

**RUBRICS: HSSC 1<sup>st</sup> ANNUAL EXAMINATION 2024**  
**SUBJECT: BIOLOGY-I (LOCAL)**

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
2(i)	Role of peroxisome in plant cell i.e photorespiration, lipid metabolism, glyoxalate cycle etc	Correct description of any two criterion(2)	Correct description of any one criterion(1)	Some relevant information(0.5)	Wrong answer(0)			
	Role of peroxisome in animal cell i.e formation and decomposition of hydrogen peroxide, detoxification of alcohols, contain oxidative enzymes etc	Correct description of any two criteria(1)	Correct description of any one criteria(0.5)	Wrong answer(0)				
OR	Functions of plasma membrane proteins i.e carrier proteins, enzymes, receptor molecules, antigens etc	Correct functions of any three proteins (3)	Correct functions of any two proteins (2)	Correct functions of any one protein (1)	Some relevant information(0.5)	Wrong answer(0)		
2(ii)	Formation of glycosidic bond in sucrose i.e -OH at C-1 of glucose reacts –OH of C -2 of fructose forming $\alpha$ -1,2 glycosidic linkage , formation through equation etc	Correct explanation with equation (1.5)	Correct explanation without equation (1)	Some relevant information(0.5)	Wrong answer(0)			
	Formation of glycosidic bond in maltose i.e -OH at C-1 of glucose reacts –OH of C -4 of glucose forming $\alpha$ -1,4 glycosidic linkage , formation through equation etc	Correct explanation with equation (1.5)	Correct explanation without equation (1)	Some relevant information(0.5)	Wrong answer(0)			
OR	Illustration with labeling of non- cyclic photophosphorylation/ Z-scheme i.e photosystem II,	Correct illustration with any three labels (3)	Correct illustration with any two labels OR correct	Correct illustration with any one label OR partially correct	Only drawing with no label OR Some relevant information(0.5)	Wrong ans		

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	photosystem I, b <sub>6</sub> -f complex, PQ, PC, PEA, FD, NADP reductase etc		description of non-cyclic photophosphorylation (2)	description of non-cyclic photophosphorylation (1)		wer (0)		
2(iii)	Significance of amino acid sequence in sickle cell anemia i.e crescent shaped RBCs, blocks blood flow, mutation in β globin gene, glutamic acid replaced with valine, mutation at 6 <sup>th</sup> amino acid of beta chain, CTT code replaced with CAT etc	Correct explanation of any three criteria (3)	Correct explanation of any two criteria (2)	Correct explanation of one criteria (1)	Some relevant information(0.5)	Wrong answer(0)		
OR	Flow chart of C <sub>4</sub> photosynthesis i.e PEP, PEP carboxylase, oxaloacetate, malate in mesophyll cell, Calvin cycle with CO <sub>2</sub> , rubisco, sugar pyruvate in bundle sheath cell, etc	Correct flow chart in mesophyll and bundle sheath with any three criteria (3)	Partially correct flow chart in mesophyll and bundle sheath with any two criteria(2)	Correct flow chart in mesophyll OR bundle sheath with any one criteria (1)	Some relevant information(0.5)	Wrong answer(0)		
2(iv)	Working of oxidoreductases with example i.e oxidation reduction of substrate, add or remove H <sup>+</sup> ions, cytochrome oxidase etc	Correct explanation of two criteria (1)	Correct explanation of any one criteria (0.5)	Wrong answer(0)				
	Working of oxidoreductases with example i.e breakdown of large complex organic molecules by adding water, photolytic enzymes like pepsin, renin, trypsin and digestive enzymes etc	Correct explanation of two criteria (1)	Correct explanation of any one criteria (0.5)	Wrong answer(0)				
	Working of lyases with example i.e breakdown of covalent bonds without adding water, histidine decarboxylase etc	Correct explanation of two criteria (1)	Correct explanation of any one criteria (0.5)	Wrong answer(0)				

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O R	Endospore formation i.e develops within vegetative cell inside cell wall, cell forms copy of chromosome ,tough wall surrounds it etc	Correct explanation of any two criteria (2)	Correct explanation of any one criterion (1)	Some relevant information(0.5)	Wrong answer(0)			
	How withstands in unfavorable conditions i.e water is removed from endospore, metabolism stops, cell disintegrates etc OR help to cope high temperature, drought ,pH etc.	Correct explanation of any one reason(1)	Some relevant information(0.5)	Wrong answer(0)				
(v)	Steps of lytic cycle of bacteriophage i.e attachment , adsorption , penetration, genomic injection, synthesis of phage components, assembly, maturation, lysis, release etc	Correct explanation OR sketch showing any three criteria (3)	Correct explanation OR sketch showing two criteria (2)	Correct explanation OR sketch showing one criteria (1)	Some relevant information (0.5)	Wrong answer(0)		
OR	Pathogenic role of fungi in humans in terms of name of disease, symptom or causative agent i.e ring worm and athlete's foot disease, candidiasis, histoplasmosis, ergotism etc	Correct description of any three diseases (3)	Correct description of any two diseases (2)	Correct description of any one disease(1)	Some relevant information(0.5)	Wrong answer(0)		
2(vi)	Working of antivenom i.e boost immune response, artificial passive immunity etc	Correct description of working (1.5 )	Partially correct description of working (1)	Some relevant information(0.5)	Wrong answer(0)			
	Why passive immunity i.e immediate protection , body gets antibodies instead producing inside body etc	Correct reason (1.5)	Partially correct reason(1)	Some relevant information(0.5)	Wrong answer(0)			
OR	a-Name of P i.e flagellum and R i.e cell	Correct explanation of	Correct explanation of	Correct explanation	Some relevant	Wrong		

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	wall or capsule b- composition of pili or cell membrane c- Name of asexual method bacteria reproduce i.e budding or binary fission	three criteria(3)	any two criteria(2)	of any one criteria (1)	information(0.5)	answer(0)		
2(vii)	T-cells with their roles i.e cytotoxic T cells which produce cytotoxin or perforin, , helper T cells which produce interleukin 2, suppressor T cells which shut down immune response,, memory T cells which convert into helper T cells etc	Correct explanation of three criteria(3)	Correct explanation of any two criteria(2)	Correct explanation of any one criteria OR only names of T-cells (1)	Some relevant information(0.5)	Wrong answer(0)		
OR	Evolutionary adaptations in arthropoda in terms of respiration i.e gills in aquatic form, book lungs and trachea in terrestrial etc	One correct evolutionary adaptation (1)	Partially correct answer(0.5)	Wrong answer(0)				
	Evolutionary adaptations in arthropoda in terms of excretion i.e malpighian tubules, uric acid etc	One correct evolutionary adaptation (1)	Partially correct answer(0.5)	Wrong answer(0)				
	Evolutionary adaptations in arthropoda in terms of nervous system i.e brain ,ventral double nerve cord, ganglion in each segment etc	One correct evolutionary adaptation (1)	Partially correct answer(0.5)	Wrong answer(0)				
2(viii)	Flow of blood through heart guarded by valves i.e superior and inferior vena cava to right atrium, right atrium to right ventricle via tricuspid valve, right ventricle to lungs via pulmonary semilunar valve, lungs to left atrium via pulmonary veins, left atrium to left ventricle via bicuspid valve, left ventricle to aorta via aortic semilunar valve etc	Correct explanation of any three criteria OR correct flow chart showing three labels (3)	Correct explanation of any two criteria OR correct flow chart showing two labels (2)	Correct explanation of any one criteria OR correct flow chart showing one labels (1)	Some relevant information(0.5)	Wrong answer(0)		
OR	Steps of swallowing action of bolus in oral cavity i.e tongue pushes bolus into	Correct explanation of any three criteria OR diagram with	Correct explanation of any two criteria OR diagram with two	Correct explanation of any one criteria OR diagram with one label	Some relevant information(0.5)	Wrong answer(0)		

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	pharynx, muscles push soft palate against pharynx, larynx raises up to epiglottis, epiglottis covers glottis etc	three labels (3)	labels (2)	(1)				
2(ix)	A. Effect of temperature on rate of reaction i.e molecular motion and probability of reaction, minimum temperature, optimum temperature and maximum temperature, denaturation OR graph showing effect of temperature etc	Correct explanation or graph with any two criteria (2)	Partially correct explanation or graph showing one criteria(1)	Some relevant information(0.5)	Wrong answer(0)			
	B. comparison of optimum temperature in human and thermophilic bacteria i.e 37- 38° and 70° respectively	Correct graph showing both criteria(1)	Partially correct graph with one criteria (0.5)	Wrong answer(0)				
OR	Names/ features/ example of Protista i.e animal like protists/protozoa, plant like protists/ algae, fungi like protists/ oomycota and myxomycota etc	Correct explanation of any three criteria (3)	Correct explanation of any two criteria(2)	Correct explanation of any one criteria (1)	Some relevant information(0.5)	Wrong answer(0)		
2(x)	Role of transpiration in TACT theory i.e open stomata derive more water, dry intercellular spaces bring more water from xylem tissues, transpiration pull etc	Correct explanation of role of transpiration (2)	Partially correct explanation (1)	Some relevant information(0.5)	Wrong answer(0)			
	Role of adhesion in TACT theory i.e water and cellulose polar nature, adhesion with walls of xylem cells, hold water in the absence of transpiration etc	Correct explanation of role of adhesion (1)	Some relevant information(0.5)	Wrong answer(0)				
OR	Names and explanation of out-growth hypothesis i.e naked branches of primitive plants, no vascular tissues, vascular supply extended from vascular bundle etc	Correct name of hypotheses with explanation (1.5)	Partially correct explanation OR correct name of hypotheses (1)	Some relevant information(0.5)	Wrong answer(0)			

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	Name and explanation of reduction hypothesis i.e simplification and modification of forked branches, planation, webbing etc	Correct name of hypotheses with explanation (1.5)	Partially correct explanation OR correct name of hypotheses (1)	Some relevant information(0.5)	Wrong answer(0)			
2(xi)	Complete the table i.e a. Radial symmetry, diploblastic, mesoglea, gastro vascular cavity, tentacle, nematocysts, polyps, medusa, hydra ,jelly fish, obelia etc	One feature and one example of both (1)	One feature or example(0.5)	Wrong answer(0)				
	b. Annelida/ segmented worm, neries, earthworm, leech etc	Name of phylum and one example of both(1)	Name of phylum or one example(0.5)	Wrong answer(0)				
	c. Mollusca/ soft bodied animals, bilateral symmetry, triploblastic, coelomate, mantle, radula,trochophore larvae etc	Name of phylum and one feature(1)	Name of phylum or one feature(0.5)	Wrong answer(0)				
OR	Life cycle of fern a-Name of P and Q P- Sporophyte/ Gametophyte/prothallus Q- Sporophyte/ Gametophyte/prothallus	Correct names of both P & Q (1)	Correct name of P or Q (0.5)	Wrong answer(0)				
	b-X-zygote OR embryo OR mitotic division Y-spores OR meiosis	Correct name of X& Y both(1)	Correct name of X or Y(0.5)	Wrong answer(0)				
	c-dominant generation i.e sporophyte and gametophyte both independent	Correct answer (1)	Some relevant information(0.5)	Wrong answer(0)				
2(xii)	Causative agent of CLCuD i.e begomoviruses	Correct name of causative agent(1)	Wrong answer(0)					
	Symptom of CLCuD i.e deep downward cupping of young leaves, leaf like structure etc	Correct one symptom(1)	Some relevant information(0.5)	Wrong answer(0)				

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	Treatment of CLCuD i.e insecticide against vector etc	Correct treatment(1)	Some relevant information(0.5)	Wrong answer(0)				
OR	Mechanism of translocation in plants i.e Source, phloem sieve tube elements, water potential, hydrostatic potential, sink etc	Correct explanations of any three criteria OR diagram with three labels(3)	Correct explanations of any two criteria OR diagram with two labels(2)	Correct explanations of any one criteria OR diagram with one label(1)	Some relevant information(0.5)	Wrong answer(0)		
2(xiii)	Definition of xerophytes with example i.e plants in little amount of water, cactus, opuntia etc	Correct explanation OR example (1)	Partially correct explanation OR example only (0.5)	Wrong answer(0)				
	Adaptations of xerophytes i.e reduced transpiration, leaves modified into spines, sunken stomata, thick cuticle, stomata close during day, succulent organs, deep roots etc	Correct explanation of any four criteria(2)	Correct explanation of any three criteria(1.5)	Correct explanation of any two criteria(1)	Correct explanation of any one criteria(0.5)	Wrong answer(0)		
OR	Dermis of skin in first line of defense i.e thick layer with keratin, dead cells, sweat glands, sebaceous glands, lactic acid as natural antibody etc	Correct explanation of any three criteria(3)	Correct explanation of any two criteria(2)	Correct explanation of any one criteria(1)	Some relevant information(0.5)	Wrong answer(0)		
2(xiv)	Names of growth promoters with effects on plant body parts .i.e auxins___ cell elongation etc gibberellins___stem elongation etc cytokinins ___cell division etc	Correct names with effects of both (2)	Correct names OR correct effects (1)	Some relevant information(0.5)	Wrong answer(0)			
	Names of growth inhibitor with effect on plant body parts i.e abscisic acid ___inhibits cell growth, dormancy, closure of stomata etc, ethylene or	Correct one name with effect (1)	Correct name OR correct effect (0.5)	Wrong answer(0)				

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	ethene ____ripening of fruits , abscission of fruits and leaves etc							
OR	Mechanism and example of irreversible non-competitive inhibition i.e destroys by altering shape, substrate cannot bind on active site, cyanides potent poisons ,ions of heavy metals, breaks disulphide bridges, inhibit cytochrome oxidase ,combines with iron etc	Correct explanation of any two criteria(3)	Correct explanation of any one criteria(2)	Some relevant information(01)	Wrong answer(0)			
Q.3	Evolution of seed i.e development of heterospory, evolution of pollen tube, evolution of integument around mega sporangium and seed	Correct explanation of any three criteria(6)	Correct explanation of any two criteria(4)	Correct explanation of any one criteria (2)	Partially correct explanation OR only names of stages(1.5)	Some relevant information(1)	Wrong answer (0)	
OR	Influx of potassium ions i.e morning time, low level of carbon dioxide stimulates K <sup>+</sup> ion , blue light ionizes malic acid into malate and H <sup>+</sup> ions ,drop of pH, combination of malate and potassium ions, movement of water in , turgidity of guard cells, stomata open etc	Correct explanation of any three criteria(6)	Partially correct explanation of any three criteria(5)	Correct explanation of any two criteria(4)	Partially correct explanation of any two criteria(3)	Correct explanation of any two criteria(2)	Some relevant information(1)	Wrong answer(0)



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	Efflux of potassium ions i.e evening time, level of CO <sub>2</sub> rises, efflux of K <sup>+</sup> ions from guard cell, reformation of malic acid, no blue light, water potential decreases, guard cells become flaccid, stomata closed etc	Correct explanation of any three criteria(3)	Correct explanation of any two criteria(2)	Correct explanation of any one criteria(1)	Some relevant information(0.5)	Wrong answer(0)		
Q.4	Mechanical digestion in stomach i.e. smooth muscles produce mixing waves, mixing waves mix bolus with gastric juice, formation of chime etc	Correct explanation of any two criteria(2)	Correct explanation of any one criteria(1)	Some relevant information(0.5)	Wrong answer(0)			
	Chemical digestion in stomach i.e mucus and its role, parietal cells, intrinsic factor, HCl and its role, chief cells and their role, pepsin and its role ,gastric secretion, acetyl choline and gastrin ,peristaltic waves etc	Correct explanation of mucus, HCl, pepsin and gastrin (5)	Correct explanation of mucus, HCl and pepsin or gastrin (4)	Correct explanation of mucus or gastrin, HCl or pepsin(3)	Correct explanation of any one criteria (2)	Some relevant information OR partial explanation of any one criteria (1)	Wrong answer (0)	
OR	Structure of Golgi complex i.e Cisternae , Golgi vesicles, forming face ,maturing face etc	Correct explanation of any two criteria (2)	Correct explanation of any one criteria (1)	Some relevant information(0.5)	Wrong answer(0)			
	Functions of Golgi complex i.e Processing of cell secretions, modification of proteins, formation of organelles like lysosomes and peroxysomes, formation of conjugated molecules, phragmoplast formation etc	Correct explanation of any four functions (4)	Correct explanation of any three functions (3)	Correct explanation of any two functions (2)	Correct explanation of any one function (1)	Some relevant information (0.5)	Wrong answer (0)	
	Diagram of Golgi complex	Correct diagram with two labels (1)	Partially correct diagram with partial labels(0.5)	Wrong answer(0)				

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Q.5	General characteristics of class Aves i.e streamlined body, two pairs of pent dactyl limb, feathers, jaws with no teeth, four chambered heart, right aorta persistent, endothermic, lungs ,syrinx, gizzard, uric acid, internal fertilization, one ovary and oviduct functional etc	Correct explanation of any six criteria (6)	Correct explanation of any five criteria (5)	Correct explanation of any four criteria (4)	Correct explanation of any three criteria (3)	Correct explanation of any two criteria (2)	Correct explanation of any one criteria (1)	Wrong answer(0)
OR	Structure and roles of Steroids i.e lipids of high molecular weight, nucleus with 17 carbon atoms, isoprene units, structural component of membranes, precursor of bile acids , hormones vitamin D etc	Correct explanation of any three criteria(3)	Correct explanation of any two criteria(2)	Correct explanation of any one criteria(1)	Some relevant information(0.5)	Wrong answer(0)		
	Structure and roles of prostaglandins i.e local hormones, arachidonic acid, reduce or increase blood pressure, induce fever and inflammation, regulate platelets, inhibited by aspirin etc	Correct explanation of any three criteria(3)	Correct explanation of any two criteria(2)	Correct explanation of any one criteria(1)	Some relevant information(0.5)	Wrong answer(0)		
Q.6	Transduction i.e transfer of genetic material by third party, bacteriophage replication inside bacteria, during infection DNA fragment transferred to new host bacterium etc	Correct description of process (2.5)	Partially correct description(2)	Some relevant information(1)	Wrong answer(0)			
	Transformation i.e bacteria die or reproduce and release fragments, transfer through immediate environment, transformed cells etc	Correct description of process (2.5)	Partially correct description(2)	Some relevant information(1)	Wrong answer(0)			

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	Diagram of transduction and transformation	Correct diagrams of both processes (2)	Correct diagrams of any one process or partially correct diagrams of both processes (1)	Some relevant diagrams (0.5)	Wrong answer(0)			
OR	Electrocardiogram i.e impulses passing through conducting system during cardiac cycle	Correct description (1)	Partially correct description(0.5)	Wrong answer(0)				
	Components of electrocardiogram i.e P wave, P-R interval, QRS complex, S-T segment, T wave etc	Correct explanation of any five criteria (5)	Correct explanation of any four criteria (4)	Correct explanation of any three criteria (3)	Correct explanation of any two criteria (2)	Correct explanation of any one criteria (1)	Some relevant information (0.5)	Wrong answer(0)
	Sketch of electrocardiogram	Correct labeled sketch(1)	Partially correct labeled sketch(0.5)	Wrong answer(0)				

**RUBRICS: HSSC-I 1<sup>st</sup> ANNUAL EXAMINATION 2024**  
**SUBJECT: BIOLOGY (Hard Area)**

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2(i)	<b>Diagram of Neutral Lipid :</b>  <b>Name of component X and Y</b>	Correct names of both X and Y part i.e, X = Glycerol Y = Fatty acids. (1)	Correct name of any one part. (0.5)	Wrong Answer. (0)				
	<b>Type of bond b/w X and Y</b>	Correct name i.e, ester bond <b>OR</b> ester linkage <b>OR</b> triglyceride bond. (1)	Partially correct name. (0.5)	Wrong Answer. (0)				
	<b>Why this molecule is called neutral lipid?</b>	Correct reason i.e, Because all three <b>OH</b> groups of glycerol are occupied by fatty acids and no charge bearing <b>OH</b> group is left. (1)	Partially correct reason. (0.5)	Wrong Answer. (0)				
OR	<b>Complete the table.</b>	All six correct information asked in given table i.e, <b>Porins</b> : Present in gram negative and absent in gram positive bacteria. <b>Peptidoglycan</b> : Less in gram negative and more in gram positive bacteria. <b>Thickness</b> : Thin (8-10 nm) in gram negative and thick (20-80 nm) in gram positive bacteria.(3)	Any five correct information. (2.5)	Any four correct information. (2)	Any three correct information. (1.5)	Any two correct information. (1)	Any one correct information. (0.5)	Wrong Answer. (0)

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2(ii)	<b>Definition of mesophytes.</b>	Correct definition i.e, Mesophytes are the plants found in the area where moderate supply of water is available. (1)	Partially correct definition. (0.5)	Wrong Answer.(0)				
	<b>Adaptation to their environment.</b>	Any four correct adaptations i.e, exposed in nearly isotonic conditions to avoid flooding and dehydration, moderate rate of transpiration due to medium sized leaves, store small amount of water, very thin cuticle on their surfaces etc. (2)	Any three correct adaptations. (1.5)	Any two correct adaptations. (1)	Any one correct adaptations. (0.5)	Wrong Answer. (0)		
OR	<b>Evolutionary adaptations in echinoderms regarding digestion, respiration and nervous system.</b>	Correct evolutionary adaptations regarding <b>digestion any two</b> i.e, digestive system is usually complete, axial or coiled anus is absent in ophiuroids etc. (1)	Partially correct information. (0.5)	Wrong Answer. (0)				
		Correct evolutionary adaptations regarding <b>respiration any two</b> i.e, respiration is performed by dermal branchiae, tube feet, respiratory tree. (1)	Partially correct information. (0.5)	Wrong Answer. (0)				
		Correct evolutionary adaptations regarding <b>nervous system any two</b> i.e, nervous system includes a circumoral nerve ring	Partially correct information. (0.5)	Wrong Answer. (0)				

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		and radial nerve cords, brain is absent. (1)						
2(iii)	<b>Differences between primary and secondary growth.</b>	<p>Any three correct differences i.e,  <b>Primary growth :</b>            Increase in length, continue throughout life, carried out by cell division in apical meristem etc.</p> <p><b>VS</b></p> <p><b>Secondary growth :</b>            Increase in thickness or diameter, role in support of plant body, carried out by the cell division in lateral meristem, wood formation etc. (3)</p>	Any two correct differences. (2)	Any one correct difference. (1)	Some relevant information. (0.5)	Wrong Answer. (0)		

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OR	<b>Differences between mitochondria and chloroplast.</b>	<p>Any three correct differences between mitochondria and chloroplast i.e,  <b>Mitochondria</b> : Site of cellular respiration, two membranes in which outer membrane is smooth and inner membrane is folded inwards (cristae), inner surface of cristae has granular structures called F0-F1 particles, power house of cell, self-replicating etc.</p> <p><b>VS</b></p> <p><b>Chloroplast</b> : Site for photosynthesis, consist of three parts (envelope, stroma &amp; thylakoids), contain photosynthetic pigments in membranes of smaller thylakoids, self-replicating etc (3)</p>	Any two correct differences. (2)	Any one correct difference. (1)	Some relevant information. (0.5)	Wrong Answer. (0)		
2(iv)	<b>How natural killer cell kills 'cells infected by bacteria' and 'cancerous cells'</b>	Correct description i.e, they are also called cytotoxic T-cells. They kill cell infected by bacteria and viruses	Partially correct information. (2)	Some relevant information. (1)	Wrong answer. (0)			

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	?	and cancerous cells by releasing proteins called <b>perforins</b> which punch holes through the membranes of infected cells. The pores formed by these proteins allow for the passive diffusion of certain apoptotic proteases known as <b>granzymes</b> in to target cells and it kills infected cells by apoptosis etc. (3)						
OR	<b>Why laboratory manufactured sugars are not metabolized by enzymes of our body?</b>	Correct description i.e, Laboratory manufactured sugars are L-sugars while natural sugars are D sugars. The enzymes of our body are designed to react only with D sugars. So laboratory manufactured sugars don't have appropriate enzyme in our body to metabolize. (3)	Partially correct description. (2)	Some relevant information. (1)	Wrong Answer. (0)			
2(v)	<b>Effect of pH on the rate of enzyme action.</b>	Correct description i.e, enzyme conformation is sensitive to pH changes because pH influences the charges on the amino acid side chains that are involved in maintaining tertiary and quaternary structure of enzyme, ionization of	Partially Correct information.(1)	Wrong Answer. (0)				



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		active site, etc (2)						
	<b>Optimum pH for trypsin and papain.</b>	Correct optimum pH value for both enzymes i.e, <b>Trypsin</b> = pH 8 <b>OR</b> act in alkaline medium <b>Papain</b> = pH 6.5 <b>OR</b> acts both in acidic and alkaline media. (1)	Correct optimum pH value for any one enzyme OR graph showing optimum pH of both enzymes. (0.5)	Wrong Answer. (0)				
OR	<b>Effect of temperature on the activities of RuBisCO.</b>	Correct description i.e, . Photo respiration starts when the level of CO <sub>2</sub> inside a leaf become low. This happens on hot dry days when plant begin to secrete abscisic acid which causes closing of stomata to prevent water loss etc. (3)	Partially correct description. (2)	Some relevant information. (1)	Wrong Answer. (0)			
2(vi)	<b>Complete the table.</b>	Any six correct terms in the table i.e, <b>Mode of nutrition :</b> Animals (ingestive hetretotrophs), plants (autotrophs), fungi (absorptive heterotroph) <b>Cell wall composition:</b> Animals (no cell wall), plants (cellulose), fungi (chitin). <b>Presence of centrioles</b> : Animals (present), Plants (absent), Fungi (absent)	Any five correct terms. (2.5)	Any four correct terms. (2)	Any three correct terms. (1.5)	Any two correct terms. (1)	Any one correct term. (0.5)	Wrong Answer. (0)

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		(3)						
OR	<b>Series of events in inflammatory response</b>	Correct description of any three criteria i.e, release of chemical signals such as histamines, dilation and increased leakiness of local blood vessels and migration of phagocytes to the infected area, phagocytes (macrophages and neutrophils) consumes bacteria and cell debris, tissue heals. (3)	Correct description with two criteria. (2)	Correct description with one criteria. (1)	Some relevant information. (0.5)	Wrong Answer. (0)		
2(vii)	<b>Labeled diagram of antibody.</b>	Diagram with two correct labeling. (2)	Diagram with one correct labeling. (1.5)	Only diagram with no labeling OR some relevant information. (1)	Wrong Answer. (0)			
	<b>Specific role of antibody.</b>	Any one correct role i.e, antibody bind with antigen to form antigen-antibody complex to promote phagocytosis <b>OR</b> activate complement system <b>OR combine</b> with toxin to neutralize them. (1)	Partially correct information. (0.5)	Wrong Answer. (0)				

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
OR	<b>Outline of Calvin cycle mentioning substrates and products of each step.</b>	Correct outline of all three steps (Carbon fixation, Reduction & Regeneration of CO <sub>2</sub> acceptor RuBP) mentioning substrates and products. (3)	Correct outline of any two steps. (2)	Correct outline of any one step. (1)	Some relevant information/ Only outline with no labels. (0.5)	Wrong Answer. (0)		
2(viii)	<b>Why HIV is called so?</b>	Correct reason i.e, HIV damage helper T cells. Hepler T cells regulate immunity, so damage of these cells by HIV affects human immune system. (1)	Partially correct reason. (0.5)	Wrong Answer. (0)				
	<b>Two opportunistic diseases caused by HIV.</b>	Any two correct diseases i.e, skin cancer, fungal infection, viral infection, gastrointestinal diseases etc. (1)	Any one correct disease. (0.5)	Wrong Answer. (0)				
	<b>Any two enzymes in HIV core.</b>	Correct names of any two enzymes i.e, reverse transcriptase, integrase, and protease. (1)	Any one correct name of enzyme. (0.5)	Wrong Answer. (0)				
OR	<b>Why bryophytes are called amphibious plants?</b>	Correct reason i.e, because bryophytes need water for their reproduction, development and existence. (1)	Partially correct reason. (0.5)	Wrong Answer. (0)				
	<b>Two distinguishing features of bryophytes.</b>	Any two correct distinguishing features i.e, lack vascular tissues, multicellular sex organs, alternation of generation,	Any one correct feature. (1)	Some relevant information. (0.5)	Wrong Answer. (0)			

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		sporophyte smaller and get its food from gametophyte, amphibious plants etc (2)						
2(ix)	<b>Difference of cleavage, coelom formation and blastopore fate in protostomes and deuterostomes.</b>	Correct difference of <b>cleavage</b> i.e, spiral and determinate in protostomes <b>VS</b> radial and indeterminate in deuterostomes. (1)	Partially correct information. (0.5)	Wrong Answer. (0)				
		Correct difference of <b>coelom formation</b> i.e, coelom formed by splitting of mesoderm in protostomes <b>VS</b> coelom formed by an out-pocketing of primitive gut. (1)	Partially correct information. (0.5)	Wrong Answer. (0)				
		Correct difference of <b>blastopore fate</b> i.e, blastopore develop into mouth in protostomes <b>VS</b> blastopore develop into anus in deuterostomes. (1)	Partially correct information. (0.5)	Wrong Answer. (0)				

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
OR	<b>Labeled diagram of lysogenic cycle of bacteriophage.</b>	Correct diagram with three labels. (3)	Correct diagram with two labels (2)	Correct diagram with one label. (1)	Diagram with no labels. (0.5)	Wrong Answer. (0)		
2(x)	<b>Blood circulation between heart and kidneys.</b>	Correct description of any three blood vessels i.e, renal artery enters into kidney and give branches which pass through renal medulla. In renal cortex they give rise to afferent glomerular arteriole. From here blood enters the peritubular capillaries and vasa recta. From here blood is drained through veins and leave the kidney as a single renal vein that empties in to inferior vena cave. (3)	Correct description of any two blood vessels (2)	Correct description of any one blood vessels (1)	Some relevant information (0.5)	Wrong Answer. (0)		

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
OR	<b>Definition of feedback inhibition in enzymes.</b>	Correct definition i.e, when the activity of an enzyme is inhibited by its own product it is called feedback inhibition. (1)	Partially correct definition. (0.5)	Wrong Answer. (0)				
	<b>Example of feedback inhibition.</b>	Correct example i.e, the amino acid aspartate becomes the amino acid threonine by a sequence of five enzymatic reactions. When threonine (the end product) is present in excess, it binds to an allosteric site on enzyme 1 of this pathway and then active site is no longer able to bind with aspartate. When all threonine is consumed, the pathway resumes its activity once again. OR correct flow chart (2)	Partially correct description OR partially correct flow chart. (1)	Some relevant information. (0.5)	Wrong Answer. (0)			
(xi)	<b>Parts of large intestine</b>	Any two correct names of the parts of large intestine, Caecum, vermiform	Any one correct name of the parts of large intestine (0.5)	Wrong answer (0)				

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
2(xi)		appendix. Colon (ascending, transverse, descending, sigmoid) and rectum. . (1)						
	<b>Specific role of large intestine</b>	<p>Any two correct role of the large intestine that is ;</p> <p><b>Absorption of water and electrolytes;</b> water and electrolytes absorption to make the stool solid., remaining substances become faeces which is stored.</p> <p><b>Absorption of vitamin;</b> Absorption of vitamins made by bacteria, the important of these vitamins is vitamin K and Biotin( B vitamin)</p> <p><b>Reducing acidity and protecting from infections;</b> mucosa of large intestine secretes bicarbonates to neutralize the increased acidity due to fatty acids, acts as mucosal barrier and protects from microbial infections and invasions. etc(2)</p>	Any one correct role of the large intestine. (1)	Some relevant information. (0.5)	Wrong answer (0)			

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
OR	<b>Definition of photoperiodism</b>	Correct definition of photoperiodism that is effect of the total duration of light on the developments of flowers in some plants. etc (1)	Partially Correct definition (0.5)	Wrong answer. (0)				
	<b>Role of photoperiodism on long day plants and short day plants with examples.</b>	Correct explanation of photoperiodism on ; <b>short day plants</b> flowers when the photoperiod is less than the critical length. For <b>example for Tobacco 14 hours photoperiod.</b> <b>OR</b> short day plant requires a low ratio of Pfr to Pr. <b>Long day plants;</b> flowers when the photoperiod exceeds from the critical length. <b>OR</b> critical photoperiod for long day plants is the minimum length of the day . <b>for example for henbane 11 hours</b>	Correct explanation effect of photoperiodism of any one short day <b>OR</b> long day plants.(1)	Some relevant information. (0.5)	Wrong answer. (0)			



Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		photoperiod is critical OR Long day plants requires a high ratio of Pfr to Pr.etc (2)						
2(xii)	<b>Inflorescence</b>	Correct description of both <b>inflorescence</b> ; <b>OR</b> correct diagram of both inflorescence i.e racemose <b>inflorescence</b> that is the main axis of inflorescence does not end in a flower but it continues to grow and give off flowers laterally. The basal flowers are older and upper are younger.etc. <b>Cymose inflorescence</b> ; here the main axis terminates in a flower but the growth continues through the lateral buds. The flowers are arranged in basipetal succession i.e the basal flowers are younger and the upper flowers are older e.t c. (3)	Correct description of any one OR correct diagram of any one (2)	Partially Correct description of both. (1)	Some relevant information (0.5)	Wrong answer. (0)		
OR	<b>Mycorrhizae</b>	Correct definition of Mycorrhizae that is mutualistic relationships between soil fungus and the roots of most plants.(1)	Partially Correct definition of Mycorrhizae (0.5)	Wrong answer. (0)				

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
	<b>Types of Mycorrhizae</b>	Correct description of both types of Mycorrhizae; <b>Ectomycorrhizae;</b> form a covering that is exterior to the root and they grow between the cell walls . e.t.c. <b>Endomycorrhizae;</b> penetrates only into outer cells of plant roots forming coils, swellings and minutes branches and also extend out into surrounding soils etc (2)	Correct description of any one (1)	Partially Correct description of any one (0.5)	Wrong answer. (0)			
2(xiii)	<b>Parts of bacterial flagellum</b>	Correct names of any two parts of bacterial flagellum and explanations of any two structures of bacterial flagellum i.e, <b>Basal body;</b> originates from cytoplasm, consists of two pairs of discs( gram positive bacteria have only one pair), anchor the flagellum in cell etc <b>Hook ;</b> connects basal body to the filament, projects from cell surface <b>Filament;</b> hollow structure originates from hook, contains flagellin protein.(3)	Correct names of any one part of bacterial flagellum and explanation of any one structure of bacterial flagellum (2)	Correct names of parts of bacterial flagellum OR partially correct explanation of any one structure of bacterial flagellum (1)	Some relevant information (0.5)	Wrong answer. (0)		

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
OR	<b>Three benefits of bacterial flora of human</b>	Correct description of any three benefits of bacterial flora that is The nonpathogenic resident bacteria occupy attachment sites on the skin and mucosa that can interfere with colonization by pathogenic bacteria. The ability of members of the normal flora to limit the growth of pathogens is called colonization resistance. They may serve as nutritional function that is producing vitamin, B and K by intestinal bacteria etc. (3)	Correct description of any two benefits of bacterial flora, (2)	Correct description of any one benefit of bacterial flora (1)	Some relevant information (0.5)	Wrong answer. (0)		
2(xiv)	<b>Complete the table</b>	All six correct information in the given table. 1. Whisk fern characteristics; resemblance to whiskbroom <b>OR</b> lack true roots, <b>OR</b> presence of rhizoids etc. Examples Rhynia <b>OR</b> psilotum . 2.Group name is Sphenopsida ( horsetail) Example equisetum. 3.Group name is	Any five correct information in the given table.(2.5)	Any four correct information in the given table.(2)	Any three correct information in the given table. (1.5)	Any two correct information in the given table. (1)	Any one correct information in the given table. (0.5)	Wrong answer. (0)

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		Pteropsida (ferns) Characteristics; seedless vascular plants <b>OR</b> occur in moist and warm tropical regions <b>OR</b> homosporous etc (3)						
OR	<b>Gametophyte of ferns.</b>	Correct name of the structure Prothallus (gametophyte)(1)	Wrong answer. (0)					
		Correct identification of A—Archegonium B--- Antheridium (1)	Correct identification of any one (0.5)	Wrong answer. (0)				
		Correct description of any one reason that gametophyte of ferns differ from other plants gametophyte that it is independent/ free living or photosynthetic. <b>OR</b> its prothallus is small, flat, heart shaped structure etc (1)	Some relevant information (0.5)	Wrong answer. (0)				
Q3	<b>Components and mechanism of ETC in Mitochondria</b>	Correct description of any two components of ETC in mitochondria that is NADH-dehydrogenase complex I, FADH-dehydrogenase complex II, Coenzyme Q, Cytochrome reductase complex III,	Correct description of any one component of ETC and partially correct description of mechanism of ETC (3)	Partial correct components of ETC OR partial correct description of mechanism of ETC (2)	Some relevant information (1)	Wrong answer. (0)		

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		cytochrome-c, cytochrome oxidase complex IV.  Correct description of any two criteria of mechanism/ Chemiosmosis and oxidative phosphorylation; synthesis ATP during oxidation of reduced co- enzymes NADH, FADH <sub>2</sub> , ATP synthetase, description of F1, F0 channel, , proton gradient, higher concentration of H+ FADH <sub>2</sub> produces 2 ATPs etc. (4)						
	<b>Flow Sheet of electron carriers in respiratory ETC OR chemiosmosis in respiratory ETC</b>	Any four correct components (2)	Any three correct componentsf (1.5)	Any two correct components (1)	Any one correct component (0.5)	Wrong answer (0)		
OR	<b>Characteristics of class Mammals</b>	Any six correct characteristics of class mammals , variously shaped, head, neck, trunk, tail, two pairs of pentadactylal limbs,	Any five correct characteristics of class mammals (5)	Any four correct characteristics of class mammals (4)	Any three correct characteristics of class mammals (3)	Any two correct characteristics of class mammals (2)	Any one correct characteristic of class mammals (1)	Wrong answer (0)

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		coelom, occipital condyles, large cranium, larynx, epiglottis, give birth, RBCs non nucleated etc .(6)						
Q4	<b>Role of lysosomes in autophagy and autolysis</b>	Correct description of any two criteria of lysosomes in Autophagy that is unwanted structures digested, , autophagosomes, process takes in starvation period to obtain energy, to control specific number of cell organelle e.g, number of mitochondria in heavy muscular exercise etc (3)	Correct description of any one criteria of lysosomes in Autophagy (2)	Some relevant information (1)	Wrong answer (0)			
		Correct description of any two criteria of lysosomes in intracellular digestion that is description of food vacuole, secondary lysosomes, contractile vacuole. Exocytosis of wastes etc (2)	Correct description of any one criteria of lysosomes in intracellular digestion (1)	Some relevant information (0.5)	Wrong answer (0)			
		Correct description of any two criteria i.e lysosomes in autolysis that is during	Partial Correct description of lysosomes in autolysis (1)	Some relevant information (0.5)	Wrong answer (0)			

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		developmental phase, some cells, structure to be disintegrated , programmed cell death, lysosomes burst and their enzymes contents dispersed and cell becomes fragmented, which are phagocytized by other cells, suicidal bags etc (2)						
OR	<b>Structure and role of conducting system of human heart</b>	Correct description of any four structures of conducting system that includes, cardiac muscles are myogenic, SA node, AV node, bundle of His, purkinje fibers (4)	Correct description of any three structures of conducting system (3)	Correct description of any two structures of conducting system (2)	Correct description of any one structure of conducting system (1)	Some relevant information OR only names of conducting system (0.5)	Wrong answer (0)	
		Correct explanation of role of any three components of conducting system that is 1) Action potentials originate in SA node, travel to AV node 2) from AV node to AV bundle to fibrous skeleton into interventricular septum. 3) AV bundle divide into right and left bundle branches, action potential descend to	Correct explanation of role of any two components of conducting system (2)	Correct explanation of any one role of component of conducting system(1)	Some relevant information (0.5)	Wrong answer (0)		

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		apex of each ventricle along bundle branches. 4) Action potentials carried by purkinje fibers from bundle branches to the ventricular walls e.t.c. (3)						
Q5	<b>1-General characteristics of Polysaccharides,</b>  <b>2- Characteristics and molecular structure of Starch,</b>  <b>3-Characteristics and molecular structure of cellulose</b>	<b>Correct</b> description of any two characteristics of poly saccharides; more than 10 saccharides units, highly complex structure, insoluble in water, tasteless etc (2)	<b>Correct</b> description of any one characteristic of poly saccharides;(1)	Some relevant information (0.5)	Wrong answer (0)			
		Correct description of any two Characteristics and molecular structure of Starch; homopolysaccharides of alpha glucose, stored in roots, stem, seeds , two types etc(2)	Correct description of any one Characteristic and molecular structure of Starch; (1)	Some relevant information (0.5)	Wrong answer (0)			
		Correct description of any two Characteristics (and molecular structure of cellulose; homopolysaccharides of beta glucose, component of plant cell wall, cotton, paper form from cellulose etc (2)	Correct description of any one Characteristic and molecular structure of cellulose; (1)	Some relevant information (0.5)	Wrong answer (0)			



Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
OR	<b>Pathways</b> taken by water to reach xylem	Correct of description of three pathways i.e. apoplast, symplast, vacuolar (6)	Partially Correct description of three pathways (5)	Correct description of any two pathways (4)	Partially Correct description of any two pathways (3)	Correct description of any one pathway (2)	Partially correct description of any one pathway (1)	Wrong answer (0)
Q.6	<b>Development of male gametophyte</b>	Correct description of male gametophyte(; microspore mother cells, microspores, gervative nucleus, pollen tube nucleus, sperms nuclei, male gametophyte etc (2)	Partially Correct description of male gametophyte (1)	Some relevant information (0.5)	Wrong answer (0)			
	<b>Development of female gametophyte, sketch of life cycle of flowering plant</b>	Correct description of female gametophyte; ovule, micropyle, megaspore, embryo sac, antipodal, synergids, fusion nucleus, polar nuclei etc(3)	Partially Correct description of female gametophyte (2)	Some relevant information (1)	Wrong answer (0)			
		Correct life cycle of flowering plant with labeling showing diploid, haploid, meiosis, fertilization e.t.c (2)	Partially correct life cycle of flowering plant with labeling showing diploid, haploid, meiosis, fertilization e.t.c (1)	Some relevant information (0.5)	Wrong answer (0)			
OR	<b>Structure of Pancreas and its role as exocrine gland.</b>	Correct description of the structure of pancreas complex organ have both exocrine and endocrine tissues, its head located within the curvature of the duodenum, a body and a tail, which extends	Partially Correct description of the structure of pancreas(1)	Some relevant information (0.5)	Wrong answer (0)			

Q.# /Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	
		to the spleen, pancreatic islets etc (2)						
		Correct explanation of any five criteria about role of pancreas as exocrine gland; exocrine secretions called pancreatic juice, two components are aqueous and enzymatic component , bicarbonates neutralize acidic chime, , enzymatic components includes role of trypsin, chymotrypsin carboxypeptidases, trypsinogen activated by proteolytic enzyme enterokinase into trypsin, amylase acts on polysaccharides, Lipases breakdown lipids to fatty acids and glycerols, deoxyribonucleases, ribonucleases etc, (5)	Correct explanation of any four criteria about role of pancreas as exocrine gland; exocrine (4)	Correct explanation of any three criteria about role of pancreas as exocrine gland; exocrine (3)	Correct explanation of any two criteria about role of pancreas as exocrine gland; exocrine (2)	Correct explanation of any one criteria about role of pancreas as exocrine gland; exocrine (1)	Some relevant information (0.5)	Wrong answer (0)