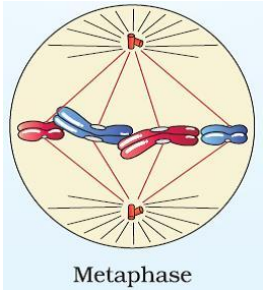




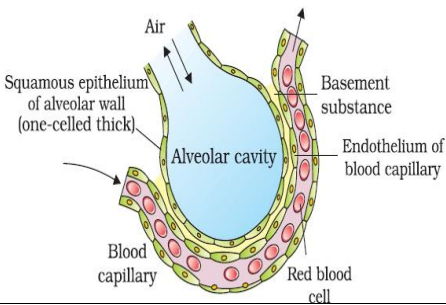
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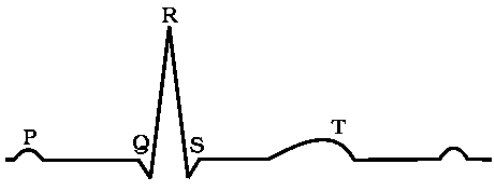
ASSESSMENT-1 (2025 - 26) MARKING SCHEME CLASS 11- BIOLOGY

Section A		
Q. No	Question	Marks
1.	C. Osmosis and diffusion are examples of active transport.	1
2.	B. These are composed of ribonucleic acid and proteins.	1
3.	A. Collagen	1
4.	C. C-Synthesis phase	1
5.	C. 32	1
6.	A. Total volume of air in the lungs after forceful inspiration.	1
7.	B. The alveolar walls are damaged.	1
8.	A) Damaged tissue releases factors → Thrombokinase complex is formed → Inactive prothrombin is converted to active thrombin → Inactive fibrinogen is converted to insoluble fibrin.	1
9.	D. Glycosuria and ketonuria	1
10.	C. Somatic nerves	1
11.	B. Osteoporosis, decreased levels of oestrogen	1
12.	D. Dura mater, arachnoid, pia mater	1
13.	B. Both A and R are true and R is not the correct explanation of A.	1
14.	A. Both A and R are true and R is the correct explanation of A.	1
15.	C. A is true but R is false.	1
16.	C. A is true but R is false.	1
Section-B		
17.	<u>Attempt either option A or B</u> A. The Golgi apparatus and ER are closely associated because they function together in the cell's endomembrane system. The ER synthesizes proteins and lipids, which are then transferred via transport vesicles to the Golgi's <i>cis</i> face.	1+1

	The Golgi further modifies, sorts, and packages these materials for delivery to their final cellular destinations. This continuous flow is essential for efficient cellular function. OR B. (i) The arrangement of microtubules in cilia and flagella is known as the "9 + 2" organization, consisting of 9 microtubule doublets arranged radially around the periphery and 2 single microtubules in the center. (ii) Plasmids are small, circular, double-stranded DNA molecules that are separate from the chromosomal DNA and can replicate independently within a bacterial cell. Significance of plasmids: Carry genes that provide bacteria with genetic advantages, such as antibiotic resistance.	1 + ½ + ½
18.	<u>Attempt either option A or B</u> A.  Metaphase B. iThe number of chromosomes in the mitosis cell division remains constant in daughter cells. ii. Asexual reproduction occurs with the help of mitosis. iii. The size of a cell is controlled by the process of mitosis. iv. The growth and development of the zygote are maintained by the process of mitosis.	1 (any two) 1
19.	A. The secondary structure of proteins refers to the regular folding of the polypeptide chain into structures like alpha-helices and beta-pleated sheets. If the long protein chain is folded into a hollow woollen ball it will form tertiary structure. B. Enzymes have an optimum temperature at which they exhibit maximum activity. This is usually around the normal body temperature for many enzymes (approximately 37°C in humans). -Both below and above the optimum temperature enzyme activity decreases. - Each enzyme has a specific pH range where it functions best, known as the optimum pH. Outside of this range, enzyme activity decreases.	1+1

20.	A. $\begin{array}{ccccc} \text{R} & & \text{R} & & \text{R} \\ & & & & \\ \text{H}_3\text{N}^+-\text{CH}-\text{COOH} & \rightleftharpoons & \text{H}_3\text{N}^+-\text{CH}-\text{COO}^- & \rightleftharpoons & \text{H}_2\text{N}-\text{CH}-\text{COO}^- \\ \text{(A)} & & \text{(B)} & & \text{(C)} \end{array}$ B is called zwitterionic form. OR B. Oxidoreductases: These enzymes catalyze oxidation-reduction reactions, which involve the transfer of hydrogen or electrons between two substrates. Isomerases: These enzymes catalyze the interconversion of optical, geometric, or positional isomers. They rearrange the atoms within a molecule to form a different isomer.	2 1+1
21.	<u>Attempt either option A or B</u> A. The pectoral girdle has two bones called the clavicle and scapula which is articulated by a cavity called glenoid cavity with the head of the humerus by forming a ball and socket joint. The pelvic girdle has three bones Ilium, Ischium, and Pubis which is articulated by a cavity called the acetabulum with the femur by forming a ball and socket joint. OR B. Fibrous joints are types of joints where the bones are connected by dense connective tissue. These joints are immovable, meaning they do not allow any movement between the bones. An example of a fibrous joint is the sutures in the skull, where the bones are tightly bound together. Cartilaginous joints are joints where the bones are connected by cartilage. These joints allow for slight movement, making them semi-movable. An example of a cartilaginous joint is the intervertebral discs found between the vertebrae in the spine, which allow for limited movement and flexibility.	1+1 1+1
Section-C		
22.	1. Chloroplasts- Contain <u>chlorophyll</u>. Function: The principal sites of <u>photosynthesis</u>. 2. Chromoplasts- Contain fat-soluble carotenoid pigments, such as carotene (orange) and <u>xanthophylls</u> (yellow). Function: Impart various colors, including yellow, orange, and red, to plant parts like flowers and fruits. 3. Leucoplasts- Colourless, meaning they do not contain any pigments. Function: Primarily responsible for storing food in plants. They are further specialized into types based on the stored nutrient: <u>Amyloplasts</u>: Store starch. <u>Elaioplasts</u>: Store oils and fats. <u>Aleuroplasts</u>: Store proteins.	1+1+1
23.	(i) Zygotene: Homologous chromosomes begin to pair through a process called synapsis. Pairing forms a structure called a bivalent or tetrad.	3

	A protein structure called the synaptonemal complex forms between homologous chromosomes. (ii) Pachytene: Chromosomes become thicker and shorter. Crossing over occurs between non-sister chromatids of homologous chromosomes. This leads to genetic recombination, increasing genetic variation. (iii) Diplotene: Synaptonemal complex dissolves; homologous chromosomes start to separate. However, they remain attached at chiasmata (points where crossing over occurred).	
24.	A. Starch has a helical structure. This means that the glucose units in starch are arranged in a spiral formation. When iodine molecules come into contact with starch, they fit into these helical structures and gives blue black colour. Cellulose does not give a blue-black color with iodine is that it lacks the helical structure that allows iodine to bind effectively. B. Competitive inhibition is when an inhibitor, structurally similar to the normal substrate, binds to the active site of an enzyme, thereby blocking the substrate from binding. The effect is reversible and can be overcome by increasing the substrate concentration, which outcompetes the inhibitor. Example Inhibition of succinic dehydrogenase by malonate which closely resembles the substrate succinate in structure. Such competitive inhibitors are often used in the control of bacterial pathogens.	1+2
25.	The three main layers of the diffusion membrane are the thin squamous epithelium of the alveoli, the basement substance, and the endothelium of the alveolar capillaries. The total thickness of these layers is much less than a millimeter. A thinner membrane leads to a faster rate of diffusion because the gases have a shorter distance to travel. A thicker membrane, however, increases the diffusion distance, thereby slowing down the rate of diffusion.  The diagram illustrates the structure of the alveolar diffusion membrane. It shows a cross-section of an alveolus (a sac-like air space) and an adjacent blood capillary. The alveolar cavity is filled with air, indicated by a double-headed arrow. The alveolar wall is composed of a thin layer of squamous epithelium (one-celled thick). The basement substance is a thin layer separating the alveolar wall from the endothelium of the blood capillary. The blood capillary contains red blood cells. Labels include: Air, Squamous epithelium of alveolar wall (one-celled thick), Alveolar cavity, Basement substance, Endothelium of blood capillary, Blood capillary, and Red blood cell.	3
26.	A. P wave: Represents the electrical excitation (depolarization) of the atria, causing them to contract. QRS complex: Represents the depolarization of the ventricles, triggering ventricular contraction.	2+1

	T wave: Represents the repolarization (relaxation) of the ventricles, as they return to their resting state.  B. The heart rate is determined from an ECG by counting the number of QRS complexes that occur in a given time period.	
27.	Mammals produce concentrated urine. -The Henle's loop and vasa recta play a significant role in this. - Counter current - Flow of filtrate in the two limbs of Henle's loop is in opposite directions and thus forms a counter current. The flow of blood through the two limbs of vasa recta is also in a counter current pattern. -The proximity between the Henle's loop and vasa recta, as well as the counter current in them help in maintaining an increasing osmolarity towards the inner medullary interstitial. This gradient is mainly caused by NaCl and urea. Counter current mechanism -NaCl is transported by the ascending limb of Henle's loop which is exchanged with the descending limb of vasa recta. -NaCl is returned to the interstitium by the ascending portion of vasa recta. Similarly, small amounts of urea enter the thin segment of the ascending limb of Henle's loop which is transported back to the interstitium by the collecting tubule. -This transport of substances facilitated by the special arrangement of Henle's loop and vasa recta is called the counter current mechanism.	3
28.	A sarcomere is the functional unit of muscle contraction, found in myofibrils. Its striated appearance is due to the arrangement of two key proteins: actin (thin) and myosin (thick). Structure of a sarcomere -Z-line: The boundary of a sarcomere. It is an elastic fiber that bisects the light-colored I-band. The thin actin filaments are firmly attached to the Z-line. -I-band (Isotropic band): The light-colored band that contains only the thin actin filaments. A Z-line runs through its center. -A-band (Anisotropic band): The dark-colored band that contains the thick myosin filaments. The A-band also partially overlaps with the thin actin filaments. -H-zone: A central, lighter zone within the A-band that, in a resting state, contains only the thick myosin filaments and is not overlapped by the thin filaments. -M-line: A thin fibrous membrane that holds the thick myosin filaments together in the middle of the H-zone.	3
Section-D		

29.	A. Medulla region of the brain, is responsible for the basic rhythm of breathing. (1) B. The pneumotaxic centre can moderate the functions of the respiratory rhythm centre by sending neural signals that reduce the duration of inspiration, thereby altering the respiratory rate. (2) <u>Attempt either subpart C or D.</u> C. The chemosensitive area is sensitive to CO_2 and H^+ ions. Increased levels of these activate the center, signaling the rhythm center to adjust respiration to remove them. (1) OR D. Receptors in the aortic arch and carotid artery can recognize changes in the CO_2 and H^+ concentration in the blood and send signals to the respiratory rhythm centre for remedial actions. (1)	
30.	A. Osmoreceptors in the body get activated by changes in the blood volume, body fluid volume and ionic concentration. (1) B. When blood pressure or volume drops, the kidneys release renin, which triggers the formation of angiotensin II. Angiotensin II then causes vasoconstriction and stimulates the adrenal gland to release aldosterone, which promotes sodium and water reabsorption in the kidneys. This dual action of vasoconstriction and fluid retention increases blood volume and pressure back to a normal range. (2) <u>Attempt either subpart C or D.</u> C. An increase in blood flow to the atria can cause the release of Atrial Natriuretic Factor (ANF). It is released from the walls of the atria of the heart. (1) OR D. Atrial Natriuretic Factor (ANF) decreases blood pressure by causing vasodilation (widening of blood vessels) and increasing the excretion of sodium and water by the kidneys, which lowers blood volume. (1)	
Section-E		
31.	<u>Attempt either option A or B.</u> A. (i) First Pregnancy - During the first pregnancy, the Rh-negative mother is carrying an Rh-positive baby. The placental barrier typically prevents the mother's blood from mixing with the baby's Rh-positive blood. - However, at the time of delivery, there is a chance of exposure to the baby's Rh-positive blood. This exposure sensitises the mother's immune system, which begins producing specific Rh antibodies against the foreign Rh antigens. Subsequent Pregnancy (Risk of erythroblastosis foetalis)	3+2

	• In a later pregnancy with another Rh-positive fetus, the Rh antibodies from the sensitised mother's blood can cross the placenta into the fetus's circulation. • These antibodies destroy the foetus's red blood cells, causing severe anemia, jaundice, and other complications. This condition is called erythroblastosis foetalis. • This is why the Rh factor is of great significance in pregnancies involving an Rh-negative mother and an Rh-positive man (ii) ABO blood group system, the classification of human blood based on the inherited properties of red blood cells (erythrocytes) as determined by the presence or absence of the antigens A and B, which are carried on the surface of the red cells. People may thus have type A, type B, type O, or type AB blood. OR B. (i) Ventricular Systole • Ventricles contract, causing pressure to increase. • AV valves close (first heart sound, 'lub'). • Semilunar valves open as ventricular pressure exceeds arterial pressure. • Blood is pumped into the pulmonary artery and aorta. Ventricular Diastole • Ventricles relax, and pressure drops. • Semilunar valves close (second heart sound, 'dub') due to backflow from arteries. • AV valves open when ventricular pressure falls below atrial pressure. • Blood flows from the atria into the ventricles, filling them (ii) Cardiac output is the volume of blood pumped out by each ventricle per minute. This volume is the product of stroke volume (volume of blood pumped per heartbeat) and heart rate (number of heartbeats per minute). (iii) We call our heart myogenic because the cardiac impulse that initiates and maintains the heartbeat originates from a specialised patch of muscle tissue within the heart itself (the SA node), making it self-regulated.	2+2+1
32.	<u>Attempt either option A or B.</u> A. (i) A neural signal causes calcium ions Ca^{2+} to be released from the sarcoplasmic reticulum, which then bind to troponin on the actin filaments and expose the active myosin-binding sites. Energized myosin heads bind to the exposed active sites on actin, forming cross-bridges. The myosin heads then pull the actin filaments towards the centre of the sarcomere, powered by ATP hydrolysis, causing muscle contraction. The cycle of cross-bridge formation and breakage continues until Ca^{2+} are pumped back into the sarcoplasmic cisternae, unmasking the actin filaments and causing the muscle to relax.	3+2

	OR B. (i) A motor unit is a single motor neuron along with all the muscle fibers it innervates. The junction between a motor neuron and the sarcolemma of the muscle fiber is called the neuromuscular junction or motor-end plate. When the motor neuron sends a signal, all the muscle fibers in that unit contract simultaneously. (ii) Key components of the actin filament are: • F-actin: Each F-actin is a polymer of globular ('G') actin monomers. • Tropomyosin: Two filaments of this protein run along the length of the F-actin strands. • Troponin: This is a complex protein that is distributed at regular intervals on the tropomyosin. In the resting state, a subunit of troponin masks the active binding sites for the myosin head on the actin filaments. (iii) Red Muscle Fibres: Contain a high amount of myoglobin, giving them a reddish appearance. This myoglobin allows for significant oxygen storage, enabling aerobic respiration and making these fibres suitable for prolonged, sustained activities without fatigue. White Muscle Fibres: Have very little myoglobin, which makes them appear pale or whitish. They rely on anaerobic processes for energy, which allows for quick, short-duration activities but causes them to fatigue more quickly.	1+2+2
33.	<u>Attempt either option A or B.</u> A (i) Polarization (Resting State): In a resting neuron, the membrane is more permeable to potassium ions than sodium ions. The sodium-potassium pump actively transports three Na^+ out for every two K^+ in, maintaining a negative charge inside and a positive charge outside. Depolarization (Action Potential): A stimulus causes sodium channels to open, leading to a rapid influx of Na^+. This reverses the membrane's polarity, with the inside becoming positive and the outside negative, generating an action potential. Repolarization: The sodium channels quickly close while potassium channels open, allowing	3+2

K^+ to flow out of the cell. This restores the original charge polarity, and the sodium-potassium pump then works to reestablish the initial ionic concentrations. This wave of depolarization moving down the axon constitutes the nerve impulse.

(ii)

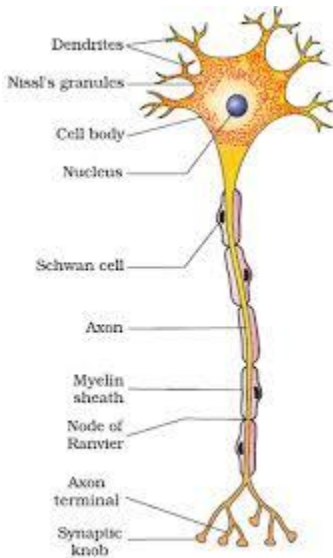


Figure 21.1 Structure of a neuron

OR

B.

Neurotransmitters are chemical messengers stored in small membrane-bound sacs called synaptic vesicles, which are found in the synaptic knob at the end of the axon terminal.

Release of neurotransmitters

1. Arrival of Nerve Impulse: When a nerve impulse (action potential) reaches the axon terminal, it stimulates the synaptic vesicles to move towards the presynaptic membrane and fuse with the presynaptic plasma membrane.
2. Release of neurotransmitters: The fusion process releases the neurotransmitters into the synaptic cleft, the fluid-filled space between the presynaptic and postsynaptic neurons. The released neurotransmitters then diffuse across the synaptic cleft and bind to specific receptors located on the postsynaptic membrane, thus transmitting the impulse to the next neuron.

The new potential developed may be either excitatory or inhibitory.

3+2

