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**WINTER– 18 EXAMINATION**

**Subject Title: Human Anatomy Physiology**

Subject Code: **0809**

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**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for anyequivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.



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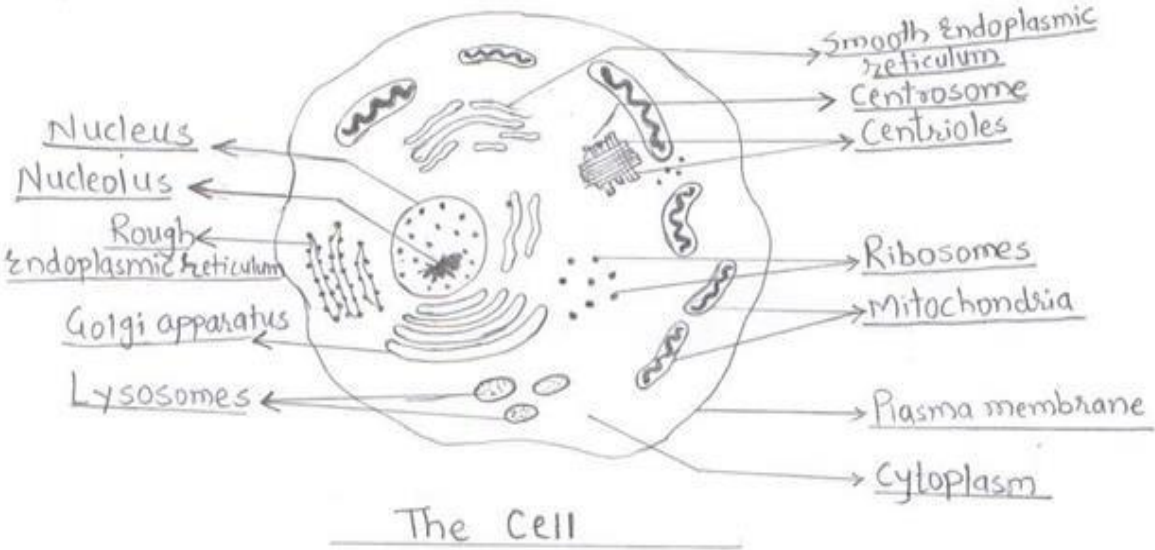
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Q. No.	Sub Q. N.	Answer	Marking Scheme
1		<b>Answer any EIGHT of the followings:</b>	16M
1	a)	<b>What is a joint? Name the bones forming the elbow joint.</b>  A joint is a site at which any two or more bones articulate or come together.  The bones forming the elbow joint are humerus, radius & ulna.	2M (1M each)
1	b)	<b>Name the two muscles of facial expression.</b>  Levator palpebrae superioris, orbicularis oculi, buccinator, orbicularis oris, masseter, temporalis, pterygoid.	2M (1M each)
1	c)	<b>Define:</b>  (i) <b>Digestion:</b> The conversion of complex food into simple form by mechanical & chemical breakdown, so that it is easily absorbed in the blood is described as digestion.  (ii) <b>Absorption:</b> The process by which the digested food passes through the walls of some organs of alimentary canal.	2M (1M each)
1	d)	<b>List the types of cells present in blood.</b>  RBCs or erythrocytes , WBCs or leucocytes, Platelets or thrombocytes.	2M
1	e)	<b>What are true ribs &amp; false ribs?</b>  <b>True ribs</b> – The first seven pairs of ribs anteriorly articulate directly through costal cartilages with the sternum and are known as true ribs.  <b>False ribs</b> – The last five pairs are called false ribs. The 8th, 9th and 10th pair of ribs are indirectly attached to the sternum anteriorly i.e. cartilages of these ribs join immediately with costal cartilage of 7th pair of ribs. 11 <sup>th</sup> & 12 <sup>th</sup> pairs are known as floating ribs as they are not attached anteriorly.	2M (1M each)

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1	f)	<p><b>Define hormones. Give two examples of it.</b></p> <p>Hormone is Chemical messenger secreted by endocrine gland into bloodstream, carried away at a distant where it influences cellular activity.</p> <p>Growth hormone ,Thyrotrophic hormone/Thyroid stimulating hormone (TSH), Adrenocorticotrophic hormone (ACTH), Gonadotrophic hormones, Follicle stimulating hormone (FSH), Luteinising hormone (LH)/ ICSH in males, Lactogenic hormone (Prolactin), Oxytocin, Antidiuretic hormone (ADH) /Vasopressin, Thyroxine ,tri iodothyronine, calcitonin , parathormone, cortisol, corticosterone, cortisone, aldosterone, adrenaline, noradrenaline, insulin, glucagon, somatostatin, melatonin., oestrogen, progesterone, testosterone.</p>	2M (1M Def. 0.5 M for each example)
1	g)	<p><b>Draw and label the structure of cell.</b></p> 	2M
1	h)	<p><b>List the fundamental tissues of the body.</b></p> <p>Tissues are classified into four major types:-</p> <p>1) Epithelial tissue/Epithelium 2) Connective tissue 3) Muscular tissue 4) Nervous tissue</p>	2M (0.5x4)
1	i)	<p><b>What is cardiac output? Write its normal value.</b></p> <p>Cardiac Output- It is the amount of blood ejected per ventricle per minute. It is also termed as minute volume. It takes in account the rate and force of cardiac contraction.</p> <p>Cardiac Output= Stroke volume X Heart Rate</p> <p>70 ml X 72 = 5040 ml / minute.</p>	2M



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1	j)	<b>Name the three auditory ossicles.</b> Auditory ossicles are three very small bones present in tympanic cavity of the ear. They are named according to their shape, namely-i)Malleus (hammer) ii) Incus (anvil) iii) Stapes (stirrup).	2M
1	k)	<b>Mention any two functions of spleen.</b> 1) <b>Phagocytosis</b> :-Erythrocytes are destroyed in spleen as well other cellular materials such as leucocytes, platelets and microbes are also phagocytosed in the spleen. 2) <b>Haemopoietic organ</b> :- Formation of erythrocytes in foetal as well as in adult. 3) <b>Red cell storage</b> :- During stress, it can liberate 150 ml of blood, thus acts as reservoir of red blood cells. 4) <b>Immunity (Antibodies formation)</b> :It contains T & B lymphocytes which help in protection against infection.	2M (1M each)
1	l)	Define: (i) <b>Cell</b> : A cell is a smallest functional unit of an organism. It is the basic unit of all body tissues. (ii) <b>Anatomy</b> : It is the study of structure of the body & its individual parts & their relation to one another.	2M (1M each)
2		<b>Attempt any FOUR of the followings</b>	12M
2	a)	<b>Give the structure and functions of mitochondria.</b> <b>Structure</b> ; They are sausage shaped str. in cytoplasm. It has a double unit membrane where the inner membrane contains folds known as cristae, forms shelves on which oxidative enzymes are present. The fluid filled cavity is known as matrix. They contain a special type of DNA, which is self-replicative. <b>Function</b> : It is known as power house of cell. They are involved in cellular respiration, the process by which chemical energy is made available in the cell. When <b>nutrients</b> and <b>oxygen</b> come in contact with the enzyme, they combine to form CO <sub>2</sub> ,water & energy, this is in the form of ATP. (aerobic oxidation) This ATP is used by the cell to do cellular functions.	3M (1.5M each)
2	b)	<b>Write the mechanism of blood clotting.</b> When the blood vessel is damaged, loss of blood is stopped by the following way.	3M



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		<p>1) <b>Vasoconstriction:</b> - When platelets come in contact with a damaged blood vessel they adhere to it. Serotonin is released which constricts the blood vessel.</p> <p>2) <b>Platelet plug formation:</b> - The adhered platelets attract more platelets which form platelet plug. This forms temporary seal.</p> <p>3) <b>Coagulation-</b> (blood clotting): The thromboplastin (prothrombinase) released by damaged tissue cells by extrinsic or intrinsic pathway. In presence of calcium ions it converts prothrombin to thrombin. Thrombin acts on fibrinogen &amp; converts it to insoluble fibrin. The fibrin mesh traps blood cells. This is known as clotting.</p> <p>Prothrombin+ Calcium+ Thromboplastin → Thrombin (inactive) (from damaged tissue) (active)</p> <p>Thrombin acts on ↓ Fibrinogen → Fibrin (soluble) (insoluble) Fibrin + Blood Cells → Clot</p>	
2	c)	<p><b>What are the functions of lymphatic system? Draw a well labelled diagram of lymph node.</b></p> <p><b>Functions of Lymphatic system:</b></p> <ol style="list-style-type: none"><li>1) It drains excessive tissue fluids from the intercellular spaces to the blood.</li><li>2) It returns plasma proteins to the blood.</li><li>3) It absorbs and transport fatty acids and fats from the digestive system.</li><li>4) It plays an important role in immune response of the body either by releasing cytotoxic chemicals or by producing antibodies.</li></ol>	<p><b>3M</b> <b>1.5M</b></p>

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			<b>1.5M</b>										
<b>2</b>	<p><b>d)</b></p>	<p><b>Define skeleton. Write the difference between male and female pelvis.</b></p> <p><b>Definition:</b> Skeleton is the bony framework of the body.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Male Pelvic Girdle</th> <th style="width: 50%;">Female Pelvic Girdle</th> </tr> </thead> <tbody> <tr> <td>Bones are heavier and thicker</td> <td>Bones are lighter and thinner</td> </tr> <tr> <td>Cavity is deep and funnel shaped</td> <td>Cavity is shallow and round</td> </tr> <tr> <td>Sacrum less concave, making the true pelvis narrower at the outlet.</td> <td>Sacrum more concave anteriorly, making the true pelvis broader at the outlet</td> </tr> <tr> <td>The angle made at the pubic arch is narrower. (less than 90degree angle)</td> <td>The angle made at the symphysis pubic arch is wider. (more than 90degree angle)</td> </tr> </tbody> </table>	Male Pelvic Girdle	Female Pelvic Girdle	Bones are heavier and thicker	Bones are lighter and thinner	Cavity is deep and funnel shaped	Cavity is shallow and round	Sacrum less concave, making the true pelvis narrower at the outlet.	Sacrum more concave anteriorly, making the true pelvis broader at the outlet	The angle made at the pubic arch is narrower. (less than 90degree angle)	The angle made at the symphysis pubic arch is wider. (more than 90degree angle)	<p><b>3M</b></p> <p><b>1M</b></p> <p><b>(0.5x4)</b></p>
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<b>2</b>	<p><b>e)</b></p>	<p><b>Write the composition and functions of gastric juice.</b></p> <p><b>Composition of Gastric juice-</b> water, mineral salts, mucus, hydrochloric acid, Enzymes such as pepsinogen, and the intrinsic factor.</p>	<p><b>3M</b></p> <p><b>(1.5M)</b></p>										



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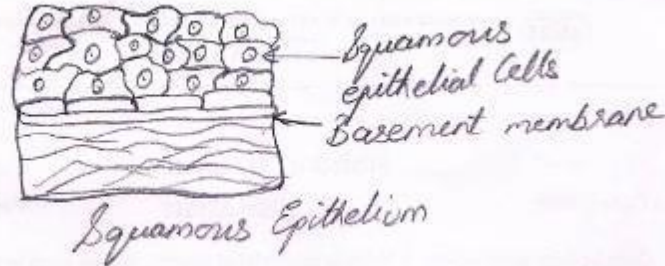
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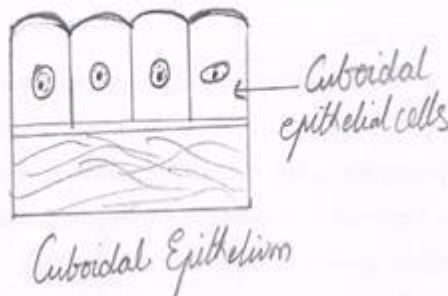
		<b>Functions of Gastric Juice:</b> 1. Water liquefies the food. 2. HCl acidifies the food & stops the action of salivary amylase. 3. HCl kills the microbes 4. Pepsinogen is activated to pepsin by HCl, This digests protein to peptones and peptides. 5. Intrinsic factor helps in absorption of vit. B <sub>12</sub> from small intestine 6. Mucus prevents mechanical injury to the stomach wall.	(1.5M)
2	f)	<b>Define (i) Sickle cell anaemia (ii) Angina pectoris (iii) Menopause</b> <b>Define (i) Sickle cell anaemia:</b> Due to genetic abnormal haemoglobin synthesis, the abnormal haemoglobin molecule become misshapen when deoxygenated, making erythrocytes sickle shaped. The life span is reduced due to early haemolysis. This causes anaemia. <b>(ii) Angina pectoris:</b> Angina pectoris is the medical term for chest pain or discomfort. It occurs when the myocardium doesn't get as much blood (hence as much oxygen) as it needs, because one or more of the coronary arteries is narrowed. <b>(iii) Menopause:</b> It occurs at the age of 45-55 yrs marking the end of child bearing age with the permanent cessation of menses.	3M (1M each)
3		<b>Attempt any FOUR of the followings</b>	12M
3	a)	<b>Name the various types of epithelial tissues. Explain any one.</b> Epithelial tissues can be classified in two type:- 1) <b>Simple epithelium</b> -i) Squamous/pavement epithelium ii) Cuboidal epithelium, iii) Columnar epithelium, iv) Ciliated columnar epithelium. 2) <b>Compound epithelium</b> :- i) Stratified epithelium and ii) Transitional epithelium. 1) <b>Simple epithelium:</b> i) <b>Squamous/pavement epithelium</b> :- Composed of single layer of flattened cells, fit like	3M 2M

flat stones and forms a smooth membrane. This tissue provides a thin smooth, inactive lining for heart, blood vessels, alveoli of lungs and lymph vessels.

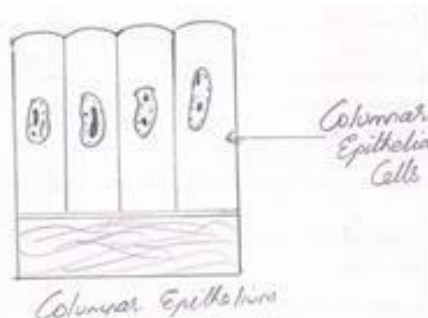
1M



ii) **Cuboidal epithelium**:-Composed of cube shaped cells and forms the basement membrane. Involved in secretion and absorption. Present in some simple secretive glands. Forms basement membrane in tubules of kidney .



iii) **Columnar epithelium**:-Formed by single layer of tiny cylindrical columns and situated on a basement membrane .Found lining the organs of alimentary tract and special columnar cells called 'goblet cells', in GIT secretes sticky substances called mucous. Function-absorption



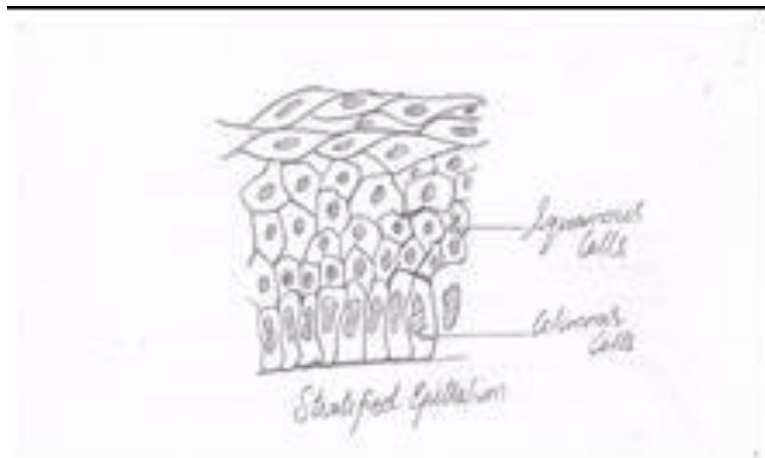


iv) **Ciliated epithelium**:-This is formed by columnar cells with fine hair like protoplasmic processes called cilia, capable of wave like movements. They move the contents in one direction. Found lining most of the respiratory passages and uterine tubes. In respiratory passages, it propels mucous towards throat and in the uterine tube, it propels ova towards the uterus



2) **Compound epithelium**:-Consists of number of layers of cells,protecting underlying layers of cells.

i) **Stratified epithelium**:-Deepest layer of columnar cells which becomes flattened at the surface due to constant migration of cells from deep layer to the surface. At the surface the cells die and lose their nuclei. Such cells form a hard substance called 'keratin'. Such keratinized epithelium is found on dry surfaces like skin, hair and nails, whereas non kaeratinized epithelium is found on wet surfaces lining mouth, pharynx, esophagus and conjunctiva of eyes.

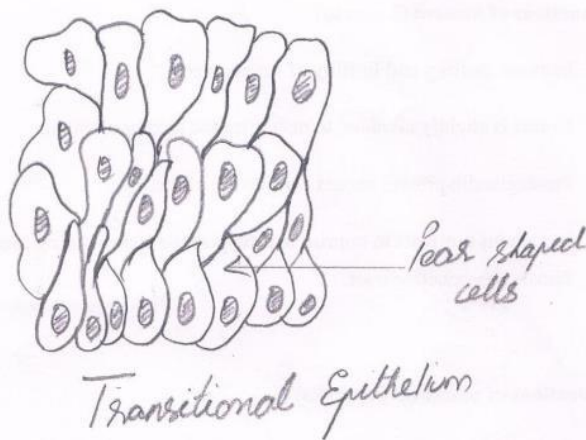


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ii) **Transitional epithelium:-** Composed of several layers of pear shaped cells ,a stage between simple and stratified epithelium hence called transitional epithelium .Superficial layer of oval shaped cells held together by intercellular cement, slimy and allows the cells to slip on one another. Found lining accessory structures of ureters, urinary bladder and urethra.



3

b) **Name the different types of blood groups. Explain erythroblastosis foetalis.**

( 3M)

The ABO system is based on presence or absence of different antigen on RBC membrane and antibodies in the serum. The blood groups are thus classified as A,B,AB,& O.

(1M)

(2M)

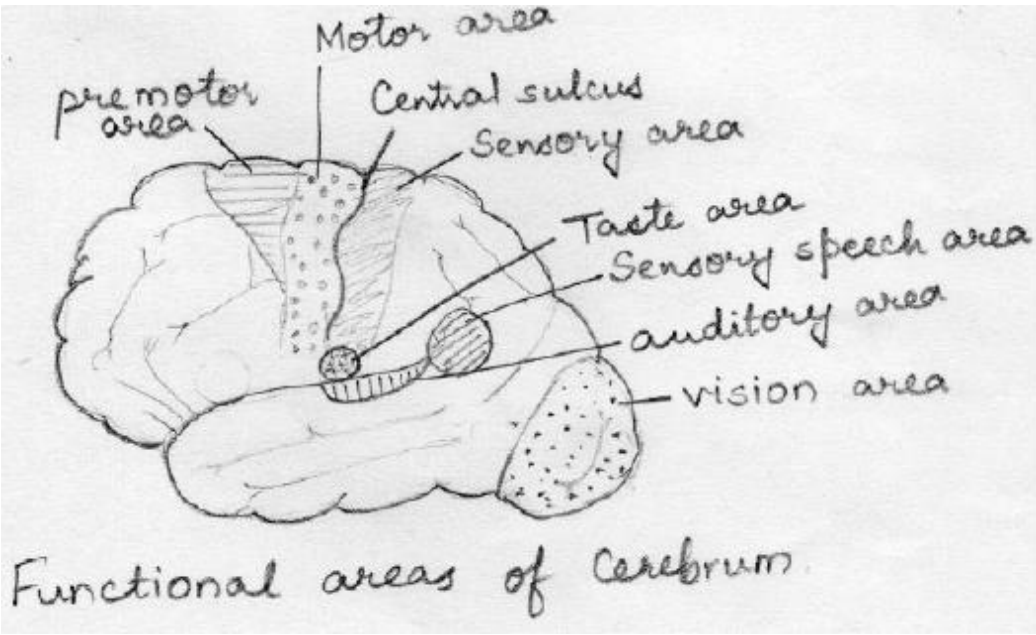
The rhesus factor- The RBC cell membrane has Rh antigen. Based on presence or absence of the Rh factor, the blood group is Rh +ve or Rh -ve.

**Erythroblastosis foetalis** is also known as haemolytic disease of the newborn. In this disorder, the mother's immune system makes antibodies to the baby's RBCs, causing destruction of fetal erythrocytes.. If the mother is Rh -ve & the fetus is Rh +ve, during the time of delivery, fetal blood may enter the mother's circulation & stimulates the production of antibody. During the next pregnancy, these antibodies destroy the fetal blood by antigen antibody reaction result in agglutination & haemolysis abortion Jaundice occurs.

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3	c)	<p><b>Give the role of diaphragm in the mechanism of respiration.</b></p> <p><b>Inspiration</b></p> <p>When diaphragm contracts, then central tendon is pulled downwards. During inspiration, simultaneous contraction of intercostal muscles &amp; diaphragm increases the capacity of thoracic cavity. This reduces the pressure in the lungs. To equalize the pressure the air from atmosphere enters the lungs. The process of inspiration is active as it needs energy for muscle contraction.it lasts for 2 sec.</p> <p><b>Expiration</b></p> <p>When diaphragm relaxes, then central tendon is pushed upwards. Relaxation of intercostal muscles &amp; diaphragm results in decrease in the size of thoracic cavity. As a result, the pressure inside the lungs increases as compared to atmospheric pressure. The air from the lungs is expelled from the lungs. This process is passive as does not require energy. The expiration lasts for 3 sec.</p> <p>After expiration there is <b>pause</b> &amp; then the next cycle begins.</p>	3M
3	d)	<p><b>Draw a well labeled diagram of 'functional areas of cerebrum</b></p>  <p>Functional areas of Cerebrum.</p>	3M



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3	e)	<p><b>Enumerate six functions of skin</b></p> <p><b>i) protection</b> It forms the water proof layer &amp; protects the inner delicate structures. it acts as the barrier against the invasion of the microbes chemicals &amp; dehydration. The melanin pigment protects against the harmful UV rays.</p> <p><b>ii) Regulation of body temperature</b> The temp. is constant at 36.8° C. When the metabolic rate of the body increases the body temp. increases &amp; vice a versa. To ensure constant body temp. a balance between heat production &amp; heat loss is maintained by the skin.</p> <p><b>iii) Formation of vit. D.</b> - 7-dehydroxycholesterol is present in the skin. UV light from the sun converts it to vit. D.</p> <p><b>iv) Sensation.</b> There are different sensations like touch, pain, pressure, etc. are felt due to presence of sensory receptors in the skin.</p> <p><b>v) Absorption-</b> Some drugs &amp; chemicals are absorbed through the skin.</p> <p><b>vi) Excretion-</b> skin is a minor excretory organ &amp; excretes NaCl, urea &amp; sub.like garlic.</p>	<b>3M (0.5x6)</b>
3	f)	<p><b>Define: i) Oedema ii) Glaucoma iii) Congestive cardiac failure</b></p> <p><b>i) Oedema:</b> All the cells in the body are bathed in the tissue fluid. Oedema is excessive accumulation of tissue fluid causing swelling.</p> <p><b>ii) Glaucoma:</b> It is a condition characterized by increased intraocular pressure (pressure within the eye)</p> <p><b>iii) Congestive cardiac failure:</b> Congestive cardiac failure is also known as right ventricular failure. In this, right ventricle fails to contract and empty itself completely. Due to this, the right atrium is unable to empty the blood into the right ventricle. This results in congestion of the venous system.</p>	<b>3M (1M) (1M) (1M)</b>

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4		<b>Attempt any FOUR of the followings</b>	<b>12M</b>
4	a)	<p><b>Explain the circulation of blood in the heart.</b></p> <p>The superior &amp; inferior vena cava empty into the right atrium. The blood passes to the right ventricle. From this it is passed into the pulmonary artery. The opening of pulmonary artery is guarded by the pulmonary valve, which prevents the backflow of blood. The pulmonary artery divides into right &amp; left arteries which carries deoxygenated blood to the lungs for exchange of gases. The two pulmonary veins from each lung carrying oxygenated blood open into the left atrium. From this it goes to left ventricle &amp; then pumped into the aorta. The opening of aorta is guarded by aortic valve.</p>	<b>3M</b>
4	b)	<p><b>Draw a diagram of 'L.S. of kidney' and label it</b></p> <p>A longitudinal section of kidney</p>	<b>3M</b>
4	c)	<p><b>What are the functions of medulla oblongata?</b></p> <p>The vital centres consisting of group of cells associated with autonomic reflex activity lie in Medulla oblongata. These are</p> <ul style="list-style-type: none"> <li>• <b>Cardiac centre-</b> The cardiac centre controls the rate and force of cardiac contraction</li> </ul>	<b>3M.</b>



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	<p>and blood pressure.</p> <ul style="list-style-type: none"><li>• <b>Respiratory centre</b> – The respiratory centre controls the rate and depth of respiration. Nerve impulses pass to the phrenic and intercostals muscles which stimulate the contraction of diaphragm and intercostals muscles,thus initiating inspiration.</li><li>• <b>Vasomotor centre</b> – This controls the diameter of blood vessels especially small arteries and arterioles.Stimulation causes coopnstriction or dilation depending on site.</li><li>• <b>Reflex centre</b> – When irritating substance are present in stomach or respiratory tract, nerve impulse pass on to the medulla oblongata stimulating the reflex centre which initiate reflex actions like vomiting, sneezing and coughing</li></ul>	
4	<p>d) <b>Justify ‘Pituitary gland is known as master gland’.</b></p> <p>Pituitary gland consists of two lobes: Anterior and Posterior Lobe. The hormones secreted by each lobe and their functions are mentioned below:</p> <p><b>Anterior Lobe</b></p> <ol style="list-style-type: none"><li>1.Growth Hormone (GH)-It stimulates growth directly and in conjunction with other hormones.</li><li>2. Thyroid Stimulating Hormone (TSH)- It controls the growth and activity of thyroid gland.</li><li>3. Adrenocorticotrophic Hormone (ACTH)-It stimulates the cortex of adrenal glands to produce their hormones.</li><li>4. Gonadotrophic hormones- a. Follicle Stimulating Hormone (FSH)- In females, it stimulate the ovarian follicle to produce mature ovum and secretion of estrogens by ovaries. In males, it stimulates the formation of spermatozoa in testis.</li><li>b. Luteinizing Hormone(LH)/ ICSH in males-In females, it stimulates the corpus luteum to produce progesterone. In males, it stimulates interstitial cells to produce testosterone.</li><li>5. Prolactin-It has direct effect on mammary glands &amp; with help of oxytocin it stimulates mammary glands to secrete milk.</li></ol>	3M



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		<p><b>Posterior Lobe-</b></p> <p>1. Oxytocin- Contraction of uterus during labor and to bring about parturition (birth of a baby) and Ejection of milk from breasts.</p> <p>2. Vasopressin (Anti Diuretic Hormone) - Decreases the urine output and Increases the blood pressure.</p> <p>Thus Pituitary gland is the main gland of the endocrine system because it produces hormones that control many functions of other endocrine glands. Each gland produces different hormones which regulate the activity of other organs and tissues.</p>	
4	e)	<p><b>Write the physiology of digestion of proteins</b></p> <p>Digestion of protein is process of conversion of protein into amino acids by action of enzymes. Digestion of protein initiates in stomach and ends in small intestines.</p> <p>In Stomach: Acid from gastric juice converts enzyme pepsinogen into pepsin. This pepsin acts on protein and breakdown into polypeptides.</p> <p>In Small Intestines: By the action of enzyme enterokinase present in intestinal mucosa, chymotrypsinogen and trypsinogen from pancreatic juice get converted into chymotrypsin and trypsin. These enzymes convert polypeptides into bi-peptides and tri-peptides. Enzyme peptidase secreted by enterocytes of small intestine converts bi-peptides and tri-peptides into amino acids. These amino acids further absorbed into blood circulation. In this way digestion of protein takes place.</p>	3M  (1M)  (2M)
4	f)	<p><b>Define and give normal value of</b></p> <p><b>Tidal volume:</b> It is the volume of air moved in &amp; out of lungs during normal breathing.</p> <p>Normal value is 500 ml.</p> <p><b>Residual volume:</b> It is the volume of air remaining in lungs after forced (maximum) expiration. Normal value is 1.2 L in males and 1.1 L in females.</p>	3M  (1.5M)  (1.5M)



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<b>5</b>		<b>Attempt any FOUR of the followings</b>	<b>12M</b>
<b>Q.5</b>	<b>a.</b>	<p><b>Name the methods of measurement of blood pressure. Explain the auscultatory method of measurement of BP.</b></p> <p><b>Methods of measurement of blood pressure:</b> 1.Palpitory 2.Auscultatory method and 3. Oscillatory method.</p> <p><b>Auscultatory Method:</b> The auscultatory method uses a quality stethoscope and a sphygmomanometer.</p> <p><b>1 - Prepare the patient:</b> Make sure the patient is relaxed by allowing 5 minutes to relax. The patient should sit upright or lie down in a supine position.</p> <p><b>2 - Place the BP cuff on the patient's arm:</b> Locate the brachial artery and position the cuff so that it will cover the brachial artery. Wrap the cuff tightly around the arm.</p> <p><b>3 - Position the stethoscope:</b> Place the chest piece of the stethoscope over the brachial artery.</p> <p><b>4 - Inflate the BP cuff:</b> Cuff is inflated to raise the pressure to 200mmHg.</p> <p><b>5 - Slowly Deflate the BP cuff:</b> Slowly release the pressure by unscrewing the valve.</p> <p><b>6 - Listen for the Systolic Reading:</b> The pressure at which the first sound is heard is the systolic blood pressure.</p> <p><b>7 - Listen for the Diastolic Reading:</b> Continue to release cuff pressure until no sound can be heard. This pressure is diastolic blood pressure.</p>	<b>3M</b>  <b>(1M)</b>  <b>(2M)</b>
<b>Q.5</b>	<b>b.</b>	<p><b>Describe the process of urine formation.</b></p> <p>There are three processes of urine formation:</p> <ol style="list-style-type: none"><li>1. Glomerular ultrafiltration</li><li>2. Selective reabsorption</li><li>3. Tubular secretion</li></ol>	<b>3M</b>





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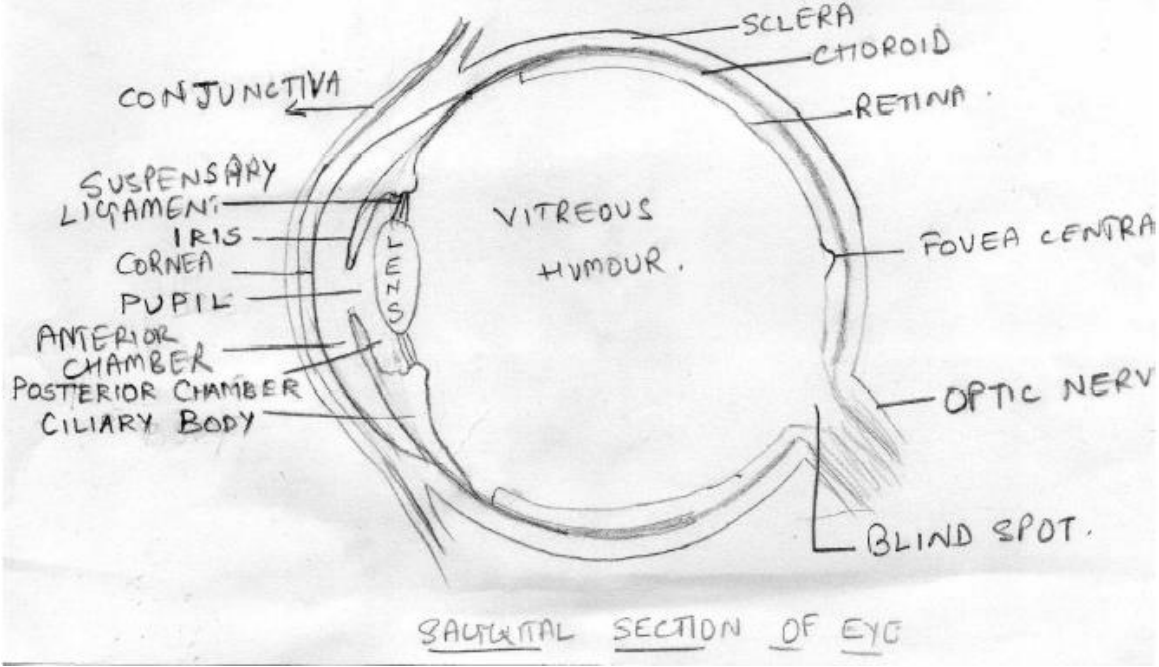
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		<p><b>1. Ultrafiltration/ glomerular filtration</b> – Filtration takes place through the semi permeable walls of the glomerulus &amp; glomerular capsule or Bowman’s capsule. Water and small molecules pass through it. The afferent renal artery brings blood to the glomerulus and the efferent artery carries the blood away from it. As the diameter of afferent artery is more than the efferent artery, a hydrostatic pressure is generated in the glomerulus (55mm Hg). This pressure is opposed by osmotic (30 mmHg) and filtrate hydrostatic pressure in capsule (15mm Hg). The net filtration pressure is <math>55-(30+15) = 10</math> mm of Hg.</p> <p>All constituents of blood are filtered except blood cells and plasma proteins.</p> <p><b>2. Selective reabsorption-</b> This is the process by which composition and volume of filtrate are changed during its passage through the tubule. The constituents required by the body are reabsorbed. Components like glucose, vitamins, amino acids get completely re- absorbed into the blood. These are called high threshold substances. Low threshold substances like urea, uric acid are absorbed slightly. Some substances like creatinine are not reabsorbed at all.</p> <p><b>3. Tubular secretion-</b> Substances not required &amp; the foreign material which have not got cleared during filtration due to short time, are secreted into the convoluted tubule &amp; excreted in the urine. Tubular secretion of Hydrogen ions is imp. for maintaining P<sup>H</sup>.H ions are secreted in combination with bicarbonate as carbonic acid, with ammonia as ammonium chloride &amp; with hydrogen phosphate as dihydrogen phosphate.</p>	
Q.5	c.	<p><b>Justify that pancreas is both exocrine and endocrine gland.</b></p> <p>Endocrine glands secrete their secretions (hormones) directly into the blood stream, and there is no duct involved. That is they are also called as ductless/glands secretion.</p> <p>The pancreatic islets secrete insulin, glucagon and somatostatin all of which are secreted into the blood stream without ducts, and therefore pancreas is an endocrine gland.</p> <p>Exocrine glands are the glands which secrete their secretion via a duct. The pancreas</p>	<p>3M</p> <p>(1.5M)</p> <p>(1.5M)</p>

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		<p>also makes digestive enzymes, which are collectively known as pancreatic juice, and are secreted into the duodenum of the small intestine through the pancreatic duct.</p> <p>Thus pancreas performs an exocrine function.</p> <p>Thus pancreas performs both the functions; they are called as exo-endocrine gland.</p>	
Q.5	d.	<p><b>Draw a sagittal section of eye.</b></p> 	3M
Q.5	e.	<p><b>What is puberty? Give the features of puberty in male.</b></p> <p><b>Puberty-</b> Puberty is defined as age at which the internal reproductive organs reach maturity. This occurs between the age of 10 &amp; 14. Luteinising hormone from the anterior lobe of the pituitary gland stimulates the interstitial cells of the testes to increase the production of testosterone. This hormone influences the development of the body to sexual maturity.</p> <p><b>The changes occurring at puberty in male:</b></p> <ul style="list-style-type: none"> <li>• Growth of muscle and bone and a marked increase in height and weight.</li> </ul>	<p>3M</p> <p>( 1 M)</p> <p>(2 M)</p>



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		<ul style="list-style-type: none"> <li>• Enlargement of the larynx and changing of the voice —it 'breaks'.</li> <li>• Growth of hair on the face, axillae, chest, abdomen and pubis.</li> <li>• Enlargement of the penis, scrotum and prostate gland.</li> <li>• Maturation of the seminiferous tubules and production of spermatozoa &amp; semen.</li> </ul>																			
Q.5	f.	<p><b>Define:</b> (i) <b>Renal calculi-</b> It means kidney stones. These are small hard deposits of minerals and salts in kidneys, ureters or urinary bladder.</p> <p>(i) <b>Arthritis-</b> It is inflammation of joints which causes pain or swelling of joints.</p> <p>(ii) <b>Tonsillitis-</b>It is inflammation of tonsils, lymphoid tissue present in pharynx.</p>	<p><b>3M</b></p> <p><b>( 1 mark each)</b></p>																		
Q.6		<b>Answer any FOUR of the following:</b>	<b>16M</b>																		
Q.6	a.	<p><b>Differentiate between artery and vein</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Artery</th> <th style="width: 50%; text-align: center;">Vein</th> </tr> </thead> <tbody> <tr> <td>1. Arteries are the blood vessels which carry the blood away from the heart.</td> <td>Veins are the blood vessels which bring the blood towards the heart.</td> </tr> <tr> <td>2. All arteries except pulmonary artery carry oxygenated blood.</td> <td>All veins except pulmonary veins bring deoxygenated blood</td> </tr> <tr> <td>3. Arteries are thick walled. In artery tunica media is thick.</td> <td>Veins are thin walled. In veins tunica media is thin.</td> </tr> <tr> <td>4. Arteries are elastic</td> <td>Veins are less elastic.</td> </tr> <tr> <td>5. Lumen of the artery is smaller as compared to vein</td> <td>Lumen of the vein is larger as compared to artery.</td> </tr> <tr> <td>6. Arteries are branched into arterioles.</td> <td>Venules reunite to form veins.</td> </tr> <tr> <td>7. They are reddish in colour</td> <td>They are bluish in colour</td> </tr> <tr> <td>8. They do not contain valves</td> <td>They contain valves</td> </tr> </tbody> </table>	Artery	Vein	1. Arteries are the blood vessels which carry the blood away from the heart.	Veins are the blood vessels which bring the blood towards the heart.	2. All arteries except pulmonary artery carry oxygenated blood.	All veins except pulmonary veins bring deoxygenated blood	3. Arteries are thick walled. In artery tunica media is thick.	Veins are thin walled. In veins tunica media is thin.	4. Arteries are elastic	Veins are less elastic.	5. Lumen of the artery is smaller as compared to vein	Lumen of the vein is larger as compared to artery.	6. Arteries are branched into arterioles.	Venules reunite to form veins.	7. They are reddish in colour	They are bluish in colour	8. They do not contain valves	They contain valves	<p><b>4M</b></p> <p><b>(0.5x8)</b></p>
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Q.6	b.	<p><b>Explain the negative feedback mechanism of the endocrine glands.(4 marks)</b></p> <p>Negative feedback mechanism: The increased level of hormone is detected by detector</p>	<b>4M</b>																		

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		<p>organ e.g. hypothalamus and its release is controlled. e.g. Growth hormone, FSH.</p> <div style="text-align: center; border: 1px solid black; padding: 10px; background-color: #e0f2f1;"> <pre> graph TD     H[Hypothalamus (detector)] -- "Releasing hormones" --&gt; A[Anterior lobe of pituitary gland (control centre)]     A -- "Trophic hormones to target (endocrine) glands" --&gt; T[Target gland (effector)]     T -- "Raised blood levels of target gland hormones" --&gt; U[Use of hormones]     U -- "Lowered blood levels of target gland hormones" --&gt; L[Lowered blood levels of target gland hormones]     L -- "Stimulation (+)" --&gt; A     L -- "Stimulation (+)" --&gt; H     L -- "Inhibition (-)" --&gt; H     </pre> </div>	
<b>Q.6</b>	<b>c.</b>	<p><b>Write the functions of liver.</b></p> <p><b>Functions of liver:</b></p> <ol style="list-style-type: none"> <li>1. Secretion of bile: Bile salts are helpful in digestion and absorption of fats by its emulsification.</li> <li>2. Glycogenic function: The hepatic cells by the action of enzymes convert glucose into glycogen and it is then stored in the liver.</li> <li>3. Formation of urea: Hepatic cells by the action of the enzyme cause deamination of amino acid, i.e. amine group is set free which forms urea.</li> <li>4. Metabolism of fat: Whenever energy is needed, the saturated stored fat is converted to a form in which it can be used to provide energy.</li> <li>5. Formation of RBCs in foetal life.</li> <li>6. Destruction of RBCs forming bile pigments and iron.</li> <li>7. Formation of plasma protein.</li> <li>8. Formation of heparin, a natural anticoagulant in the blood.</li> </ol>	<p><b>4M</b></p> <p><b>(0.5x8)</b></p>



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		<p>9. Storage of iron and vitamin B12.</p> <p>10. Maintenance of body temperature: As a number of chemical reactions occur in the liver, heat is generated which is helpful in maintaining body temperature.</p> <p>11. Excretion of toxic substances: The toxic substances entering the body through alimentary canal are destroyed in liver.</p>	
Q.6	d.	<p><b>What is menstrual cycle? Describe the phases of menstruation.</b></p> <p><b>Menstrual Cycle</b> -Series of events occurring regularly in females every 26-30 days, during reproductive years.</p> <p>Consists of series of changes that take place simultaneously in ovaries &amp; uterine walls, stimulated by changes in blood level of hormones. Days of cycle are numbered from beginning of Menstruation (4), Proliferative phase (10), and Secretory phase (14).</p> <p><b>Menstruation</b> Decrease level of progesterone &amp; Estrogens stimulate release of PGs, causes constriction of arterioles in endometrium, leads to death of cells.</p> <ul style="list-style-type: none"><li>Entire stratum functionalis sloughs off. Menstruation, only stratum basalis remains.</li><li>Menstrual flow consists of 50-150ml of blood, tissue fluid, mucus &amp; epithelial cells. Lasts for 4-5 days.</li></ul> <p><b>Proliferative phase</b></p> <ul style="list-style-type: none"><li>One of the follicles from both ovaries, develop and become dominant follicle, starts secreting estrogens.</li><li>This follicle matures into Graafian follicle (diameter more than 20 mm).</li><li>Estrogens stimulate repair of endometrium.</li><li>Cells of stratum basalis undergo mitosis &amp; produce new stratum functionalis.</li></ul>	<p>4M</p> <p>(1M)</p> <p>(3M)</p>



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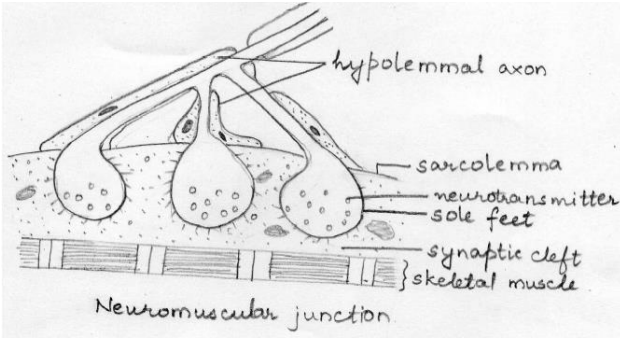
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		<ul style="list-style-type: none"><li>• Thickness of endometrium doubles:5-10mm</li><li>• LH causes rupture of mature follicle &amp; ovulation. That is end of this phase.</li></ul> <p><b><u>Secretory phase</u></b></p> <ul style="list-style-type: none"><li>• Under influence of LH ruptured follicle transforms into corpus luteum that secretes progesterone, estrogens.</li><li>• Promotes growth and coiling of endometrial glands, vascularisation of superficial endometrium &amp; thickening of endometrium to 12 -18 mm.</li><li>• Under influence of progesterone secretory glands produce large amount of mucus.</li><li>• There is similar increase in secretion of watery mucus by glands of uterine tubes&amp; cervical glands of vagina.</li><li>• If oocyte is not fertilised, degeneration of corpus luteum within 2 weeks into corpus albicans.</li><li>• Levels of progesterone &amp; estrogens decrease, that causes menstruation &amp; cycle continues.This phase is most constant part of cycle lasts for 14 days i.e. from 15 to 28 days.</li></ul>	
Q.6	e.	<p><b>Describe the structure of neuromuscular junction.</b></p> <p>The Neuromuscular junction is the connection between a large myelinated nerve and skeletal muscle fibre.The motor pathway from the brain to the muscles involves two neurons. The upper motor neuron &amp; the lower motor neuron. The lower motor neuron has the cell body in the anterior horn of the grey mater in the spinal cord. The axon of this neuron reaches the muscle. The muscle membrane through which a nerve fibre passes is called sarcolemma. Near the termination in the muscle, the axon branches into tiny fibres that form the motor end plate near the muscle fibre. The nerve fibre spreads to form branches called Hypolemmal axons which end in club like feet called sole feet. The entire nerve ending is called end plate. Below the sole feet, a small space called synaptic cleft is</p>	4M

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		<p>present. Below this, there are large folds of muscle membrane. The neuro transmitter released is Ach. at this junction which is responsible for stimulating the muscle fibre &amp; causing voluntary muscle movement.</p> 	
<p>Q.6</p>	<p>f.</p>	<p><b>What is the effect of sympathetic and parasympathetic stimulation on</b></p> <p>(i) <b>Heart-</b> Sympathetic stimulation: Increases heart rate and force of contraction Parasympathetic stimulation: Decreases heart rate and force of contraction.</p> <p>(ii) <b>Bronchi-</b> Sympathetic stimulation: Bronchodilation allowing greater amount of air to enter the lungs at each inspiration. Parasympathetic stimulation: Bronchoconstriction (Broncho-spasm)</p> <p>(iii) <b>GIT-</b> Sympathetic stimulation: Reduces GI motility and sphincters are constricted. Therefore digestion process is slow down. Parasympathetic stimulation: Increases GI motility and sphincters are relaxed. Therefore digestion process is hastened.</p> <p>(iv) <b>Eye-</b> Sympathetic stimulation: Dilation of pupils causing mydriasis. Parasympathetic stimulation: Constriction of pupils causing miosis</p>	<p>4M  (1M each)</p>