



Indian School Al Wadi Al Kabir

Assessment 1 (2026-27)- MS

Sub: BIOLOGY

Class: XI

Max. Marks:70

Date: 24.09.2026

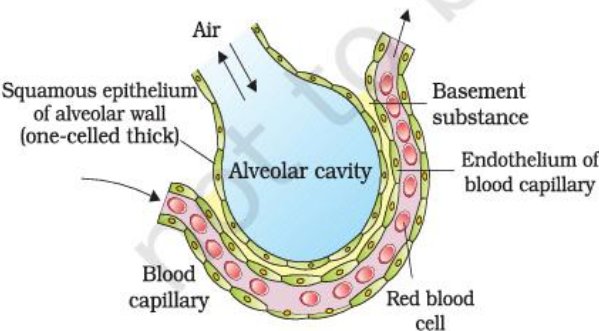
SET-1

Time: 3Hour

	SECTION											
Q. No.	Question	Marks										
1.	C. Structural support and movement	1										
2.	B. Accumulation of undigested cellular waste	1										
3.	C. Chitin	1										
4.	B. Growth, repair of tissues, and replacement of dead cells.	1										
5.	C. 4C and 2n	1										
6.	D. All the above	1										
7.	A. Tidal Volume (TV)	1										
8.	A. Thrombin	1										
9.	B. Uricotelic animals	1										
10.	C. The cytoplasm of striated muscle is called endoplasm.	1										
11.	A. Sino-atrial node (SAN)	1										
12.	A. More permeable to K ⁺ ions than to Na ⁺ ions	1										
13.	A. Both A and R are true, and R is the correct explanation	1										
14.	A. Both A and R are true, and R is the correct explanation	1										
15.	A. Both A and R are true, and R is the correct explanation	1										
16.	A. Both A and R are true, and R is the correct explanation	1										
SECTION B												
17.	i. Rough endoplasmic reticulum bears ribosomes on its cytoplasmic surface because these ribosomes are involved in the synthesis of proteins, particularly proteins destined for secretion, membranes and certain organelles. ii. The Golgi apparatus receives proteins and lipids produced by the ER through transport vesicles. It modifies, sorts and packages these materials for their final destinations. Therefore, the close association facilitates efficient transfer and processing of cellular products. OR <table><thead><tr><th>Primary cell wall</th><th>Secondary cell wall</th></tr></thead><tbody><tr><td>Formed first</td><td>Formed after cell growth has stopped</td></tr><tr><td>Usually thinner</td><td>Usually thicker</td></tr><tr><td>Capable of growth/expansion</td><td>Generally rigid and does not permit further expansion</td></tr><tr><td>Cellulose, hemicellulose and pectin are present.</td><td>Often contains more cellulose and may contain lignin.</td></tr></tbody></table>	Primary cell wall	Secondary cell wall	Formed first	Formed after cell growth has stopped	Usually thinner	Usually thicker	Capable of growth/expansion	Generally rigid and does not permit further expansion	Cellulose, hemicellulose and pectin are present.	Often contains more cellulose and may contain lignin.	1+1 1+1
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18.	The G ₀ phase is a quiescent stage in which cells leave the active cell cycle and do not proliferate, although they may remain metabolically active.	1+1										

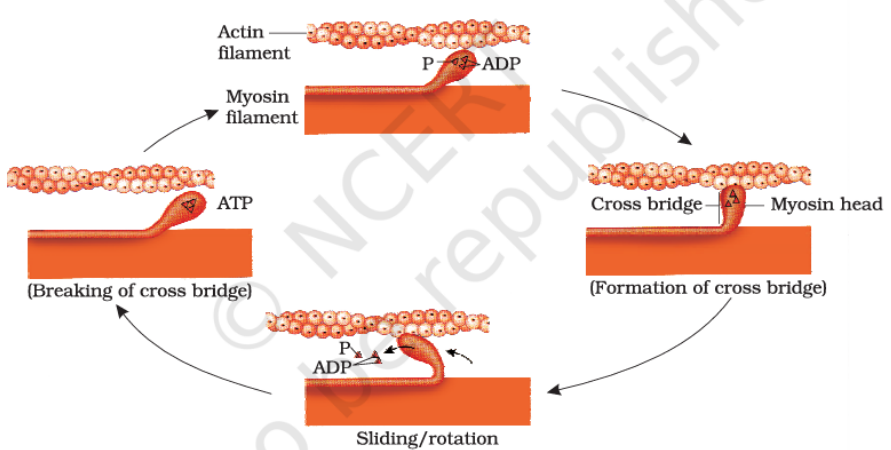
	It is important because cells can perform their specialised functions without undergoing continuous division. Example: Neurons remain in the G ₀ phase.													
19.	A. Amino acids exist as zwitterions in aqueous solution, in which the amino group carries a positive charge and the carboxyl group carries a negative charge. B. Representation $\begin{array}{c} \text{R} \\ \\ \text{H}_3\text{N}^+ - \text{CH} - \text{COOH} \\ \text{(A)} \end{array} \rightleftharpoons \begin{array}{c} \text{R} \\ \\ \text{H}_3\text{N}^+ - \text{CH} - \text{COO}^- \\ \text{(B)} \end{array} \rightleftharpoons \begin{array}{c} \text{R} \\ \\ \text{H}_2\text{N} - \text{CH} - \text{COO}^- \\ \text{(C)} \end{array}$ B is called zwitterionic form. The molecule as a whole is electrically neutral.	1+1												
20.	<table><tr><td> A. <table><tr><td> Primary metabolites Directly involved in normal growth and development Produced during normal growth Examples: amino acids, sugars, organic acids </td><td> Secondary metabolites Generally, not directly involved in basic growth Often produced in particular developmental/environmental conditions. Examples: alkaloids, pigments, essential oils, antibiotics </td></tr></table> OR B. Enzyme-substrate complex An enzyme has an active site to which the substrate binds due to complementary shape and chemical interactions. E + S ⇌ ES → EP The substrate binds to the active site, forming an enzyme-substrate (ES) complex. The complex is transient because the substrate is converted into product and the product is subsequently released, leaving the enzyme available for another reaction. </td><td>1+1</td></tr><tr><td>21.</td><td><table><tr><td> A. <table><tr><td> Afferent neurons Carry nerve impulses from receptors/sense organs to the CNS. Also called sensory neurons. Example: Carrying pain sensation from the skin to the spinal cord. </td><td> Efferent neurons Carry nerve impulses from the CNS to muscles glands. Also called motor neurons. Example: Carrying signals from the spinal cord to a muscle to produce movement. </td></tr></table> B. 1. Cerebrum: </td><td>1+1</td></tr><tr><td></td><td></td><td>1/2x4</td></tr></table></td></tr></table>	A. <table><tr><td> Primary metabolites Directly involved in normal growth and development Produced during normal growth Examples: amino acids, sugars, organic acids </td><td> Secondary metabolites Generally, not directly involved in basic growth Often produced in particular developmental/environmental conditions. Examples: alkaloids, pigments, essential oils, antibiotics </td></tr></table> OR B. Enzyme-substrate complex An enzyme has an active site to which the substrate binds due to complementary shape and chemical interactions. E + S ⇌ ES → EP The substrate binds to the active site, forming an enzyme-substrate (ES) complex. The complex is transient because the substrate is converted into product and the product is subsequently released, leaving the enzyme available for another reaction.	Primary metabolites Directly involved in normal growth and development Produced during normal growth Examples: amino acids, sugars, organic acids	Secondary metabolites Generally, not directly involved in basic growth Often produced in particular developmental/environmental conditions. Examples: alkaloids, pigments, essential oils, antibiotics	1+1	21.	<table><tr><td> A. <table><tr><td> Afferent neurons Carry nerve impulses from receptors/sense organs to the CNS. Also called sensory neurons. Example: Carrying pain sensation from the skin to the spinal cord. </td><td> Efferent neurons Carry nerve impulses from the CNS to muscles glands. Also called motor neurons. Example: Carrying signals from the spinal cord to a muscle to produce movement. </td></tr></table> B. 1. Cerebrum: </td><td>1+1</td></tr><tr><td></td><td></td><td>1/2x4</td></tr></table>	A. <table><tr><td> Afferent neurons Carry nerve impulses from receptors/sense organs to the CNS. Also called sensory neurons. Example: Carrying pain sensation from the skin to the spinal cord. </td><td> Efferent neurons Carry nerve impulses from the CNS to muscles glands. Also called motor neurons. Example: Carrying signals from the spinal cord to a muscle to produce movement. </td></tr></table> B. 1. Cerebrum:	Afferent neurons Carry nerve impulses from receptors/sense organs to the CNS. Also called sensory neurons. Example: Carrying pain sensation from the skin to the spinal cord.	Efferent neurons Carry nerve impulses from the CNS to muscles glands. Also called motor neurons. Example: Carrying signals from the spinal cord to a muscle to produce movement.	1+1			1/2x4
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	- Controls voluntary activities such as thinking, memory, intelligence and reasoning. - Receives and interprets sensory information. 2. Cerebellum: - Maintains body balance and posture. - Coordinates muscular movements. 3. Medulla oblongata: - Controls involuntary activities such as breathing, heartbeat, swallowing and blood pressure. ii) Tract connecting the two cerebral hemispheres The tract of nerve fibres connecting the two cerebral hemispheres is the Corpus callosum.	
SECTION C		
22.	Mitochondria are called the powerhouse of the cell because they are the major site of aerobic respiration and produce ATP, the energy currency of the cell.	2+1
23.	A. Enzymes act as biological catalysts. They increase the rate of biochemical reactions by lowering the activation energy without being consumed. B. 1. Temperature - Activity increases with temperature up to an optimum. - Beyond the optimum temperature, the enzyme may denature and activity decreases. 2. pH - Every enzyme has an optimum pH. - Activity decreases when pH moves significantly away from the optimum.	1+1+1
24.	A. i. Synapsis → Zygotene ii. Terminalisation of chiasmata → Diakinesis B. The enzyme involved in crossing over is generally referred to as recombinase. C. Significance of crossing over Crossing over: - Produces genetic recombination. - Creates new combinations of genes. - Increases genetic variation among offspring. - Contributes to evolution.	1+1+1

25.	A.  B. Three layers of diffusion surface The respiratory membrane consists essentially of: 1. Thin squamous alveolar epithelium 2. Basement membrane 3. Capillary endothelium These form the thin diffusion barrier between alveolar air and blood.	2+1
26.	A. Electrocardiogram (ECG) is the graphical representation of the electrical activity of the heart during a cardiac cycle.  B. The P-wave represents the electrical excitation (or depolarisation) of the atria, which leads to the contraction of both the atria. The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole. The T-wave represents the return of the ventricles from excited to a normal state (repolarisation). The end of the T-wave marks the end of systole.	1+2
27.	A. The juxtaglomerular apparatus (JGA) is a specialised structure formed by cellular modifications in the region where the distal convoluted tubule comes in contact with the afferent arteriole of the same nephron. B. Renin It is secreted by juxtaglomerular cells. C. JGA plays an important role in regulating: • Blood pressure	1+1+1

	• Glomerular filtration rate • Renin–angiotensin–aldosterone system Renin ultimately contributes to restoration of blood pressure and volume when they fall.	
28.	A. Patient A: Gout It is caused by accumulation/deposition of uric acid crystals in joints, resulting in inflammation. Patient B: Osteoporosis It involves reduced bone mass and increased susceptibility to fractures and is associated with reduced estrogen levels, particularly after menopause. B. i. Girdle: Pelvic girdle The thigh bone (femur) articulates with the pelvic girdle, ii. Joint: Ball-and-socket joint The hip joint is a ball-and-socket joint.	2+1
SECTION D		
29.	A. The oxygen-haemoglobin dissociation curve is sigmoid (S-shaped). This shape is due to the cooperative binding of oxygen to haemoglobin. Binding of one O₂ molecule increases the affinity of haemoglobin for subsequent O₂ molecules. B. In alveoli: 1. High pO₂ 2. Low pCO₂ 3. Low H⁺ concentration / higher pH 4. Lower temperature These conditions favour formation of oxyhaemoglobin. C. Two methods of CO₂ transport: CO₂ is transported from tissues to lungs mainly as: 1. Bicarbonate ions (HCO₃⁻) — major form. 2. Carbaminohaemoglobin. 3. A smaller amount is transported dissolved in plasma. Any two OR D. Asthma: Often associated with exposure to allergens/irritants that cause inflammation and narrowing of airways. Emphysema: Commonly caused by cigarette smoking, resulting in damage to alveolar walls and reduced respiratory surface.	1 1/2x4 1/2x2
30.	A. The Rh factor is an antigen present on the surface of RBCs. Individuals possessing the Rh antigen are Rh-positive, while those lacking it are Rh-negative. It was first discovered in Rhesus monkeys. B. Blood grouping and cross-matching are essential before transfusion to ensure compatibility between donor and recipient blood. An incompatible transfusion can cause an antigen-antibody reaction, resulting in agglutination and destruction of RBCs, which can be dangerous or fatal. C. ABO system: Individuals generally have naturally occurring antibodies against the ABO antigen(s) they lack.	1 2 1/2x2

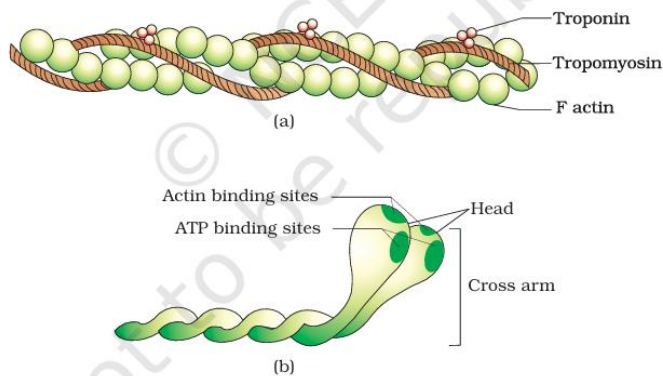
	Rh system: Rh-negative individuals do not normally have anti-Rh antibodies naturally. They develop them after exposure to Rh-positive blood. OR D. It can occur when an Rh-negative mother carries an Rh-positive foetus. Administration of anti-Rh antibodies (anti-Rh immunoglobulin) to the Rh-negative mother prevents sensitisation.	
	SECTION E	
31.	A. i. The counter-current mechanism involving the loop of Henle and vasa recta establishes and maintains a high osmolarity in the renal medulla. In the loop of Henle: • Descending limb is permeable to water but relatively impermeable to electrolytes. • Ascending limb is impermeable to water and transports electrolytes into the medullary interstitium. • This creates an osmotic gradient from cortex towards the inner medulla. The vasa recta acts as a counter-current exchanger and helps maintain this gradient by preventing rapid removal of solutes from the medulla. The gradient is essential for producing concentrated urine. ii. The mechanism of blood-volume regulation involving the kidney generally includes: Decrease in blood volume/pressure → JGA → Renin → Angiotensin II → Aldosterone → increased Na⁺ and water reabsorption → increased blood volume and pressure. ADH also promotes water reabsorption. B. i. Three major steps 1. Glomerular filtration Blood is filtered through the glomerulus into Bowman's capsule. Water and small dissolved substances such as: • glucose • amino acids • salts • urea are filtered, while blood cells and most proteins remain in the blood. 2. Selective reabsorption Useful substances are selectively reabsorbed from the filtrate into the blood. Examples: • Glucose • Amino acids • Major quantities of water • Na⁺ and other ions 3. Tubular secretion Additional wastes and ions are actively secreted from blood into the renal tubule. Examples include: • H⁺ • K⁺ • NH₃ • certain drugs This helps maintain ionic and acid-base balance.	3+2

	ii. Kidney failure A patient with kidney failure may be kept alive by dialysis (haemodialysis) until transplantation. During haemodialysis, blood is passed through a dialyser containing a semipermeable membrane. Waste products such as urea and excess salts diffuse into the dialysis fluid, while useful components are retained in the blood.	
32.	A. According to the sliding filament theory, muscle contraction occurs because thin actin filaments slide over thick myosin filaments, causing shortening of the sarcomere. Sequence: 1. Neural signal reaches neuromuscular junction An action potential reaches the motor nerve ending. 2. Acetylcholine release Acetylcholine is released into the synaptic cleft. 3. Muscle action potential It produces an action potential in the sarcolemma, which travels through the T-tubules. 4. Calcium release The sarcoplasmic reticulum releases Ca^{2+} into the sarcoplasm. 5. Exposure of active sites Ca^{2+} binds to troponin, causing tropomyosin to move away from the active sites on actin. 6. Cross-bridge formation Myosin heads bind to exposed active sites on actin. 7. Power stroke Myosin heads pull actin towards the centre of the sarcomere. 8. ATP binding A new ATP molecule binds to myosin, causing detachment of the myosin head from actin. 9. ATP hydrolysis ATP is hydrolysed, providing energy for re-cocking of the myosin head. The cycle repeats as long as Ca^{2+} and ATP are available.	3+2
	 B. i. The main contractile proteins are: • Actin — thin filament • Myosin — thick filament Actin filament It consists of two helical chains of F-actin, each made of globular G-actin monomers. Associated proteins:	3+1+1

- Tropomyosin
- Troponin

Myosin

Each myosin (thick) filament is also a polymerised protein. Many monomeric proteins called Meromyosins constitute one thick filament. Each meromyosin has two important parts: a globular head with a short arm and a tail, the former being called the heavy meromyosin (HMM) and the latter, the light meromyosin (LMM). The HMM component, i.e.; the head and short arm projects outwards at regular distance and angle from each other from the surface of a polymerised myosin filament and is known as the cross arm. The globular head is an active ATPase enzyme and has binding sites for ATP and active sites for actin.



ii. Calcium:

Ca^{2+} binds to troponin, causing tropomyosin to move away from the active sites on actin. This permits myosin-actin interaction.

ATP:

ATP is required for:

- Detachment of myosin from actin.
- Re-cocking of the myosin head.
- Continued cross-bridge cycling.

Without ATP, cross-bridges cannot properly detach.

iii.

Location Attached to bones Found only in the heart

Control Voluntary (under conscious control) Involuntary (works automatically)

Appearance Striated (striped) Striated (striped)

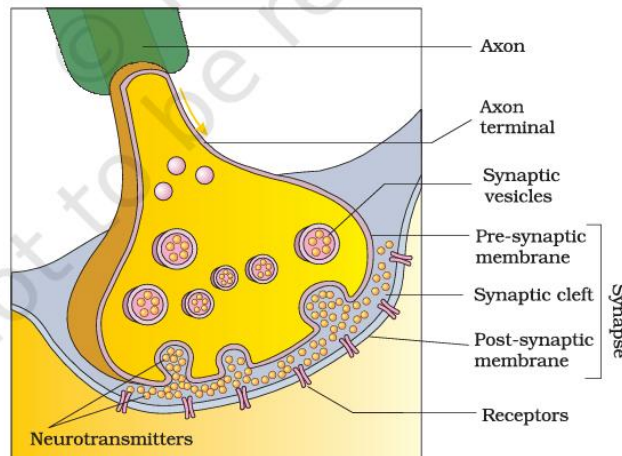
Cell Shape Long, cylindrical, unbranched fibres Short, branched fibers

Nuclei Many nuclei per cell, located at the periphery Usually one (sometimes two) central nucleus

Any one point

33.	A. i. At a chemical synapse, the membranes of the pre- and post-synaptic neurons are separated by a fluid-filled space called the synaptic cleft. Chemicals called neurotransmitters are involved in the transmission of impulses at these synapses. The axon terminals contain vesicles filled with these neurotransmitters. When an impulse (action potential) arrives at the axon terminal, it stimulates the movement of the synaptic vesicles towards the membrane, where they fuse with the plasma membrane and release their neurotransmitters into the synaptic cleft. The released neurotransmitters bind to their specific receptors,	2+2+1
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present on the post-synaptic membrane. This binding opens ion channels, allowing the entry of ions which can generate a new potential in the post-synaptic neuron.



ii. Impulse transmission across a chemical synapse is unidirectional because:

- Neurotransmitter is released only from the presynaptic terminal.
- Receptors for the neurotransmitter are present on the postsynaptic membrane.

Therefore, transmission occurs only from the presynaptic neuron → postsynaptic neuron.

B.

i. At rest, the axonal membrane is **polarised**, with the inside relatively negative.

When a stimulus reaches threshold:

Depolarisation

Voltage-gated Na^+ channels open → Na^+ rapidly enters the axon → membrane becomes less negative and eventually positive.

Repolarisation

Na^+ channels become inactive, and K^+ channels open → K^+ moves out → membrane potential becomes negative again.

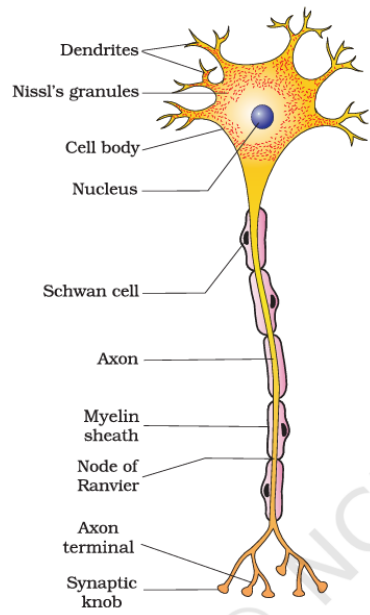
Restoration

The Na^+/K^+ pump helps restore ionic gradients.

Thus, an action potential is generated and propagated along the axon.

ii. Multipolar neurons have **one axon and many dendrites** and are common in the central nervous system.

2+1+2



All the Best