

<b>SET</b>	<b>A</b>
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**INDIAN SCHOOL MUSCAT  
HALF YEARLY EXAMINATION 2023  
BIOLOGY (044)**

CLASS: XI

Max.Marks: 70

MARKING SCHEME			
SET	QN.NO	VALUE POINTS	MARKS SPLIT UP
A	1	C) TCT	1
	2	B) Osteoporosis	1
	3	C) Acetylcholine	1
	4	D) A III B I C II D IV	1
	5	C) A III B I C II D IV	1
	6	D) Thyroxine	1
	7	C) Intrapulmonary pressure is lower than the atmospheric pressure during inspiration	1
	8	A) Endothelium – Basement membrane -Epithelium of Bowman's capsule	1
	9	B) Collecting duct	1
	10	C) The gap between two adjacent myelin sheath	1
	11	D) Emphysema	1
	12	a) Somatic neural system	1
	13	Answer: (c)	1
	14	Answer – (b)	1
	15	Answer: (c)	1
	16	Answer (a)	1
	17	A- ADH B- Thymus Gland	½ X4

		C- Oestrogen D- Pineal Gland	
	18	By Interatrial septum and Interventricular septum	1+1
	19	Ureotelism -process of elimination of urea, water moderately required for elimination./bony fishes  Uricotelism – process of elimination of uric acid, much less water required for elimination/reptiles, birds	1+1
	20	Synovial fluid. Ball and socket joint, hinge joint, pivot joint and gliding joint.(any three)	1x3
	21	The process of formation of RBC is known as erythropoiesis. The peptide hormone erythropoietin produced from the juxtaglomerular cells of the kidney triggers the erythropoiesis.  <b>OR</b>  Hypothalamic hormones are of two types:  a) Releasing hormones- they stimulate the secretion of pituitary hormone. GnRH  b) Inhibiting hormones- they inhibit the secretion of pituitary hormones. Somatostatin.	1+1+1
	22	Carbon dioxide is carried by the blood in three forms (i) In Dissolved State Under normal temperature and pressure, about 7% of CO <sub>2</sub> is carried by physical solution. (ii) As Carbamino Compounds CO <sub>2</sub> binds directly with Hb to form an unstable compound carbamino compounds (CO Hb) 2 About 23% CO <sub>2</sub> is transported in this form. When pCO <sub>2</sub> is high and pO <sub>2</sub> is low as in the tissues, more binding of carbon-dioxide occurs whereas, when pCO <sub>2</sub> is low and pO <sub>2</sub> is high as in alveoli as tissue dissociation of CO <sub>2</sub> from carbamino-haemoglobin takes place. (iii) As Bicarbonate Ions-CO <sub>2</sub> reacts with water to form carbonic acid (H <sub>2</sub> CO <sub>3</sub> ) in the presence of carbonic anhydrase in RBC. H <sub>2</sub> CO <sub>3</sub> dissociates into hydrogen and bicarbonate ions. The bicarbonates on reaching the lungs dissociate to form CO <sub>2</sub> and H <sub>2</sub> O and CO <sub>2</sub> is released out.  <b>OR</b> (d) Pulmonary ventilation by which atmospheric air is drawn in and CO <sub>2</sub> rich alveolar air is released out. (a) Diffusion of gases (O <sub>2</sub> and CO <sub>2</sub> ) across alveolar membrane. (b) Transport of gases by blood. (c) Diffusion of O <sub>2</sub> and CO <sub>2</sub> between blood and tissues. (e) Utilization of O <sub>2</sub> by the cells for catabolic reactions and resultant release of CO <sub>2</sub> .	3
	23	(a) Plasma without clotting factors is called serum. (b) Lymphocytes and monocytes are agranulocytes.	1+ ½ x4

		(c) Albumins are associated with osmotic potential. (d) Calcium ions play a significant role in clotting. (e) One can determine the heart beat rate by counting the number of QRS complex in an ECG	
	24	(a) Fibrinogens are inactive components of blood plasma. Under the action of enzyme thrombin they form a clot or coagulum of a network of threads called fibrin in which dead and damaged elements of blood are trapped. (b) Globulins are primarily involved in immunity, i.e., defence mechanisms of the body. (c) Neutrophils are phagocytic cells which destroy foreign organisms entering the body.	1x3
	25	(a) ANF Atrial Natriuretic Factor (b) ADH Antidiuretic Hormone (c) GFR Glomerular Filtration Rate	1x3
	26	Correct diagram with labeling	1+2
	27	Hyposecretion of thyroid hormones during pregnancy causes defective development and maturation of the developing foetus and leads to a condition known as cretinism. Symptoms include:  a) Stunted growth b) Mental retardation c) Low intelligence quotient d) Abnormal skin e) Deaf mutism	3
	28	Unipolar- one axon-embryonic stage  Bipolar-one axon and one dendron-retina  Multipolar- one axon and many dendrons-cerebral cortex	1x3
	29	1. Ans: c) Cartilage  2. Ans. d) both a and b  3. Ans: a) C7, T12,L5,S1,C1  4. Ans: b) 80  5. Ans. b) sternum	½ x6
	30	1. Answer: (c)  2. Answer: (a)  3. Answer: (c)  4. Answer: (b)  5. Answer: (c)	½ x6

31	<p>A.2. a) Insulin hormone and Pancreas gland.</p> <p>b) It is secreted by the <math>\beta</math>-cells of islets of Langerhans present in the pancreas</p> <p>c) Prolonged hyperglycemia causes diabetes mellitus that is linked to loss of glucose via urine and accumulation of harmful compounds called as ketone bodies. Insulin therapy can be successfully used to treat Diabetic patients.</p> <p style="text-align: center;"><b>OR</b></p> <p>The Henle's loop and vasa recta play a significant role in concentrating urine.</p> <ul style="list-style-type: none"><li>· The flow of filtrate in the two limbs of Henle's loop is in opposite directions and thus forms a counter current.</li><li>· The flow of blood through the two limbs of vasa recta is also in a counter current pattern.</li><li>· 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 interstitium,</li><li>· Osmolarity gradient from 300 mOsmolL<sup>-1</sup> in the cortex to about 1200 mOsmolL<sup>-1</sup> in the inner medulla. This gradient is mainly caused by NaCl and urea.</li><li>· NaCl is transported by the ascending limb of Henle's loop which is exchanged with the descending limb of vasa recta.</li><li>· NaCl is returned to the interstitium by the ascending portion of vasa recta.</li><li>· 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.</li><li>· This counter current mechanism helps to maintain a concentration gradient in the medullary interstitium.</li><li>· Presence of such interstitial gradient helps in an easy passage of water from the collecting tubule thereby concentrating the filtrate (urine).</li></ul>	2+1+3						
32	<table><tr><td colspan="2">Differences between the mechanism of action of a peptide and a steroid hormone are as Follows</td></tr><tr><td><b>Peptide hormone</b></td><td><b>Steroid hormone</b></td></tr><tr><td>Peptide hormones interact with membrane bound receptors. They generate second messengers (e.g. cyclic AMP, IP3 ,Ca2 + etc.)  The second messengers regulate cellular metabolism.  e.g. oxytocin insulin, glucagon, vasopressin. etc.</td><td>They interact with intracellular receptors to form hormone receptor complex They regulate gene expression or chromosomes function by the interaction of hormone receptor complex with the genome Cumulative biochemical actions results in physiological and development effects.  e.g. cortisol, testosterone, estrogen and progesterone.</td></tr></table> <p style="text-align: center;"><b>OR</b></p>	Differences between the mechanism of action of a peptide and a steroid hormone are as Follows		<b>Peptide hormone</b>	<b>Steroid hormone</b>	Peptide hormones interact with membrane bound receptors. They generate second messengers (e.g. cyclic AMP, IP3 ,Ca2 + etc.)  The second messengers regulate cellular metabolism.  e.g. oxytocin insulin, glucagon, vasopressin. etc.	They interact with intracellular receptors to form hormone receptor complex They regulate gene expression or chromosomes function by the interaction of hormone receptor complex with the genome Cumulative biochemical actions results in physiological and development effects.  e.g. cortisol, testosterone, estrogen and progesterone.	5
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	33	<p>Sliding filament theory is applicable to smooth, cardiac and skeletal muscles. The essential features of this theory are as follows</p> <p>(i) During muscle contraction, thin myofilaments slide inward towards the H-zone.</p> <p>(ii) The sarcomere, the basic unit of muscle contraction, shortens, without changing the length of thin and thick myofilaments.</p> <p>(iii) The cross-bridge of the thick myofilaments connect with the portions of actin of the thin myofilaments. These cross-bridge move on the surface of the thin myofilaments, resulting in the sliding of thin and thick myofilaments over each other. The length of the thick and thin myofilaments do not change during muscle contraction.</p> <p>(v) A muscle fiber maintains a resting potential under resting conditions just like a nerve fiber. As soon as a nerve impulse reaches the terminal end of the axon, small sacs called synaptic vesicles fuse with the axon membrane and release a chemical transmitter, called acetylcholine. It diffuses across the synaptic cleft (the space between the axon membrane and the motor end plate) and binds to the receptor sites of the motor end plate.</p> <p>(vi) As soon as depolarization of the motor end plate reaches a certain level, it creates an action potential. After this, an enzyme cholinesterase present along with the receptor sites for acetylcholine breaks down acetylcholine into acetate and choline.</p> <p>A portion of the choline diffuses back to the axon and is reused to synthesize more acetylcholine for the transmission of subsequent impulses.</p> <p>(vii) Calcium plays a key regulatory role in muscle contraction. The <math>\text{Ca}^{2+}</math> ions bind to troponin causing a change in its shape and position. This in turn alters the shape and position of tropomyosin.</p> <p>This shift exposes the active sites on the F-actin molecules and myosin cross-bridges are then able to bind to these active sites.</p> <p>(viii) The head of each myosin molecule contains an enzyme myosin ATPase. In the presence of myosin ATPase, <math>\text{Ca}^{2+}</math> and <math>\text{Mg}^{2+}</math> ions, ATP breaks down into ADP and inorganic phosphate. Energy from ATP causes energized myosin cross-bridges to bind to actin. The energized cross-bridge move, causing the thin myofilaments to slide along the thick myofilaments. This movement is like the movement of the oars of a boat.</p> <p>(x) As stated earlier in theory, there is no shortening of thin and thick myofilaments.</p> <p>However, the sarcomere shortens, because of the sliding of the thin myofilaments produced by cross-bridge movements. The H-zone and I-band shorten, but the width of the A-band remains constant.</p> <p style="text-align: center;"><b>OR</b></p> <p>Transport and release of a neurotransmitter occurs within a synapse. At a chemical synapse, the membranes of the pre- and post-synaptic neurons are separated by a fluid-filled space called synaptic cleft. Chemicals called neurotransmitters are involved in the transmission of impulses at these synapses. The axon terminals contain vesicles filled with these</p>	5

		<p>neurotransmitters.</p> <p>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 in the synaptic cleft.</p> <p>The released neurotransmitters bind to their specific receptors, present on the post-synaptic membrane. This binding opens ion channels allowing the entry of ions which can generate a new action potential in the post-synaptic neuron.</p>	
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<b>SET</b>	<b>B</b>
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MARKING SCHEME			
SET	QN.NO	VALUE POINTS	MARKS SPLIT UP
A	1	C) TCT	1
	2	a) Carbaminohemoglobin	1
	3	C) A III B I C II D IV	1
	4	(a) proximal convoluted tubule	1
	5	d) Emphysema	1
	6	c) The gap between two adjacent myelin sheath	1
	7	D) A III B I C II D IV	1
	8	A) Endothelium – Basement membrane -Epithelium of Bowman's capsule	1
	9	d) thyroid	1
	10	c) postsynaptic membrane	1
	11	(d) both (b) and (c)	1
	12	a) Myosin	1
	13	Answer: c	1
	14	Answer – (a)	1
	15	Answer: (c)	1
	16	Answer (b)	1
	20	The amount of blood pumped by the ventricle during a cardiac cycle. 70ml.	1+1

	18	Excretory product is ammonia and uric acid respectively	1+1
	21	Fibrous joint. Immovable/no synovial fluid	1+1
	22	<ul style="list-style-type: none"> <li>a. Serum</li> <li>b. Lymphocytes</li> <li>c. Osmotic potential</li> <li>d. Calcium</li> <li>e. neutrophil</li> </ul>	
	23	<p>ECG has three waves.</p> <p>P wave- depolarization of atria</p> <p>QRS complex- depolarization of ventricles</p> <p>T wave – repolarization of ventricles</p>	1x3
	25	Correct diagram with 4 labelling.	1+2
	26	<p>Regulate the development, maturation and functions of male accessory sex organs like epididymis, vas deferens, seminal vesicles etc.</p> <p>Stimulate muscular growth, growth of facial and axillary hair.</p> <p>Aggressiveness</p> <p>Low pitch voice.</p> <p>Spermatogenesis.</p> <p>Libido</p> <p>Anabolic effects on protein and carbohydrate metabolism (any three)</p>	1x3



<b>SET</b>	<b>C</b>
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MARKING SCHEME			
SET	QN.NO	VALUE POINTS	MARKS SPLIT UP
C	1	b) collecting duct	1
	2	a) Somatic neural system	1
	3	C) Acetyl choline	1
	4	a) Endothelium – Basement membrane -Epithelium of Bowman's capsule	1
	5	(c) Intrapulmonary pressure is lower than the atmospheric pressure during inspiration.	1
	6	(d) A - 111, B - I, C - II, D – IV	1
	7	d) emphysema	1
	8	(c) III I II IV	1
	9	(a) Amoeboid	1
	10	a) outer layer of cerebrum, called grey matter	1
	11	b) Decreases calcium level in blood	1
	12	(c) Catecholamines	1
	13	Answer: c	1
	14	Answer – (b)	1
	15	Answer: (c)	1
	16	Answer (a)	1

	17	a-PRL b- MSH c- Ovary d- Pineal gland	$\frac{1}{2} \times 4$
	18	The stroke volume multiplied by 72. Approximately 5000ml	1+1
	19	a) Pivot b) Fibrous joint c) Cartilaginous joint d) Gliding joint/synovial joint	1+1
	20	Excretory product is urea and ammonia respectively	1+1
	22	Systemic+ pulmonary circulation= double circulation.  Prevents the mixing of oxygenated and deoxygenated blood.	2+1
	28	Defective development and maturation of the growing baby leading to stunted growth(cretinism) mental retardation, low intelligence quotient, abnormal skin, deaf mutism etc	1x3