Question			Marking details	Marks Available
1	(a)		A = Capillary (network)/ capillaries ; B = Epithelial cell/ epithelium/ epithelial layer; C = Lacteal/ lymph vessel; NOT lymph node	3
	(b)		<table><tr><th>Feature</th><th>Explanation</th></tr><tr><td>Microvilli/ folded epithelium;</td><td>Increase/ large surface area/ greater {absorption/diffusion} (of digested products); increase catalytic surface area for digestion</td></tr><tr><td>(Dense/large) capillary network/ {good/rich} blood supply/ lots of capillaries;</td><td>{Transport/absorb} {glucose/amino acids] / maintain a {diffusion/concentration} gradient;</td></tr><tr><td>Presence of lacteal/ lymph vessel;</td><td>Absorb {lipids/fats/ fatty acids};</td></tr><tr><td>Thin epithelium/ epithelium one cell thick;</td><td>Short diffusion pathway;</td></tr></table>	Max 4
	(c)	(i)	Mucus;	1
		(ii)	{Lubricates/ reduces friction} (for passage of food); Prevents {auto digestion of /digestion of/ autolysis of/ the effect of acid/ enzymes on} the gut wall;	2
	(d)		Peristalsis; Correct action of circular and longitudinal muscles/ wave of muscle contraction; {Forces/pushes/ propels} food along/mixes food (for more efficient digestion/absorption); NOT move	3
	(e)		Deamination/ amino group removed; (amino groups) to urea; remainder to {carbohydrate/ glycogen};	Max 2
			Question 1 Total	**[15]**

Question			Marking details	Marks Available
2	(a)	(i)	Loss of water vapour/evaporation of water; From leaf/stomata/lenticels;	2
		(ii)	Cooling effect/{supply/movement} of {mineral (ions)/water} /maintains transpiration {pull/stream} /required for photosynthesis /allows water to reach aerial parts;	1
	(b)	(i)	Prevent entry of air into xylem/ prevent formation of air bubble in xylem; Which would break {transpiration stream/ cohesive forces}/ block movement of water;	2
		(ii)	Diameter of capillary tube; Distance travelled by bubble; Time taken;	Max 2
	(c)	(i)	Xerophytes;	1
		(ii)	{High humidity/ humid atmosphere} in air chamber; Because {water vapour/humid air} not removed by wind/ water vapour trapped; This produces a {less steep / reduces} {water potential/ diffusion/concentration} gradient; Between inside of leaf and air chamber/ inside and outside of stoma;	Max 3
		(iii)	{Smaller/less/ rolled} leaves/spines + reduced surface area (exposed to environment); {Reduced number/closure of stomata} + less openings for water to be lost through; {Hairs on leaves/rolled leaves} + {increases humidity/ reduces {water potential/ diffusion/ concentration} gradient/ traps water vapour}; Thick cuticle + reducing evaporation from surface of leaf;	Max 2
			Question 2 Total	**[13]**

Question			Marking details	Marks Available
3	(a)	(i)	Adaptive radiation;	1
		(ii)	Mutation (in common ancestor); (Leads to) variation/ change of beak (shape); Becomes specialised/ adapted {to occupy a particular {niche/environment}/eat particular food}; Have a selective advantage/ are better {suited/ adapted} to a particular environment/ better chances of survival/OWTTE; (More) reproduce and pass on {genes/ alleles};	Max 4
	(b)	(i)	Humans closely related to gorillas; More amino acids <u>in common</u>/ gorilla has 572 <u>in common</u> with Humans while horse has 557/ gorilla has 2 <u>different</u> from human while horse has 17 <u>different</u>; Share <u>more recent</u> common ancestor;	3
		(ii)	Chromatography/electrophoresis;	1
		(iii)	Reduces mistakes made in classification due to convergent evolution;	1
			Question 3 Total	**[10]**

Question			Marking details	Marks Available
4	(a)		Increases surface area; Diffusion takes place (over whole area);	2
	(b)	(i)	Mouth opens/floor of buccal cavity lowered; Volume of {buccal cavity/inside the mouth} increases/pressure lowered inside {buccal cavity/mouth}; Water {pulled in from outside/ enters due to pressure difference}; Mouth closes **and** {buccal cavity then contracts/ floor of buccal cavity raises}; Water forced {across/through} gills (into gill cavity); Pressure in gill cavity increases; Forces open the operculum / gill slits;	Max 4
		(ii)	Blood flows across (gills/ filaments/ lamellae/ gill plates) in opposite direction to water; Blood always meets water containing a higher oxygen concentration/{diffusion/ concentration} gradient maintained/ equilibrium is never reached; Across entire {gill/ gas exchange surface}; Higher saturation of blood with oxygen achieved;	Max 3
	(c)	(i)	Diffusion pathway would be too long/ ensures a short diffusion pathway; Speed of diffusion too slow; To supply sufficient oxygen;	Max 2
		(ii)	Less fluid/ fluid moves into muscle fibres/ fluid level decreases; More area for gaseous exchange/ shorter diffusion pathway;	2
			Question 4 Total	**[13]**

Question		Marking details	Marks Available
5	(a)	(Phloem) parenchyma; (Phloem) fibres;	2
	(b)	<table><tr><th>Feature</th><th>Explanation</th></tr><tr><td>Presence of <u>sieve</u> {plates/pores};</td><td>Permits bidirectional flow/ permits flow {from cell to cell/ through the plant};</td></tr><tr><td>{Few/no} organelles/ {thin/peripheral} cytoplasm;</td><td>No obstruction to flow of solutes;</td></tr><tr><td>Plasmodesmata;</td><td>Allows transport of {molecules/ ATP/ sucrose} from <u>companion cell</u> (to sieve tube element);</td></tr></table> Maximum of two features with matched explanation Explanation mark only given if feature correct	Max 4
	(c)	Mass flow is {a passive process/ not an active process}; From high to low {concentration/pressure}/ down a concentration gradient; {Mitochondria/energy/ATP} not required (in a passive process);	3
		Question 5 Total	**[9]**

Question			Marking details	Marks available
6	(a)	A	(some) CO_2 {<u>dissolves</u> directly/ <u>in solution</u>} in the plasma;	
		B	(some)CO_2 {diffuses into/absorbed by} {red blood cells /erythrocytes};	
		C	(some) CO_2 combines with haemoglobin/ to form carbamino {haemoglobin/ compounds};	
		D	(most) CO_2 combines with water to give carbonic acid;	
		E	(catalysed) by carbonic anhydrase;	
		F	carbonic acid dissociates into hydrogen carbonate and hydrogen ions;	
		G	hydrogen carbonate ions pass out (into plasma);	
		H	(chloride shift) allows movement of Cl^- into red blood cells;	
		I	to maintain {electrical/ electrochemical} neutrality;	
		J	<u>increased</u> {conc/partial pressure} of CO_2 (dissolved in blood);	
		K	lowers pH of blood/blood becomes more acidic;	
		L	oxyhaemoglobin {accepts H^+/acts as a buffer};	
		M	reduces <u>affinity</u> of haemoglobin for oxygen;	
		N	<u>more</u> oxygen is released (from oxyhaemoglobin)/ <u>more</u> oxyhaemoglobin dissociates;	
		O	oxygen dissociation curve moves to the right/Bohr {shift/effect}; Accept credit from graph/ diagram	

Question		Marking details	Marks available
(b)	A	Both are tubular/contain a lumen/ OWTTE;	
	B	Both have movement by mass flow/OWTTE;	
	C	Both movement along pressure gradients;	
	D	Both movement in one direction only;	
	E	Artery transports blood, xylem water;	
	F	Movement of liquid pulsatile in arteries, smooth in xylem;	
	G	Arteries living, xylem dead;	
	H	Pressure generated by heart in arteries, no pump for xylem;	
	I	Xylem vessels contain lignin;	
	J	Xylem has support function;	
	K	{Adhesive forces/ hydrophilic lining} in xylem;	
	L	Arteries have {muscle/elastic tissue}; can be shown on diagram	
	M	Arteries distend/recoil;	
	N	Smooth endothelium of artery/ endothelium reduces friction;	
	O	Artery <u>walls</u> composed of layers;	10
		Question 6 Total	**[10]**