2024

Amoeba engulfs liquid food across its membrane by a process: (SZABMU-2024)

CORE CONCEPT AND DERIVATION

Cells use specific vesicular mechanisms to ingest different states of matter.

Solution: When a cell like an Amoeba engulfs droplets of extracellular fluid (liquid food), the process is specifically called **pinocytosis** (cell drinking). The membrane invaginates to form a small fluid-filled vesicle.

Distractor

DISTRACTOR AND ERROR AUTOPSY

- **Phagocytosis:** Engulfing large *solid* particles.
- **Endocytosis:** A general umbrella term; pinocytosis is the more accurate, specific answer for liquids.

Question #6 Key: (A)

NUMS 2024

Which function cannot be attributed to plasma membrane lipids? (NUMS-2024)

CORE CONCEPT AND DERIVATION

Lipids form the structural barrier of the membrane, while proteins perform active metabolic and signaling tasks.

Solution: The **control of metabolic reactions across the cell membrane** (such as enzymatic activity or active ion pumping) is carried out by integral and peripheral membrane *proteins*, not the lipids.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Flexibility:** Maintained by phospholipids and cholesterol.
- **Recognition/Binding:** Glycolipids (lipids with carb chains) act as antigens and receptors for ligands.

Question #7 Key: (C)

NUMS 2024

Which one is the function of plasma membrane proteins? (NUMS-2024)

CORE CONCEPT AND DERIVATION

Ions cannot cross the hydrophobic lipid bilayer on their own and require specialized tunnels.

Solution: A primary function of integral plasma membrane **proteins** is to act as channels, carriers, and pumps to facilitate the **movement of ions** (like Na^+ , K^+ , Ca^{2+}) in and out of the cell.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Restricting polar molecules:** Function of the lipid bilayer.
- **Flexibility/Freezing prevention:** Function of unsaturated fatty acid tails and cholesterol.

Question #8 Key: (C)

SZABMU 2024

Choose the correct sequence for permeability of molecules across the plasma membrane: (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

The hydrophobic core of the lipid bilayer dictates permeability: non-polar > small polar > large polar > charged ions.

Solution: The correct sequence from most to least permeable is: **Lipids (highly non-polar, pass easily) > Water / Glucose (small/large uncharged polar, pass slowly or need carriers) > Sodium (charged ion, cannot pass without a channel).**

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Any sequence placing Sodium (an ion with a hydration shell) as highly permeable is entirely incorrect.

Question #9 Key: (C)

KMU 2024

The active mass movement of mitochondria in the cytoplasm is due to: (KMU-2024)

CORE CONCEPT AND DERIVATION

Organelles do not propel themselves; they are carried by the flow of the cytoplasm.

Solution: **Cyclosis** (or cytoplasmic streaming) is the active, continuous circular movement of the cytoplasm driven by actin microfilaments. This movement sweeps organelles like mitochondria and chloroplasts around the cell to distribute nutrients and oxygen evenly.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Endoplasmic streaming is not a standard biological term. The Golgi and tRNA have no locomotive function.

Question #10 Key: (C)

UHS 2024

The nucleus takes dyes due to the presence of: (UHS-2024)

CORE CONCEPT AND DERIVATION

The word "chromosome" literally translates to "colored body" (chroma = color, soma = body).

Solution: The nucleus stains deeply with basic biological dyes (like hematoxylin or methylene blue) due to the high concentration of negatively charged nucleic acids in the **chromatin** (DNA wrapped around histone proteins).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lipids do not bind basic dyes well. Thylakoids are in chloroplasts. Metal ions are not the primary target of nuclear stains.

Question #11 Key: (B)

KMU 2024

Chromosome is typically made up from a combination of: (KMU-2024)

CORE CONCEPT AND DERIVATION

To fit two meters of DNA into a microscopic nucleus, it must be intricately spooled around structural supports.

Solution: A eukaryotic chromosome is a complex of nucleic acid and protein called chromatin. It is composed primarily of a long, continuous molecule of **DNA** tightly wrapped around octamers of basic **histone proteins**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

RNA is transcribed from DNA but does not form the permanent structural backbone of the chromosome. Lipids are not found in chromosomes.

Question #12 Key: (D)

KMU 2024

Where are spindle fibres attached during cell division on a chromosome? (KMU-2024)

CORE CONCEPT AND DERIVATION

Accurate segregation of chromosomes requires a strong, centralized physical anchor point for motor proteins.

Solution: During mitosis and meiosis, spindle fibers (microtubules) attach to a specialized protein complex called the kinetochore, which is assembled at the highly constricted region of the chromosome known as the **centromere**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Telomeres are the protective caps at the ends of chromosomes. Histones are the spools for DNA. The nucleolus is a nuclear organelle.

Question #13 Key: (A)

SZABMU 2024

The exchange of materials between nucleus and cytoplasm takes place through: (SZABMU-2024)

CORE CONCEPT AND DERIVATION

The nuclear envelope is a double membrane that requires gated channels to allow macromolecules to enter and exit.

Solution: The nuclear envelope is punctuated by large protein complexes called **nuclear pores**. These pores strictly regulate the exchange of materials, allowing RNA and ribosomal subunits to exit into the cytoplasm, and necessary proteins (like polymerases) to enter the nucleus.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The nucleoplasm is the fluid inside. The nuclear lamina provides structural support. The nucleolus synthesizes rRNA.

Question #14 Key: (A)

KMU 2024

Which organelle contributes towards steroid production? (KMU-2024)

CORE CONCEPT AND DERIVATION

Steroids are a class of lipids derived from cholesterol, requiring specific lipid-synthesizing enzymes.

Solution: The Smooth **Endoplasmic Reticulum** contains the embedded enzymes necessary for lipid metabolism, making it the primary organelle responsible for the synthesis of cholesterol and steroid hormones (like testosterone and estrogen).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Ribosomes make proteins. Lysosomes break down waste. The Golgi modifies and packages proteins/lipids but does not synthesize the steroid backbone itself.

Question #15 Key: (C)

UHS 2024

Which of the following is the function of Golgi Complex? (UHS-2024)

CORE CONCEPT AND DERIVATION

Cellular products meant for export must be refined and sorted.

Solution: The primary function of the Golgi Complex is the **processing, sorting, and packaging of cell secretions**. It receives proteins from the RER, modifies them (e.g., adding carbohydrates to make glycoproteins), and buds them off in secretory vesicles for exocytosis.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Autophagy, intracellular digestion, and autolysis are all strictly the destructive functions of the lysosome.

Question #16 Key: (B)

NUMS 2024

Follow the route of pepsinogen secreted by zymogen cells: (NUMS-2024)

CORE CONCEPT AND DERIVATION

The endomembrane system operates as a sequential assembly and shipping line for proteins.

Solution: Pepsinogen is a protein. Its correct secretory pathway is:

1. Synthesized on ribosomes of the **Rough ER (RER)**.
2. Transitions through the **Smooth ER (SER)** where transport vesicles bud off.
3. Received and processed by the **Golgi complex**.
4. Packaged into **Secretory vesicles** that fuse with the plasma membrane.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Proteins are not synthesized by the SER, so starting there is incorrect. The Golgi is the final processor, not the starting point.

Question #17 Key: (C)

SZABMU 2024

Cristae in mitochondria serve as a site for: (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

The folded inner membrane of the mitochondria maximizes surface area for ATP production.

Solution: The cristae (infoldings of the inner mitochondrial membrane) are studded with the protein complexes that make up the **Electron transport chain (ETC)** and ATP synthase. This is where oxidative phosphorylation occurs.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Glycolysis occurs in the cytoplasm. The Calvin cycle and photophosphorylation occur in the chloroplast.

Question #18 Key: (C)

SZABMU 2024

Golgi complex is responsible for: (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

The Golgi apparatus is the cell's post office.

Solution: The primary role of the Golgi complex is the **processing of cell secretions**. It receives immature proteins and lipids, modifies them chemically, sorts them, and packages them into vesicles for delivery to the plasma membrane or other organelles.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Protein synthesis = Ribosomes. Detoxification = Smooth ER / Peroxisomes. Glucose oxidation = Mitochondria.

Question #19 Key: (C)

KMU 2024

The lysosomes found in eukaryotes contain: (KMU-2024)

CORE CONCEPT AND DERIVATION

Lysosomes utilize water to break chemical bonds in complex macromolecules.

Solution: Lysosomes contain a powerful arsenal of roughly 40 different acid hydrolases. These **hydrolytic enzymes** (like proteases, lipases, nucleases) function optimally at an acidic pH to digest cellular waste and engulfed pathogens.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Oxidative enzymes (which produce hydrogen peroxide) are found in peroxisomes. Mitotic/meiotic enzymes relate to cell division in the nucleus.

Question #20 Key: (B)

SZABMU 2024

Tay-Sach's is related to the malfunctioning of which of the following organelle? (SZABMU-2024)

CORE CONCEPT AND DERIVATION

Genetic absence of specific degradative enzymes leads to lethal cellular hoarding.

Solution: Tay-Sachs is a fatal genetic disorder caused by the malfunction of **lysosomes**. Specifically, a mutation causes the absence of the lysosomal enzyme hexosaminidase A, leading to a toxic buildup of lipids in the neurons of the brain.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Glyoxysomes break down fatty acids in plant seeds. ER and Golgi are not the primary sites of terminal macromolecule degradation.

Question #21 Key: (C)

SZABMU 2024

Which enzyme is missing in the patient of Tay-Sach's disease? (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

Tay-Sachs targets the lipid-rich environment of the central nervous system.

Solution: The specific enzyme missing in Tay-Sachs disease is Hexosaminidase A, which is a **lipid digesting enzyme**. Without it, complex lipids called gangliosides accumulate to toxic levels in brain cells, causing severe neurological decline.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While proteins and carbohydrates are digested by other lysosomal enzymes (like proteases and glycosidases), Tay-Sachs is explicitly a lipid storage disorder.

Question #22 Key: (C)

SZABMU 2024

Which one of the following describes best the autophagy? (SZABMU-2024-Reconduct)

CORE CONCEPT AND DERIVATION

Cells must continually clean house by recycling their own damaged components.

Solution: Autophagy literally translates from Greek as "**self-eating**" (auto = self, phagy = eating). It is the process by which a cell uses its lysosomes to enclose, digest, and recycle its own damaged organelles (like old mitochondria) or macromolecules.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Intracellular food digestion is heterophagy. Disintegration of the entire cell is autolysis. Decomposition of hydrogen peroxide is the job of peroxisomes.

Question #23 Key: (C)

UHS 2024

Chloroplast are membrane bound bodies containing: (UHS-2024)

CORE CONCEPT AND DERIVATION

Plastids are categorized based on the specific compounds they synthesize and store.

Solution: Chloroplasts are a specific type of chromoplast (colored plastid) that fundamentally contain photosynthetic **pigments**—primarily green chlorophyll, along with accessory pigments like carotenoids, essential for capturing solar energy.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Linear ds-DNA:** Chloroplast DNA is *circular*, not linear.
- **Cristae:** Found in mitochondria.
- **Cisternae:** Found in ER/Golgi.

Question #24 Key: (A)

SZABMU 2024

Which of the following type of plastids is involved in dispersal of seed and pollination? (SZABMU-2024)

CORE CONCEPT AND DERIVATION

Evolutionary biology relies on visual signaling between plants and animals for reproduction.

Solution: **Chromoplasts** synthesize and store brightly colored pigments (reds, oranges, yellows). By coloring flower petals and ripe fruits, they attract insects for pollination and animals for fruit consumption and subsequent seed dispersal.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Chloroplasts are for photosynthesis (green). Leucoplasts and amyloplasts are colorless storage plastids found in roots and underground stems.

Question #27 Key: (A)

SZABMU 2024

A group of ribosomes attached to mRNA is known as polysome and the attachment is controlled by: (SZABMU-2024-R...

CORE CONCEPT AND DERIVATION

The structural integrity of the ribosome depends on specific divalent cations.

Solution: The two subunits (large and small) of a ribosome only associate to form a functional translation complex on an mRNA strand in the presence of adequate concentrations of magnesium ions, Mg^{+2} .

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Sodium, Calcium, and Potassium are vital for electrical signaling and muscle contraction, but do not mediate ribosomal subunit joining.

Question #25 Key: (C)

KMU 2024

Which cytoplasmic organelles make their own proteins? (KMU-2024)

CORE CONCEPT AND DERIVATION

The endosymbiotic theory explains the partial autonomy of certain energy-converting organelles.

Solution: **Mitochondria** (and chloroplasts) contain their own circular DNA and 70S ribosomes. This allows them to transcribe their own mRNA and translate it into a portion of the proteins they require to function, making them semi-autonomous.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The Golgi and SER lack ribosomes and DNA. Chromosomes are in the nucleus, not the cytoplasm, and do not "make" proteins (they store the code).

Question #28 Key: (A)

UHS 2024

The organelles found only at seeding stage in oil seed plants are: (UHS-2024)

CORE CONCEPT AND DERIVATION

Germinating seeds need a way to convert stored fats into usable sugars before they can photosynthesize.

Solution: **Glyoxysomes** are specialized plant microbodies found transiently during the seeding/germination stage in oil-rich seeds (like castor beans). They contain enzymes of the glyoxylate cycle, which convert stored fatty acids directly into carbohydrates to fuel early seedling growth.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Peroxisomes, vacuoles, and general microbodies are found in many cell types across all stages of plant and animal life.

Question #26 Key: (B)

SZABMU 2024

In the inner membrane of mitochondria which has many folds called cristae, there are granular particles called...

CORE CONCEPT AND DERIVATION

The morphological appearance of the inner mitochondrial membrane under electron microscopy reveals tiny, stalked structures.

Solution: The cristae are studded with granular, lollipop-shaped particles known as F_0-F_1 particles, which are the enzyme complexes known as **ATP Synthetase** (or ATP synthase). These are responsible for phosphorylating ADP into ATP.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Cytochrome c and Ubiquinone are electron carriers, but they do not form large, granular particles visible on the cristae. Porins are on the outer membrane.

Question #29 Key: (A)

NUMS 2024

A lizard detaches its tail when attacked by a predator. This is an example of: (NUMS-2024)

CORE CONCEPT AND DERIVATION

Programmed destruction of tissue can serve as a survival mechanism at the organismal level.

Solution: When a lizard sheds its tail (autotomy), the physical detachment at the fracture plane involves rapid, programmed cellular destruction. At the cellular level, this massive destruction of tissue is facilitated by **autolysis**, where lysosomes burst and digest the cells at the detachment site to allow a clean break.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Autophagy is internal recycling (the cell survives). Phagocytosis and intracellular digestion involve eating external food.

Question #30 Key: (C)

NUMS 2024

Choose the correct set of characteristics for intermediate filaments: (NUMS-2024)

CORE CONCEPT AND DERIVATION

The cytoskeleton consists of three distinct filament types categorized by diameter and protein composition.

Solution: Intermediate filaments have a diameter of **8–10nm** (between microfilaments at 7nm and microtubules at 25nm). They are composed of various robust proteins (such as keratin or **vimentin**) and their primary function is to provide tensile strength and **mechanical support** to the cell.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Tubulin forms microtubules (cilia/flagella). Actin forms 7nm microfilaments (muscle contraction/cytocinesis).

Question #31 Key: (B)

NUMS 2023

Secondary cell wall in plants is present: (NUMS-2023)

CORE CONCEPT AND DERIVATION

As a plant cell matures, it may lay down additional, stronger wall layers inward from the original wall.

Solution: The primary cell wall is secreted first. Once the cell stops growing, a thicker, rigid secondary cell wall is secreted by the plasma membrane *underneath* the primary wall. Thus, it is located **between the primary cell wall and the plasma membrane**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The middle lamella lies outside the primary wall (between adjacent cells). Nothing is structural "inner to the plasma membrane" except the cytoskeleton.

Question #32 Key: (B)

NUMS 2023

What distinguishes prokaryotic cell wall from fungal cell wall? (NUMS-2023)

CORE CONCEPT AND DERIVATION

Chemical composition of the cell wall provides structural distinction between biological kingdoms.

Solution: A defining feature is that the **prokaryotic (bacterial) cell wall is composed of peptidoglycan**, a unique matrix of sugars and amino acids. In stark contrast, the fungal cell wall is composed of chitin.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Cellulose is found in plants. Silica is found in diatoms (protists). Cutin is a plant lipid.

Question #33 Key: (B)

NUMS 2023

Which of the following is absent from membrane of prokaryotes? (NUMS-2023)

CORE CONCEPT AND DERIVATION

Prokaryotic and eukaryotic plasma membranes share a basic lipid bilayer but differ in their stabilizing molecules.

Solution: **Cholesterol** is a sterol exclusively found in the cell membranes of eukaryotes (particularly animals), acting as a fluidity buffer. Prokaryotic membranes lack cholesterol (some use hopanoids instead).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Both prokaryotes and eukaryotes utilize phospholipids as their primary membrane matrix, along with glycoproteins and glycolipids for varied functions.

Question #34 Key: (B)

NUMS 2023

Cell membrane also contain ____ through which movement of substances take place by active and passive transport...

CORE CONCEPT AND DERIVATION

Carrier proteins undergo conformational change to transport specific solutes across the cell membrane by both passive transport (facilitated diffusion) and active transport.

Solution: **Carrier Proteins** (Option B) are membrane transport proteins that facilitate both active transport (e.g., Na^+/K^+ -ATPase pump) and passive transport (facilitated diffusion, e.g., GLUT glucose transporters). In contrast, pores or channel proteins only mediate passive diffusion along electrochemical gradients and cannot perform active transport.

Question #35 Key: (B)

NUMS 2023

According to the fluid mosaic model of cell membrane, which zone is embedded inside? (NUMS-2023)

CORE CONCEPT AND DERIVATION

The amphipathic nature of phospholipids dictates membrane self-assembly in aqueous environments.

Solution: In the lipid bilayer, the non-polar fatty acid tails turn away from the watery intra- and extracellular fluids, pointing towards each other. This creates a deeply embedded **hydrophobic** (water-fearing) core.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The hydrophilic (water-loving) phosphate heads face outward towards the aqueous environment.

Question #36 Key: (D)

SZABMU 2023

Which part of plasma membrane controls the fluidity of the membrane? (SZABMU-2023)

CORE CONCEPT AND DERIVATION

Membrane fluidity is essential for cell function, transport, and cell division.

Solution: The **lipid** component—specifically the ratio of saturated (straight) to unsaturated (kinked) fatty acid tails of phospholipids, along with intercalated cholesterol molecules—directly controls how rigidly or fluidly the membrane behaves at varying temperatures.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Proteins function in transport and signaling. Carbohydrates (on glycoproteins/glycolipids) function in cell-cell recognition.

Question #37 Key: (A)

SZABMU 2023

Many enzymes are secreted in inactive form to protect: (SZABMU-2023)

CORE CONCEPT AND DERIVATION

Cells synthesize dangerous digestive enzymes that could destroy their own architecture if activated prematurely.

Solution: Powerful proteolytic enzymes (like pepsinogen) are secreted in an inactive zymogen form. This prevents them from digesting the **cell membrane** and internal proteins of the very cell that produced them during transport and exocytosis.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While DNA and mitochondria are vital, the immediate structure exposed to a secreted enzyme during the exocytosis process is the cell membrane.

Question #38 Key: (A)

KMU 2023

Where do phospholipids arrange themselves in a cell? (ETEA-2023)

CORE CONCEPT AND DERIVATION

Phospholipids are the fundamental building blocks of all biological barriers.

Solution: Because they are amphipathic, phospholipids spontaneously assemble into a continuous bilayer to form the **plasma membrane** (and the membranes of internal organelles), creating a boundary between the cell and its environment.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

They do not freely float in the cytoplasm, nucleus, or mitochondrial matrix; they are structurally bound to the membranes themselves.

Question #39 Key: (A)

KMU 2023

An additional covering surrounds the cell wall of some bacteria that either prevents the bacteria from being p...

CORE CONCEPT AND DERIVATION

Pathogenic bacteria often possess external virulence factors to evade the host immune system.

Solution: The **capsule** is a tightly bound, thick, sticky outer layer of polysaccharides surrounding the cell wall of many bacteria. It is famously known for hiding the bacteria from host macrophages (preventing phagocytosis) and facilitating adherence for biofilms.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Slime layers are similar but much looser and easily washed off. Spores are dormant internal structures for survival, not external coverings.

Question #40 Key: (D)

KMU 2023

_____ regulates the selective permeability of the plasma membrane, allowing movement of molecules according to ...

CORE CONCEPT AND DERIVATION

While lipids provide the barrier, proteins act as the selective gates.

Solution: **Membrane proteins** (acting as channels, carriers, and pumps) dynamically regulate the selective permeability of the membrane. They selectively facilitate the movement of specific ions and polar molecules into or out of the cell based on cellular requirements.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Cholesterol regulates fluidity. Carbohydrates handle cell recognition. The lipid bilayer itself is a non-selective barrier to polar substances.

Question #41 Key: (B)

SZABMU 2023

Peripheral parts of cell are often like a: (SZABMU-2023)

CORE CONCEPT AND DERIVATION

The cytoplasm exhibits different physical states depending on its location and cytoskeletal density.

Solution: The cytoplasm is a colloidal system. The outer, peripheral part of the cell (ectoplasm) just beneath the plasma membrane is dense and viscous, behaving like a semi-solid **gel**. This provides structural support and helps maintain cell shape.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The inner region (endoplasm) is more fluid and behaves like a **sol** to facilitate organelle movement and diffusion.

Question #42 Key: (B)

KMU 2023

The cytoplasm contain/s: (ETEA-2023)

CORE CONCEPT AND DERIVATION

The cytoplasm is a complex matrix containing both living machinery and non-living materials.

Solution: The cytoplasm is a highly heterogeneous mixture. It contains metabolically active **cell organelles** (mitochondria, ribosomes), as well as non-living cell inclusions which include both **storage products** (glycogen, lipid droplets) and **insoluble wastes**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Any option claiming "only" is incorrect because the cytoplasm must simultaneously hold all three components for the cell to function and survive.

Question #43 Key: (C)

KMU 2023

Function of the nucleus is to form: (ETEA-2023 Retake)

CORE CONCEPT AND DERIVATION

The nucleus is not just a storage vault; it is the active site of transcription.

Solution: A primary synthetic function of the nucleus (specifically the nucleolus region) is to transcribe and form ribosomal RNA (**rRNA**). This rRNA is then assembled into ribosome subunits, which are exported to the cytoplasm.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Chromosomes are housed within the nucleus, not "formed" as a product. The nuclear envelope bounds the nucleus, and the cytoplasm surrounds it.

Question #44 Key: (A)

NUMS 2023

Sarcoplasmic reticulum for muscle fibers is mainly responsible for: (NUMS-2023)

CORE CONCEPT AND DERIVATION

Muscle contraction is tightly regulated by intracellular ion concentrations.

Solution: In muscle cells, the smooth endoplasmic reticulum is highly specialized and renamed the **sarcoplasmic reticulum**. Its primary role is the active sequestration and **calcium storage** (Ca^{2+}). Upon nervous stimulation, it releases calcium to trigger muscle contraction.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While standard SER handles lipid metabolism, the *sarcoplasmic* reticulum is evolutionarily adapted specifically for calcium handling.

Question #45 Key: (A)

NUMS 2023

Select the one which is not a function of smooth endoplasmic reticulum? (NUMS-2023)

CORE CONCEPT AND DERIVATION

Cellular organelles have distinct, non-overlapping post-translational duties.

Solution: The **processing of glycoproteins** (the addition and modification of carbohydrate chains on proteins) is strictly the domain of the Golgi apparatus (and begins in the RER), **not** the Smooth ER.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The SER is responsible for lipid metabolism, detoxifying drugs, transporting materials (via transition vesicles), and transmitting impulses (via calcium release in muscle cells).

Question #46 Key: (B)

KMU 2023

Lipid synthesis occurs in which one of the following organelles of the cell? (ETEA-2023)

CORE CONCEPT AND DERIVATION

The endomembrane system compartmentalizes macromolecule production.

Solution: Lipid synthesis (including phospholipids, oils, and steroid hormones) primarily occurs in the Smooth **Endoplasmic Reticulum**, which houses the necessary embedded metabolic enzymes.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Ribosomes synthesize proteins. Mitochondria synthesize ATP. Golgi bodies package and modify existing proteins/lipids.

Question #47 Key: (A)

SZABMU 2023

Outer membrane of mitochondria and chloroplast resembles as both are: (SZABMU-2023)

CORE CONCEPT AND DERIVATION

The outer boundary of endosymbiotic organelles is designed to allow easy access for cellular metabolites.

Solution: The outer membranes of both mitochondria and chloroplasts contain abundant transport proteins called porins. These create large aqueous channels making the outer membrane **freely permeable to small molecules** and ions.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The *inner* membrane is highly impermeable/semipermeable to strictly regulate proton gradients. Neither is permeable to very large macromolecules without specific translocators.

Question #48 Key: (B)

SZABMU 2023

In mitochondria, ATP synthase is located on its: (SZABMU-2023)

CORE CONCEPT AND DERIVATION

Chemiosmosis requires a membrane barrier to establish a proton gradient.

Solution: ATP synthase is an enzyme complex physically embedded in the **inner mitochondrial membrane** (on the cristae). As protons flow back into the matrix through this enzyme, it uses the kinetic energy to phosphorylate ADP into ATP.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The matrix contains the Krebs cycle enzymes. The outer membrane is too porous to maintain a proton gradient.

Question #49 Key: (B)

NUMS 2023

The folds of inner mitochondrial membrane of mitochondria are called: (NUMS-2023)

CORE CONCEPT AND DERIVATION

Membrane folding increases surface area for maximum metabolic output.

Solution: The inner membrane of the mitochondrion folds inward to form structures known as **cristae**. These folds pack a massive amount of electron transport chain proteins and ATP synthase into a small volume.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Cisternae:** Flat sacs in the Golgi/ER.
- **Mesosomes:** Membrane folds in bacteria.

Question #50 Key: (B)

KMU 2023

Which of the following organelle is regarded as self-replicating organelle? (ETEA-2023)

CORE CONCEPT AND DERIVATION

Some organelles retain evolutionary remnants of a free-living bacterial past.

Solution: **Mitochondria** (and chloroplasts) are considered semi-autonomous, self-replicating organelles. They possess their own circular DNA and ribosomes, allowing them to divide independently of the cell's main nucleus via a process similar to binary fission.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The ER, Golgi bodies, and vacuoles are produced and regulated entirely by the main endomembrane system of the cell and cannot replicate themselves.

Question #51 Key: (A)

KMU 2023

Mitochondria is usually absent in: (ETEA-2023)

CORE CONCEPT AND DERIVATION

Mammalian red blood cells undergo extreme specialization to maximize oxygen transport.

Solution: During maturation, mammalian red blood cells (**mature RBCs**) eject their nucleus and degrade all internal organelles, including mitochondria. This frees up maximum space for hemoglobin and prevents the RBC from consuming the oxygen it is meant to deliver (they rely solely on anaerobic glycolysis).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Muscle and cardiac cells have extremely high energy demands and are packed with abundant mitochondria.

Question #52 Key: (B)

UHS 2023

Proteins and lipids are modified into glycolipids and glycoproteins by which cell organelles? (UHS-2023)

CORE CONCEPT AND DERIVATION

Cellular products must be "tagged" and modified before being sent to their final destinations.

Solution: The **Golgi complex** acts as the cell's post office. It receives basic proteins and lipids from the ER and adds carbohydrate chains to them (glycosylation), modifying them into functional glycoproteins and glycolipids before secretion or membrane integration.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The Rough and Smooth ER synthesize the raw proteins and lipids, respectively, but the extensive final modification into glycolipids/proteins is the hallmark of the Golgi.

Question #53 Key: (A)

KMU 2023

_____ consists of units called dictyosomes. (ETEA-2023)

CORE CONCEPT AND DERIVATION

Plant biology sometimes uses specific terminology for universal organelles based on structural variations.

Solution: The **Golgi complex** in plant cells is often not a single, continuous structure but consists of scattered, individual stacks of membrane-bound vesicles and cisternae. These individual stacks are specifically called **dictyosomes**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lysosomes and glyoxysomes are single vesicular bodies. Ribosomes are non-membranous protein clusters.

Question #54 Key: (C)

SZABMU 2023

Which of the following is not the function of lysosomes? (SZABMU-2023)

CORE CONCEPT AND DERIVATION

Lysosomes are strictly the waste disposal and recycling centers of the cell, not the manufacturing or shipping centers.

Solution: The **processing of cell secretions** (modifying, sorting, and packaging proteins/lipids for export) is the specific function of the Golgi apparatus. Lysosomes do not process cell secretions.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lysosomes are responsible for intracellular digestion (breaking down food), autophagy (recycling old organelles), and autolysis (programmed cell death/self-destruction).

Question #55 Key: (A)

NUMS 2023

_____ are spherical sacs, surrounded by a single membrane and contain hydrolytic enzymes. (NUMS-2023)

CORE CONCEPT AND DERIVATION

Cellular digestion must be compartmentalized to protect the rest of the cell from damage.

Solution: **Lysosomes** fit this exact morphological and functional description. They are single-membrane bound vesicles (spherical sacs) packed with acidic hydrolytic enzymes capable of breaking down all biological polymers.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Golgi bodies are flattened stacks (cisternae). Mitochondria and chloroplasts are double-membrane structures.

Question #56 Key: (D)

KMU 2023

Tay-Sach's disease particularly results from the malfunctioning of: (ETEA-2023)

CORE CONCEPT AND DERIVATION

Genetic defects in organelle enzymes lead to toxic buildup of substrates within the cell.

Solution: Tay-Sachs disease is a classic lysosomal storage disorder. It results from a genetic mutation that causes a severe deficiency in hexosaminidase A, a specific lipid-digesting enzyme located inside **lysosomes**. This causes toxic levels of lipids (gangliosides) to accumulate in brain cells.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Malfunctioning of the nucleus (DNA), cell membrane, or vacuole does not directly cause the specific enzymatic lipid buildup characteristic of Tay-Sachs.

Question #57 Key: (C)

KMU 2023

Storage diseases are caused by the excessive accumulation of substances within the cell, due to defects (mutat...

CORE CONCEPT AND DERIVATION

Without cellular recycling machinery, waste products build up and eventually kill the cell.

Solution: "Storage diseases" (like Tay-Sachs, Pompe, and Gaucher disease) are caused by congenital defects in specific **lysosomal** hydrolytic enzymes. When the lysosome cannot break down a particular macromolecule, it accumulates excessively, swelling the lysosome and damaging the cell.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lipase, amylase, and lyases are specific classes of enzymes, but storage diseases are broadly classified by the *organelle* that fails (the lysosome).

Question #58 Key: (A)

NUMS 2023

Pollination is facilitated by: (NUMS-2023)

CORE CONCEPT AND DERIVATION

Plants utilize visual cues to attract animal and insect pollinators to their reproductive organs.

Solution: **Chromoplasts** are plastids that synthesize and store pigments (like carotenoids and xanthophylls) that impart bright red, orange, and yellow colors to flower petals and fruits. These bright colors attract insects and birds, thereby facilitating pollination and seed dispersal.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Chloroplasts provide green color (photosynthesis). Amyloplasts and leucoplasts are colorless and store starch.

Question #59 Key: (A)

KMU 2023

The process of photophosphorylation takes place in: (ETEA-2023)

CORE CONCEPT AND DERIVATION

Converting solar energy into chemical energy requires specialized photosynthetic machinery.

Solution: Photophosphorylation is the synthesis of ATP using light energy. This process occurs strictly on the thylakoid membranes located inside the **chloroplast**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The nucleus and nucleolus handle genetics. Golgi bodies handle protein packaging. None of these contain chlorophyll or photosystems.

Question #60 Key: (A)

KMU 2023

Which is the factory for the synthesis of sugar in autotrophic eukaryotes? (ETEA-2023 Retake)

CORE CONCEPT AND DERIVATION

Autotrophs fix inorganic carbon into organic sugar using light energy.

Solution: In eukaryotic plants and algae, the **chloroplast** is the site of both the light-dependent reactions and the light-independent reactions (Calvin cycle). The Calvin cycle acts as the "factory" that utilizes ATP, NADPH, and CO_2 to synthesize sugars (G3P/glucose).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Mitochondria break down sugar. Amyloplasts store sugar as starch. Ribosomes make proteins.

Question #61 Key: (C)

SZABMU 2023

The membrane separating the vacuole from cytoplasm is called: (SZABMU-2023)

CORE CONCEPT AND DERIVATION

The plant vacuole requires a highly specialized boundary to manage rapid water influx and ion storage.

Solution: The specific biological term for the single, selectively permeable membrane that surrounds the central vacuole in a plant cell is the **tonoplast**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While "vacuolar membrane" is descriptive, "tonoplast" is the exact terminological requirement for this level of biology. Cristae and cisternae are folds of the mitochondria and ER/Golgi, respectively.

Question #62 Key: (C)

NUMS 2023

Tonoplast is the membrane separating: (NUMS-2023)

CORE CONCEPT AND DERIVATION

Understanding the physical location of the tonoplast defines its function in maintaining cell turgor.

Solution: The tonoplast bounds the large central vacuole, physically and chemically separating the aqueous contents of the **vacuole** (cell sap) from the surrounding cellular **cytoplasm** (cytosol).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The nuclear envelope separates the cytoplasm and nucleoplasm. The chloroplast envelope separates the cytoplasm and stroma.

Question #63 Key: (B)

UHS 2023

Cell wall of prokaryotic cell is composed of: (UHS-2023)

CORE CONCEPT AND DERIVATION

The bacterial cell wall requires a unique cross-linked structure for immense tensile strength.

Solution: The prokaryotic (bacterial) cell wall is made of peptidoglycan (murein). "Peptido-" refers to short chains of amino acids (**proteins/peptides**), and "-glycan" refers to long sugar chains (**carbohydrates**). Thus, it is a complex of both.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Options listing only carbohydrates (like plant cellulose) or only proteins ignore the essential cross-linked nature of peptidoglycan.

Question #64 Key: (B)

UHS 2023

Cyclosis and amoeboid movements are due to: (UHS-2023)

CORE CONCEPT AND DERIVATION

Different elements of the cytoskeleton are responsible for different types of cellular movement.

Solution: **Microfilaments** are extremely thin, flexible fibers made of the protein actin. They are directly responsible for cellular movements involving the plasma membrane and cytoplasm, such as amoeboid movement (pseudopodia), muscle contraction, and cyclosis (cytoplasmic streaming).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Microtubules (tubulin) are rigid and handle flagella/cilia and spindle fibers. Intermediate filaments provide static structural tension, not movement.

Question #65 Key: (B)

NUMS 2023

Each centriole is composed of ____ microtubules. (NUMS-2023)

CORE CONCEPT AND DERIVATION

Centrioles have a highly conserved, rigid geometric structure across all animal cells.

Solution: A single centriole is a short cylinder composed of exactly **nine triplets** of microtubules arranged in a ring (a $9 + 0$ arrangement).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Any other number (seven, five, eleven) violates the conserved $9 + 0$ microtubule organizing structure found in nature.

Question #66 Key: (B)

KMU 2023

Cell death due to tissue damage is called? (ETEA-2023 Retake)

CORE CONCEPT AND DERIVATION

There are two primary pathways for cell death: one is planned, the other is accidental and messy.

Solution: **Necrosis** is the uncontrolled, premature death of cells in living tissue due to external factors like trauma, infection, toxins, or lack of oxygen (tissue damage). The cells swell and burst, causing inflammation.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Apoptosis is neat, programmed cell death (suicide). Cancer is uncontrolled cell growth, and metastasis is the spread of that cancer.

Question #67 Key: (A)

UHS 2022

Cell wall may be absent in which of the following? (UHS-2022)

CORE CONCEPT AND DERIVATION

While most prokaryotes have cell walls, there are notable evolutionary exceptions that lack them entirely.

Solution: Plants, algae, and fungi universally possess cell walls. However, certain bacteria (like genus *Mycoplasma*) and some archaea (like *Thermoplasma*) naturally lack a cell wall.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Any pairing containing plants, algae, or fungi is incorrect because those kingdoms are defined by the obligatory presence of a cell wall.

Question #68 Key: (C)

UHS 2022

The cell wall of bacteria is made up of: (UHS-2022)

CORE CONCEPT AND DERIVATION

Different domains of life utilize distinct biochemical polymers for their cell walls.

Solution: The bacterial cell wall is primarily composed of peptidoglycan, also known as **murein**. It consists of sugars cross-linked by short peptides.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Cellulose:** Found in plant and algal cell walls.
- **Chitin:** Found in fungal cell walls and arthropod exoskeletons.

Question #69 Key: (A)

NUMS 2022

Which of the following is correct for cell wall? (NUMS-2022)

CORE CONCEPT AND DERIVATION

The cell wall provides structural support but does not strictly regulate the passage of most small molecules and water.

Solution: Unlike the cell membrane, the primary cell wall is highly porous and fully **permeable** to water and most dissolved solutes.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Semi-permeable and **differentially permeable** are terms specifically reserved for the plasma membrane, which actively and passively selects what enters or exits the cell.

Question #70 Key: (D)

SZABMU 2022

Chemically, cell wall of fungi is made up of: (SZABMU-2022)

CORE CONCEPT AND DERIVATION

Fungi possess a unique cell wall composition that distinguishes them from plants and bacteria.

Solution: The fungal cell wall is primarily composed of **chitin**, a tough, nitrogen-containing homopolysaccharide.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Cellulose & Lignin:** Characteristic of plant cell walls.
- **Murein:** Characteristic of bacterial cell walls.

Question #71 Key: (C)

BUMHS 2022

Cell without cell wall would burst in: (BUMHS-2022)

CORE CONCEPT AND DERIVATION

Osmosis dictates that water moves from an area of higher water potential (lower solute concentration) to lower water potential (higher solute concentration).

Solution: In a **hypotonic solution**, the external environment has more free water than the cell interior. Water rushes in, causing an animal cell (or a plant cell stripped of its wall) to swell and undergo osmotic lysis (burst).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Hypertonic:** Water leaves the cell, causing it to shrink (plasmolysis).
- **Isotonic:** No net movement of water.

Question #72 Key: (B)

DUHS 2022

Plant cell wall is mainly made up of: (DUHS-2022)

CORE CONCEPT AND DERIVATION

The primary structural component of the plant kingdom's extracellular matrix is a specific carbohydrate polymer.

Solution: The primary plant cell wall is chiefly made up of **cellulose** (a polymer of β -D-glucose), along with some pectin and hemicellulose.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Lignin:** Found only in secondary cell walls of woody tissues.
- **Cutin:** A waxy coating on the epidermis, not the main structural wall.
- **Murein:** Bacterial cell wall material.

Question #73 Key: (A)

DUHS 2022

Cell become dead due to the deposition of: (DUHS-2022)

CORE CONCEPT AND DERIVATION

Secondary thickening in plant cells often involves highly rigid, impermeable polymers that restrict nutrient flow, leading to programmed cell death.

Solution: **Lignin** is deposited in the secondary cell walls of specialized plant cells (like xylem vessels and sclerenchyma). It is highly impermeable and tough. Once fully lignified, the cell loses its protoplasm and becomes structurally dead, functioning only as a mechanical support or water pipe.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Cellulose and chitin allow for a living, metabolically active cell to exist within.

Question #74 Key: (C)

UHS 2022

Movement of molecules against the concentration gradient is: (UHS-2022)

CORE CONCEPT AND DERIVATION

Moving molecules from a region of lower concentration to a region of higher concentration requires energy.

Solution: **Active transport** uses cellular energy (usually ATP) to pump molecules against their natural concentration gradient using specific membrane carrier proteins (pumps).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Passive transport and facilitated diffusion only allow molecules to move down their concentration gradients.

Question #75 Key: (C)

NUMS 2022

Why it is said that plasma membrane is asymmetrical? (NUMS-2022)

CORE CONCEPT AND DERIVATION

The inner and outer leaflets of the plasma membrane have distinct compositions based on their differing cellular roles.

Solution: The membrane is asymmetrical because **the two surfaces and halves are not identical**. The outer leaflet contains glycoproteins and glycolipids (forming the glycocalyx) which are absent on the inner cytosolic leaflet. Furthermore, the specific types of phospholipids differ between the two halves.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Protein mobility (fluidity) and lipid bilayer orientation (hydrophobic inside) describe its fluid and barrier properties, not its asymmetry.

Question #76 Key: (C)

NUMS 2022

The ____ part of plasma membrane controls the fluidity of the membrane. (NUMS-2022)

CORE CONCEPT AND DERIVATION

Membrane fluidity is highly dependent on temperature and the chemical structure of its hydrophobic core.

Solution: The **lipids** (specifically, the ratio of saturated to unsaturated fatty acid tails in phospholipids, and the presence of cholesterol) primarily control the fluidity of the membrane. Unsaturated tails create kinks that prevent tight packing, keeping it fluid.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Proteins dictate membrane function (transport, signaling), while carbohydrates dictate cell recognition.

Question #77 Key: (D)

NUMS 2022

Which molecules do not contribute to the formation of biological membranes? (NUMS-2022)

CORE CONCEPT AND DERIVATION

Biological membranes are composed of a specific set of macromolecules.

Solution: **Nucleoproteins** are complexes of nucleic acids (DNA/RNA) and proteins (e.g., histones, ribosomes). They are located inside the nucleus or cytoplasm and play no role in forming the plasma membrane.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Phospholipids form the main matrix, while glycoproteins and glycolipids are crucial components of the cell membrane's outer surface.

Question #78 Key: (C)

NUMS 2022

A group of ribosomes attached to mRNA is known as polysome and the attachment is controlled by: (NUMS-2022)

CORE CONCEPT AND DERIVATION

Ribosomal subunits are typically separate in the cytoplasm and only associate to form an active ribosome during protein synthesis.

Solution: The association of the large and small ribosomal subunits to form a functional ribosome (and subsequently attach to mRNA as a polysome) is strictly dependent on the concentration of magnesium ions, Mg^{+2} .

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Sodium, Calcium, and Potassium ions are essential for cellular functions like nerve impulses, but are not the primary agents for ribosomal subunit binding.

Question #81 Key: (A)

BUMHS 2022

Facilitated diffusion involves carrier molecules. The carrier molecules are chemically ____ in nature. (BUMHS-...

CORE CONCEPT AND DERIVATION

Facilitated diffusion relies on specific structural components to ferry polar molecules across the hydrophobic membrane core.

Solution: The carrier molecules responsible for facilitated diffusion are chemically **proteins** (specifically, integral transport proteins). They undergo conformational changes to transport substances.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lipids form the barrier, and carbohydrates act as identification tags. Neither can undergo the complex structural shifts required to transport molecules across the membrane.

Question #79 Key: (D)

SZABMU 2022

Adenylate cyclase, in the cell membrane acts as: (SZABMU-2022)

CORE CONCEPT AND DERIVATION

Membrane proteins serve various functions, including enzymatic activity for intracellular signaling.

Solution: **Adenylate cyclase** is an integral membrane protein that acts as an **enzyme**. Upon activation by a G-protein, it catalyzes the conversion of ATP into cyclic AMP (cAMP), a crucial secondary messenger.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While it interacts with receptors, it is not a receptor itself, nor is it a transport channel or carrier.

Question #82 Key: (B)

BUMHS 2022

Who proposed fluid mosaic model? (BUMHS-2022)

CORE CONCEPT AND DERIVATION

Recognizing key scientists is fundamental in biological history.

Solution: The fluid mosaic model, the universally accepted model for plasma membrane structure, was proposed by S. J. Singer and G. L. Nicolson in 1972.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Christian de Duve discovered lysosomes. Robert Brown discovered the nucleus. George Palade discovered ribosomes.

Question #83 Key: (A)

DUHS 2022

Plasma membrane is: (DUHS-2022)

CORE CONCEPT AND DERIVATION

The cell must carefully regulate its internal environment to maintain homeostasis.

Solution: The plasma membrane is **selectively permeable** (or differentially permeable). It allows certain molecules (like small non-polar gases) to pass freely while restricting others (like large macromolecules and ions), selectively transporting them via proteins.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

If it were completely permeable, the cell couldn't maintain homeostasis. If impermeable, the cell would die from starvation and waste buildup.

Question #80 Key: (B)

KMU 2022

The statement 'the membrane is like a sea of lipids in which proteins are floating' represents: (ETEA-2022)

CORE CONCEPT AND DERIVATION

The historical progression of membrane models culminated in our modern understanding of membrane dynamics.

Solution: In 1972, S. J. Singer and G. L. Nicolson proposed the Fluid Mosaic Model. They beautifully described the membrane as a fluid "sea of lipids" in which mosaic "icebergs" of proteins float.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Danielli and Davson proposed the incorrect "sandwich model" where solid protein layers coated the outside of the lipid bilayer.

Question #84 Key: (B)

UHS 2022

Which of the following are single membranous organelles? (UHS-2022)

CORE CONCEPT AND DERIVATION

Organelles are classified by their membrane boundaries: non-membranous, single membrane, or double membrane.

Solution: The Endoplasmic Reticulum (ER), Golgi apparatus, and lysosomes form part of the endomembrane system and are all bounded by a **single membrane**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Mitochondria & Chloroplasts:** Double membrane bounded.
- **Ribosomes:** Non-membranous.

Question #85 Key: (C)

SZABMU 2022

Glycogen, lipid droplets form the most important ____ of the cell. (SZABMU-2022)

CORE CONCEPT AND DERIVATION

The cytoplasm contains both living machinery (organelles) and non-living stored materials.

Solution: **Cell inclusions** are non-living, temporary structures in the cytoplasm that consist of stored nutrients or secretory products, such as glycogen granules in liver cells or lipid droplets in adipocytes.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Organelles (membranous or non-membranous) possess metabolic activity, whereas inclusions are passive storage deposits.

Question #86 Key: (A)

NUMS 2022

Within the nucleus, ____ are made by the nucleolus. (NUMS-2022)

CORE CONCEPT AND DERIVATION

The nucleolus is a dense, non-membranous region within the nucleus dedicated to RNA transcription and assembly.

Solution: The nucleolus acts as the factory for synthesizing ribosomal RNA (rRNA) and assembling it with imported proteins to form the large and small subunits of **ribosomes**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Proteins and enzymes are synthesized in the cytoplasm by ribosomes. mRNA is transcribed in the nucleoplasm (outside the nucleolus).

Question #87 Key: (A)

SZABMU 2022

The organelle which provides neurotransmitters in the nervous pathway is: (SZABMU-2022)

CORE CONCEPT AND DERIVATION

Secretory vesicles containing neurotransmitters must be meticulously packaged and sorted before reaching the synaptic terminal.

Solution: While the initial proteins are synthesized by the RER, it is the **Golgi apparatus** that modifies, packages, and buds off the final synaptic vesicles that provide neurotransmitters in the nervous pathway.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Glyoxysomes and Peroxisomes are involved in lipid metabolism and hydrogen peroxide breakdown, playing no role in neurotransmitter secretion.

Question #88 Key: (B)

BUMHS 2022

What is true about smooth endoplasmic reticulum? (BUMHS-2022)

CORE CONCEPT AND DERIVATION

The SER has highly specialized functions in specific cell types, such as muscle cells.

Solution: In muscle cells, a specialized form of SER called the sarcoplasmic reticulum sequesters and releases Calcium ions (Ca^{+2}), which is an essential step in the **transmission of impulses** leading to muscle contraction.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Intracellular digestion is done by lysosomes. Protein metabolism is the RER's job.

Question #89 Key: (A)

NUMS 2022

Which organelles would be more abundant in a secretory cell than non-secretory cell? (NUMS-2022)

CORE CONCEPT AND DERIVATION

The abundance of specific organelles in a cell is directly proportional to the cell's specialized physiological role.

Solution: Secretory cells (like glandular cells in the pancreas) produce and export large amounts of substances (enzymes, hormones). Therefore, they require an abundant **Golgi complex**, which acts as the central hub for modifying, sorting, and packaging these products into secretory vesicles.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lysosomes handle intracellular digestion, vacuoles handle storage, and centrioles handle cell division. None of these are primarily responsible for exocytosis/secretion.

Question #90 Key: (C)

BUMHS 2022

When and who discovered Golgi apparatus? (BUMHS-2022)

CORE CONCEPT AND DERIVATION

Historical milestones in cell biology are often tested as factual recall.

Solution: The Golgi apparatus was discovered by the Italian physician and biologist **Camillo Golgi** in the year **1898** while investigating the nervous system.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The dates 1888, 1988, and 1998 are historically inaccurate for this major discovery.

Question #91 Key: (B)

BUMHS 2022

Which of the following cell does not possess Golgi apparatus? (BUMHS-2022)

CORE CONCEPT AND DERIVATION

The defining characteristic of prokaryotic cells is the absence of membrane-bound organelles.

Solution: A **bacterial cell** is a prokaryote. Prokaryotes strictly lack all membrane-bound organelles, including the Golgi apparatus, Endoplasmic Reticulum, and Mitochondria.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Animal, plant, and fungal cells are all eukaryotic and therefore possess a Golgi apparatus to handle their intracellular transport and secretion needs.

Question #92 Key: (D)

UHS 2022

The digestive vacuoles and autophagosomes are also known as: (UHS-2022)

CORE CONCEPT AND DERIVATION

Lysosomes undergo structural and functional changes once they begin actively digesting material.

Solution: When a newly formed (primary) lysosome fuses with a food vacuole or an autophagosome, it becomes an active digestive compartment known as a **secondary lysosome**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Phagocytosis is the process of eating, not the organelle. Primary lysosomes are inactive (pre-fusion). Peroxisomes belong to a completely different class of microbodies.

Question #93 Key: (B)

NUMS 2022

_____ are spherical sacs surrounded by a single membrane and contain hydrolytic enzyme. (NUMS-2022)

CORE CONCEPT AND DERIVATION

Compartmentalization of destructive enzymes is crucial to prevent the cell from digesting itself.

Solution: **Lysosomes** are single-membrane-bound spherical sacs that contain a cocktail of powerful acid hydrolases (hydrolytic enzymes) used to digest macromolecules, old organelles, and engulfed pathogens.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Mitochondria and chloroplasts are double-membrane structures involved in energy conversion. Golgi bodies are stacks of flattened sacs (cisternae), not spherical sacs.

Question #94 Key: (C)

SZABMU 2022

Intracellular digestion of food is done by the organelle: (SZABMU-2022)

CORE CONCEPT AND DERIVATION

Single-celled organisms and phagocytic cells rely on internal digestion mechanisms.

Solution: Once food is ingested via a food vacuole, a **lysosome** fuses with it. The lysosome's hydrolytic enzymes then break down the complex food molecules into simple nutrients.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While the food temporarily resides in a vacuole, the actual chemical digestion is performed by the enzymes provided exclusively by the lysosome.

Question #95 Key: (A)

KMU 2022

The chloroplasts contain: (ETEA-2022)

CORE CONCEPT AND DERIVATION

Chloroplasts are semi-autonomous organelles equipped to synthesize some of their own proteins.

Solution: In accordance with the endosymbiotic theory, chloroplasts contain all the necessary machinery for basic autonomy: **small circular DNA, 70S ribosomes, and the resulting synthesized proteins**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Selecting "only" for any single component ignores the integrated biochemical system required for the chloroplast to function as a semi-autonomous unit.

Question #96 Key: (B)

DUHS 2022

*Powerhouse of the cell is: (DUHS-2022)***CORE CONCEPT AND DERIVATION**

The cell requires a constant supply of energy in the form of ATP to survive.

Solution: The **mitochondria** are universally known as the powerhouses of the cell because they extract energy from organic fuels via aerobic respiration and convert it into ATP, the cell's energy currency.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Chloroplasts generate energy but specifically convert solar energy to chemical energy in plants. Ribosomes make proteins. ER makes lipids/proteins.

Question #97 Key: (B)

NUMS 2022

*The structure which disappears during cell division is: (NUMS-2022)***CORE CONCEPT AND DERIVATION**

During mitosis, the nuclear architecture must be dismantled to allow spindle fibers to access the chromosomes.

Solution: As the cell enters prophase of cell division, the nuclear envelope disintegrates and the **nucleolus** completely disappears. This halts rRNA synthesis so the cell can focus all resources on division.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The Endoplasmic Reticulum also fragments, but in classical cytological context (and specific exam criteria), the "disappearance" of the nucleolus is the most prominent visual hallmark of prophase.

Question #98 Key: (A)

NUMS 2022

*Except during nuclear division, nucleus has the chromosomes in loosely coiled state known as: (NUMS-2022)***CORE CONCEPT AND DERIVATION**

DNA packaging varies depending on the cell cycle phase to allow for either transcription (interphase) or transport (mitosis).

Solution: During interphase (non-dividing state), DNA is unwound and loosely coiled as a thread-like mass called **chromatin**, which allows enzymes to access genes for transcription and replication.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

During division, chromatin condenses into distinct chromosomes. DNA is the molecule itself, and genes are segments of it. Ribosomes are outside the nucleus.

Question #99 Key: (A)

KMU 2022

*The colloidal mixture of ions, organic and inorganic salts present in the nucleus is called: (ETEA-2022)***CORE CONCEPT AND DERIVATION**

The nucleus contains its own distinct aqueous environment to support nucleic acid metabolism.

Solution: **Nucleoplasm** (or karyoplasm) is the highly viscous, colloidal liquid inside the nucleus that surrounds the chromatin and nucleolus. It contains a rich mixture of ions, nucleotides, and enzymes required for DNA/RNA synthesis.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The nuclear membrane is the boundary. The nucleolus is a dense structure. Chromosomes are the genetic material.

Question #100 Key: (B)

UHS 2022

*Structure formed by invagination of plasma membrane and involved in cell division and DNA replication of proka...***CORE CONCEPT AND DERIVATION**

Without internal organelles, prokaryotes utilize inward folds of their plasma membrane to increase functional surface area.

Solution: **Mesosomes** are internal pouch-like invaginations of the bacterial plasma membrane. They hold respiratory enzymes and act as attachment points for the circular DNA, aiding in DNA replication and septation during binary fission.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lysosomes and Golgi bodies are eukaryotic. Phragmoplasts are involved in eukaryotic plant cell wall formation.

Question #101 Key: (D)

UHS 2022

*Which one is common in both prokaryotic and eukaryotic cell? (UHS-2022)***CORE CONCEPT AND DERIVATION**

All living cells must decode genetic information into proteins to survive.

Solution: Because protein synthesis is a universal requirement for life, **ribosomes** (the non-membranous protein factories) are the essential structural components common to both prokaryotic and eukaryotic cells.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Nuclear envelope & Cytoplasmic streaming (cyclosis):** Strictly eukaryotic features.
- **Binary fission:** The primary mode of prokaryotic division (eukaryotes use mitosis).

Question #102 Key: (B)

PMDC 2020

In which type of cells, cell wall is not present? (PMC-2020)

CORE CONCEPT AND DERIVATION

Animal cells lack a rigid cell wall, utilizing only a flexible plasma membrane as their outermost boundary.

Solution: Liver cells are animal cells (hepatocytes). Therefore, they do not possess a cell wall. Their outermost boundary is the cell membrane.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Plant cells (cellulose), Fungal cells (chitin), and Bacterial cells (peptidoglycan) all inherently possess cell walls.

Question #103 Key: (B)

PMDC 2020

According to the fluid mosaic model of cell membrane, which zone is embedded inside? (PMC-2020)

CORE CONCEPT AND DERIVATION

Phospholipids are amphipathic molecules, meaning they have distinct water-loving and water-fearing regions.

Solution: In an aqueous environment, phospholipids organize into a bilayer where the non-polar, fatty acid tails point inward to escape water. Thus, the embedded inner zone of the membrane is strictly **hydrophobic** (water-repelling).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The **hydrophilic** (water-loving) phosphate heads face the outward and inward aqueous environments of the cell.

Question #104 Key: (B)

PMDC 2020

70S sized ribosomes are found in the cells of: (PMC-2020)

CORE CONCEPT AND DERIVATION

The evolutionary divergence between domains is reflected in ribosomal size.

Solution: **Bacteria** are prokaryotes, and their standard cytoplasmic ribosomes have a sedimentation coefficient of 70S.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Fungi, protozoa, and algae are all eukaryotic organisms. Their primary cytoplasmic ribosomes are 80S (though their mitochondria/chloroplasts contain 70S, the question refers to the primary cell type).

Question #105 Key: (B)

PMDC 2020

Select the one which is not a function of smooth endoplasmic reticulum: (PMC-2020)

CORE CONCEPT AND DERIVATION

Post-translational modification of proteins generally happens sequentially downstream from the ER.

Solution: The **processing of glycoproteins** (adding carbohydrate chains to proteins) primarily takes place in the Golgi apparatus, not the SER.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The SER is involved in lipid metabolism, transport of materials (via transition vesicles), and transmission of impulses (e.g., calcium release in sarcoplasmic reticulum of muscle cells).

Question #106 Key: (C)

PMDC 2020

Which of the following organelles are involved in the synthesis of plant cell wall? (PMC-2020)

CORE CONCEPT AND DERIVATION

The cell wall is a complex extracellular matrix composed of cellulose, hemicellulose, and pectins, which require specialized secretory machinery for construction.

Solution: The **Golgi complex** (specifically its plant equivalent, dictyosomes) is responsible for synthesizing non-cellulosic matrix polysaccharides (like pectins and hemicellulose) and packaging them into vesicles. These vesicles are then secreted to the plasma membrane to build the plant cell wall.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Endoplasmic reticulum:** Synthesizes proteins and lipids but does not directly secrete cell wall polysaccharides.
- **Lysosomes/Peroxisomes:** Involved in digestion and detoxification, not structural synthesis.

Question #107 Key: (C)

MDCAT 2019

Passive processes for the movement of molecules across cell surface membrane are: (MDCAT-2019)

CORE CONCEPT AND DERIVATION

Passive transport requires no expenditure of metabolic energy (ATP) because molecules move down their concentration gradient.

Solution: Both **osmosis** (movement of water) and **facilitated diffusion** (movement of molecules via carrier proteins) operate without ATP, classifying them as passive processes.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Phagocytosis, pinocytosis, and exocytosis are forms of bulk transport that require significant ATP expenditure (Active processes).

Question #108 Key: (B)

SZABMU 2019

The fluid mosaic model of cell membrane is: (AJK-2019)

CORE CONCEPT AND DERIVATION

The currently accepted model of the cell membrane emphasizes dynamic movement rather than a static sandwich structure.

Solution: Proposed by Singer and Nicolson, the Fluid Mosaic Model states that the membrane is a fluid bilayer of phospholipids in which various protein molecules are embedded and are free to move laterally, much like icebergs in a sea.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Options suggesting a "protein layer enclosing lipids" describe the obsolete Davson-Danielli (sandwich) model.

Question #109 Key: (D)

PMDC 2019

Cell permeability and transport processes of cell membrane depend upon its ____ component. (NTS-2019)

CORE CONCEPT AND DERIVATION

The fundamental barrier to the movement of substances across a cell membrane is lipid in nature.

Solution: The **phospholipid** bilayer is the core component that regulates permeability. Its hydrophobic core strictly prevents the free passage of polar molecules and ions, making the membrane differentially permeable.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Carbohydrates act as recognition markers. Cellulose is not found in the cell membrane (it forms the plant cell wall).

Question #110 Key: (B)

PMDC 2019

When plant cell receives a signal for death, it commits suicide by rupturing: (NTS-2019)

CORE CONCEPT AND DERIVATION

Programmed cell death (apoptosis) and necrosis eventually lead to the destruction of the cell's integrity.

Solution: According to the specific biological principles referenced in standard curricula for this exam, irreversible damage to or targeted rupturing of the **cell membrane** results in the immediate death of the cell, as it loses its ability to maintain homeostasis.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While the tonoplast can rupture in certain types of plant programmed cell death (hypersensitive response), the ultimate functional destruction cited here is tied to the cell membrane.

Question #111 Key: (D)

SZABMU 2019

Glycolysis is the common stage in both aerobic and anaerobic respiration and it occurs in ____ of the cell. (A...)

CORE CONCEPT AND DERIVATION

Cellular respiration happens in distinct cellular compartments.

Solution: Glycolysis (the splitting of glucose into two molecules of pyruvate) requires enzymes that are dissolved freely in the cytosol. Therefore, it occurs in the **cytoplasm**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The Krebs cycle occurs in the mitochondrial matrix, and the Electron Transport Chain occurs on the inner mitochondrial membrane.

Question #112 Key: (A)

SZABMU 2019

The cytoplasmic organelle commonly found both in prokaryotes and eukaryotes is: (AJK-2019)

CORE CONCEPT AND DERIVATION

While prokaryotes lack membrane-bound organelles, they still require the essential machinery for life, such as protein synthesis.

Solution: **Ribosomes** are non-membranous organelles responsible for protein synthesis. Because they are not bound by a membrane, they are universally present in both prokaryotic (70S) and eukaryotic (80S) cells.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Mitochondria are membrane-bound (absent in prokaryotes). A nucleoid is an irregular region containing DNA in prokaryotes, not an organelle found in eukaryotes.

Question #113 Key: (C)

MDCAT 2019

Smooth endoplasmic reticulum is responsible for the metabolism of: (MDCAT-2019)

CORE CONCEPT AND DERIVATION

The structural difference between Rough ER (having ribosomes) and Smooth ER dictates their biochemical roles.

Solution: The Smooth Endoplasmic Reticulum (SER) lacks ribosomes, rendering it incapable of protein synthesis. Instead, it is highly active in the synthesis and metabolism of **lipids** (like steroid hormones) and detoxification processes.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Protein metabolism occurs in the Rough ER and cytoplasm. Nucleic acid metabolism occurs primarily in the nucleus.

Question #114 Key: (C)

SZABMU 2019

Which of these is solely present in plant cell only? (AJK-2019)

CORE CONCEPT AND DERIVATION

Distinct structural differences separate plant and animal cell anatomies.

Solution: Out of the options provided, the **large central vacuole** is an anatomical feature unique to plant cells, essential for storing water, nutrients, and waste, as well as providing mechanical support via turgor pressure.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Peroxisomes, smooth endoplasmic reticulum, and the cytoskeleton are ubiquitous across both plant and animal eukaryotic cells.

Question #115 Key: (A)

MDCAT 2019

The finger like infoldings which are formed by inner membrane of mitochondria are called: (MDCAT-2019)

CORE CONCEPT AND DERIVATION

Maximizing surface area is a common biological strategy to increase the efficiency of membrane-bound chemical reactions.

Solution: The inner mitochondrial membrane folds inward to form **cristae**. These finger-like infoldings vastly increase the surface area available for housing the electron transport chain and ATP synthase complexes.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The matrix is the fluid inside. Porins are channel proteins on the outer membrane. Ribosomes are the protein factories.

Question #116 Key: (C)

MDCAT 2019

The structure present in a eukaryotic cell but absent in prokaryotic cells is: (MDCAT-2019)

CORE CONCEPT AND DERIVATION

The primary evolutionary division of life is based on the packaging of genetic material.

Solution: The term "eukaryote" literally means "true nucleus." Eukaryotic cells have their DNA enclosed within a membrane-bound **nucleus**, whereas prokaryotes ("before nucleus") have their DNA freely floating in a region called the nucleoid.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Both prokaryotes and eukaryotes possess DNA, a cell surface membrane, and ribosomes (though sizes differ: 70S vs 80S).

Question #117 Key: (C)

MDCAT 2018

Ribosomes are made up of ____ and _____. (MDCAT-2018)

CORE CONCEPT AND DERIVATION

Ribosomes are structurally ribonucleoprotein complexes.

Solution: Chemically, ribosomes are composed of approximately equal amounts of ribosomal RNA (rRNA) and specific ribosomal **proteins**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lipids and carbohydrates do not form the structure of ribosomes; they are primarily involved in membrane structure and energy storage.

Question #118 Key: (C)

MDCAT 2018

The cisternae break up into vesicles from ____ and ____ of Golgi complex. (MDCAT-2018)

CORE CONCEPT AND DERIVATION

The Golgi apparatus has a distinct polarity, with a receiving end and a shipping end.

Solution: The Golgi has a forming face (cis, convex) where vesicles from the ER arrive and fuse. After processing, the secretory vesicles bud off and break away from the trans face, which is **concave and known as the maturing face**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The forming face is convex (receives), while the maturing face is concave (dispatches). Therefore, combining "forming" with "concave" or "maturing" with "convex" is structurally inaccurate.

Question #119 Key: (A)

MDCAT 2018

These structures are involved in the breakdown of old organelles: (MDCAT-2018)

CORE CONCEPT AND DERIVATION

Cellular homeostasis requires the recycling of damaged or obsolete cellular components (autophagy).

Solution: **Lysosomes** are membrane-bound vesicles containing powerful hydrolytic enzymes. They fuse with worn-out organelles to break them down into basic monomers, a process known as autophagy.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Peroxisomes/Glyoxysomes:** Involved in lipid metabolism and detoxification.
- **Leucoplasts:** Starch/lipid storage organelles in plants.

Question #120 Key: (D)

MDCAT 2018

Which statement is correct about mitochondria and chloroplast?
(MDCAT-2018)

CORE CONCEPT AND DERIVATION

Mitochondria and chloroplasts are semi-autonomous organelles originating from ancient prokaryotic endosymbionts.

Solution: Both organelles retain their own circular DNA and **70S ribosomes** located within their matrix/stroma, which allow them to synthesize some of their own structural proteins.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Single membrane:** Both are double-membrane structures.
- **Same number:** Organelle counts vary depending on cell energy demands.

Question #121 Key: (B)

PMDC 2018

The membrane separating the vacuole from cytoplasm is called:
(MDCAT-2018, PMC-2020)

CORE CONCEPT AND DERIVATION

The plant central vacuole is highly selective in transporting ions and water.

Solution: The specialized single membrane that bounds the central vacuole of a plant cell is specifically named the **tonoplast**. It is vital for regulating the movement of ions around the cell and maintaining turgor.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Cristae:** Folds of the inner mitochondrial membrane.
- **Cisternae:** Flattened sacs of the ER or Golgi.
- **Vacuolar membrane:** While technically descriptive, "tonoplast" is the strict biological term required.

Question #122 Key: (B)

PMDC 2018

Which organelle is required for aerobic respiration? (NTS-2018)

CORE CONCEPT AND DERIVATION

Aerobic respiration requires specialized compartments to maintain the proton gradients necessary for ATP synthesis.

Solution: The **mitochondrion** is the "powerhouse of the cell." It houses the Krebs cycle in its matrix and the Electron Transport Chain on its inner membrane, making it the absolute requirement for aerobic cellular respiration.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Plastids perform photosynthesis (in plants). The ER synthesizes lipids and proteins. The nucleus stores genetic material.

Question #123 Key: (B)

PMDC 2017

Which features do animal cells share with plant cells? (NTS-2017)

CORE CONCEPT AND DERIVATION

While plant and animal cells are both eukaryotic, they have distinct organelle compositions based on their metabolic needs.

Solution: Both animal and plant cells possess a true nucleus, cytoplasm, and mitochondria (for cellular respiration). However, animal cells strictly lack chloroplasts because they are heterotrophic.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Any option claiming the presence of chloroplasts in animal cells is incorrect. Likewise, any option suggesting animal cells lack cytoplasm or a nucleus is fundamentally wrong for standard eukaryotic cells.

Question #124 Key: (C)

MDCAT 2017

Select the organelle which is only present in animal cells: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

Cell division mechanisms vary slightly between plant and animal cells, reflected in their organelle composition.

Solution: Centrioles are cylindrical structures involved in spindle fiber formation during animal cell division. Higher plant cells lack centrioles and form a spindle apparatus without them.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Microtubules:** Make up the cytoskeleton in both cell types.
- **Ribosomes & R.E.R:** Essential for protein synthesis in all eukaryotes.

Question #125 Key: (A)

MDCAT 2017

Which of the following structure is present in both plant and animal cells but is absent in prokaryotic cells?...

CORE CONCEPT AND DERIVATION

Eukaryotic cells possess a complex cytoskeleton, whereas prokaryotic cells have a much simpler, differing structural framework.

Solution: Microtubules are protein filaments (tubulin) forming the cytoskeleton in all eukaryotes (plants and animals). Prokaryotes lack true tubulin-based microtubules.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Centrioles:** Absent in higher plants.
- **Plastids:** Absent in animal cells.
- **Sieve tubes:** Specialized plant structures (phloem), absent in animals and prokaryotes.

Question #126 Key: (B)

MDCAT 2017

Taking in of solid particle by cell is called: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

Cells use specialized vesicular transport to engulf macromolecules or entire microorganisms.

Solution: **Phagocytosis** (cell eating) is the process by which a cell uses its plasma membrane to engulf a large, solid particle to form an internal compartment called a phagosome.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Pinocytosis:** Intake of fluids.
- **Exocytosis:** Expulsion of materials.

Question #127 Key: (A)

MDCAT 2017

Self-eating ability of the cells by using lysosomes is called: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

Cells must recycle old or damaged organelles to maintain cellular health.

Solution: **Autophagy** (literally "self-eating") is the regulatory mechanism where lysosomes fuse with worn-out organelles (like old mitochondria) to degrade and recycle their components.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Phagocytosis and Pinocytosis relate to taking in materials from the outside of the cell, not internal recycling.

Question #128 Key: (C)

MDCAT 2017

Ribosomes present in prokaryotes are: (MDCAT-2017, MDCAT-2019)

CORE CONCEPT AND DERIVATION

Ribosomes are classified by their sedimentation rate in a centrifuge, measured in Svedberg units (S).

Solution: Prokaryotic cells possess slightly smaller ribosomes that sediment at **70S** (composed of 50S large and 30S small subunits).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **80S:** Found in the cytoplasm of eukaryotic cells.
- **50S & 30S:** These are individual subunits, not the intact ribosome.

Question #129 Key: (A)

MDCAT 2017

Group of ribosomes attached to mRNA is called: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

To maximize efficiency, multiple ribosomes translate a single mRNA molecule simultaneously.

Solution: A single mRNA string with multiple ribosomes attached like beads on a thread is called a **polysome** (or polyribosome). This allows for the rapid production of many identical polypeptide copies.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

A polynucleotide is a chain of nucleic acids (like DNA). A polysaccharide is a carbohydrate chain.

Question #130 Key: (C)

MDCAT 2017

Which of the following organelle consist of two subunits? (MDCAT-2017)

CORE CONCEPT AND DERIVATION

The physical structure of the protein-synthesizing machinery is highly distinct from membranous organelles.

Solution: The **ribosome** is a non-membranous organelle that uniquely consists of two distinct parts: a large subunit and a small subunit, which interlock around mRNA during translation.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Mitochondria, plastids, and Golgi bodies are continuous, membrane-bound structures, not composed of separate dissociable "subunits".

Question #131 Key: (A)

MDCAT 2017

Nuclear membrane is continuous with: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

The nuclear envelope does not exist in isolation; it is directly connected to the cell's internal transport network.

Solution: The outer membrane of the nuclear envelope is physically continuous with the membrane of the rough **Endoplasmic Reticulum**, allowing the space between the nuclear membranes to connect directly to the lumen of the ER.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The Golgi body receives vesicles from the ER but is not physically continuous with it.

Question #132 Key: (D)

MDCAT 2017

Functionally, mesosomes can be compared with: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

Prokaryotic cells must perform energy-yielding reactions without membrane-bound organelles.

Solution: Mesosomes are invaginations of the bacterial plasma membrane that contain respiratory enzymes. Because they serve as the site of cellular respiration and ATP generation in bacteria, they are functionally analogous to the **mitochondria** of eukaryotic cells.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Polysomes/Ribosomes are for protein synthesis. Golgi bodies are for secretion.

Question #133 Key: (A)

MDCAT 2017

Ribosomal RNA is synthesized in: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

The assembly of ribosomes requires a dedicated, concentrated region of DNA transcription within the nucleus.

Solution: The **nucleolus** is a darkly staining, non-membranous region within the nucleus where the genes encoding Ribosomal RNA (rRNA) are actively transcribed and where initial ribosomal subunit assembly occurs.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Nucleoplasm is the fluid of the nucleus but the specific site of rRNA synthesis is the nucleolus. Golgi and peroxisomes are cytoplasmic organelles.

Question #134 Key: (A)

MDCAT 2017

DNA molecule in prokaryotes is: (MDCAT-2017)

CORE CONCEPT AND DERIVATION

Prokaryotic genomes are optimized for rapid replication and simplicity.

Solution: The main genomic DNA in prokaryotes (like bacteria) consists of a **single, circular, double-stranded DNA molecule** that resides in the nucleoid region, **not bounded by any nuclear membrane**.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Eukaryotic DNA is linear and membrane-bound. Prokaryotic DNA is circular, but emphatically lacks a membrane boundary.

Question #135 Key: (D)

MDCAT 2016

Out of the given options, choose the one which shows the structures found only in plants? (MDCAT-2016)

CORE CONCEPT AND DERIVATION

Plant cells possess specific structures adapted for their autotrophic lifestyle and structural support that animal cells lack.

Solution:

- Animal cells lack a cell wall, chloroplasts, and a large central vacuole.
- Plant cells have a rigid cellulose cell wall for support, chloroplasts for photosynthesis, and a large central vacuole to maintain turgor pressure.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Ribosomes and Mitochondria:** Found in both plant and animal cells.
- **Microtubules and Peroxisomes:** Common to both eukaryotic cell types.

Question #136 Key: (D)

MDCAT 2016

Presence of large central vacuole is the characteristic of: (MDCAT-2016)

CORE CONCEPT AND DERIVATION

Mature plant cells must maintain turgor pressure to support the plant's upright structure.

Solution: A defining feature of a mature **plant** cell is a single, large central vacuole that occupies up to 90% of the cell volume, pushing the cytoplasm and organelles against the cell wall to maintain turgidity.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Fungi and protists possess vacuoles, but they are typically much smaller and more numerous. Prokaryotes lack membrane-bound vacuoles.

Question #137 Key: (B)

MDCAT 2015

Fluid mosaic model of plasma membrane states that protein molecules float in a fluid like ____ layer. (MDCAT-2015)

CORE CONCEPT AND DERIVATION

The biological membrane is not a static solid, but a dynamic, two-dimensional fluid.

Solution: The Fluid Mosaic Model describes the membrane as a fluid **phospholipid** bilayer in which integral and peripheral proteins are embedded and can float or move laterally.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Carbohydrates, glucose, and galactose are associated with the exterior surface (glycocalyx) but do not form the fluid layer itself.

Question #138 Key: (A)

MDCAT 2015

Which one of the following cell structures is involved in the synthesis of lipids? (MDCAT-2015)

CORE CONCEPT AND DERIVATION

The endomembrane system compartmentalizes cellular synthesis.

Solution: The Smooth **Endoplasmic Reticulum** (SER) contains unique enzymes embedded in its membrane that are explicitly responsible for synthesizing lipids, including oils, phospholipids, and steroids.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

The Golgi complex modifies and packages proteins. Mitochondria produce ATP. Centrioles organize spindle fibers.

Question #139 Key: (A)

MDCAT 2015

Which organelle is bounded by two membranes? (MDCAT-2015)

CORE CONCEPT AND DERIVATION

Organelles are categorized by their protective boundaries (none, one, or two membranes).

Solution: The nucleus, chloroplasts, and **mitochondria** are uniquely bounded by a double membrane (an inner and an outer membrane).

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Lysosomes are single-membrane bounded. Ribosomes and the nucleolus are completely non-membranous.

Question #140 Key: (C)

MDCAT 2014

The intake of liquid materials across the cell membrane is: (MDCAT-2014)

CORE CONCEPT AND DERIVATION

Bulk transport across the membrane occurs via vesicle formation, categorized by the physical state of the ingested material.

Solution: **Pinocytosis** (cell drinking) is the specific form of endocytosis involving the ingestion of liquid materials or extracellular fluid by the budding of small vesicles from the cell membrane.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

- **Phagocytosis:** Intake of large solid particles (cell eating).
- **Endocytosis:** A general term that includes both pinocytosis and phagocytosis. *Pinocytosis* is the more precise answer for liquids.

Question #141 Key: (C)

DUHS 2014

Which substance from the following is important for the mechanical stability of cell membranes, as without it ...

CORE CONCEPT AND DERIVATION

The fundamental structural framework of all biological membranes is a lipid bilayer.

Solution: **Phospholipids** form a continuous bilayer. Their hydrophobic tails face inward, preventing the free passage of water-soluble ions and polar molecules. This bilayer provides the essential mechanical barrier and stability of the cell.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

While **cholesterol** modulates fluidity and stability, the fundamental structure that prevents the cell from bursting open and acts as the primary barrier is the phospholipid bilayer itself.

Question #142 Key: (C)

MDCAT 2014

Which cell organelle is responsible for cell secretion? (MDCAT-2014, 2019)

CORE CONCEPT AND DERIVATION

Exocytosis of cellular products requires a specialized packaging and shipping center.

Solution: The **Golgi body** (or Golgi complex) is the primary secretory organelle of the cell. It receives raw proteins/lipids from the ER, refines them, and encloses them in secretory vesicles that fuse with the plasma membrane for external secretion.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Ribosomes make the proteins, but do not secrete them. Mitochondria and chloroplasts are solely energy converters.

Question #143 **Key: (C)**

MDCAT 2014

Peptidoglycan or murein is a special or distinctive feature of cell wall in: (MDCAT-2014)

CORE CONCEPT AND DERIVATION

Cell wall composition is a major taxonomic identifier across the domains of life.

Solution: The cell wall of **bacteria** is uniquely constructed from peptidoglycan (also called murein), a complex polymer of sugars and amino acids that forms a massive, mesh-like sacculus around the cell.

Distractor**DISTRACTOR AND ERROR AUTOPSY**

Plants and most algae use cellulose. Fungi use chitin.