GCE BIOLOGY BY1

Questions			Marking details	Marks Available
1.	(a)	(i)	Biosensor;	1
		(ii)	Tissue;	1
	(b)	(i)	Prokaryotic has no nucleus vs eukaryotic has a nucleus / eukaryotic has membrane bound organelles vs prokaryotic no membrane bound organelles (Accept named membrane bound organelle) / prokaryotes smaller ribosomes (70S) vs Eukaryotes larger (80S) / DNA circular v DNA in chromosomes or strands [must refer to both terms]; Reject reference to cell wall; Reject reference to size; Reject reference to plasmid;	1
		(ii)	Chloroplast contain chlorophyll vs mitochondria have no chlorophyll (accept photosynthetic pigments) / grana vs no grana / stroma vs matrix / cristae vs no cristae / thylakoid vs no thylakoids / cristae vs grana / infolding of membrane in mitochondria not in chloroplasts [must refer to both structures];	1
			Question total	**4**

Questions			Marking details	Marks Available
2.	(a)	(i)	α glucose OH on C1 down, H up + β glucose OH on C1 up, H down; Allow HO (both for 1 mark).	1
	(b)	(i)	Cellulose –Beta Starch – alpha; (both for 1 mark). Allow symbols.	1
		(ii)	Starch: **any 2** correct reference to amylose and/or amylopectin; glycosidic bonds (α 1-4); molecules coil/branch (in amylopectin); NOT compact NOT: amylopectin – coiled or amylase branched easy to add/remove {<u>glucose / maltose</u>} units;	2
			Cellulose: **any 2** alternate units rotate / head up, head down / 180° rotation; straight chain only / no branches; NOT parallel hydrogen bonds between / reference to cross linking; gives strength or stability / forming microfibrils;	2
			Question total	**6**

Questions			Marking details	Marks Available
3.	(a)	(i)	Nucleotide;	1
		(ii)	Phosphate / phosphoric acid / PO_4 / PO_3^-; NOT phosphorus / P	1
		(iii)	Deoxyribose in DNA **and** ribose in RNA (both);	1
		(iv)	Adenine, Thymine, Cytosine, Guanine (1 if 1 error).	2
	(b)		**Any 4** Pairing described A-T and C-G (both needed); Backbone / Chains / polynucleotide formed by alternating sugar phosphate groups; two chains connected / joined by base pairs; hydrogen bonding; two chains (twisted) to form a helix / double helix; NOT alpha helix. Accept labelled diagram.	4
	(c)		{forming template / code / instructions} for {protein synthesis / mRNA / amino acid sequence / primary structure of protein / transcription} (accept Replication in dividing cells) / NOT genetic material alone.	1
			Question total	**10**

Questions			Marking details	Marks Available
4.	(a)		2 chromosomes in female cell; 1 chromosome in male cell; Diagrams must match each other. Accept 'chromatids' in each cell. Do not accept chromatid in male cell if chromosomes drawn in female cell or opposite.	2
	(b)	(i)	2 Chromosomes arranged on equator of spindle; (ignore orientation) 2 V shaped {chromosomes / chromatids} with centrosomes towards each centriole/pole; Ecf from one diagram to other.	2
		(ii)	Labelling: chromatids, centromere, spindle, centrioles, equator, cell membrane. 2 marks for 4 correct labels on either diagram; 1 mark for 3.	2
		(iii)	To provide {genetically identical cells / clones}; Repair / replacement {<u>of cells / tissue</u>} / regeneration qualified; NOT growth.	2
		(iv)	Making gametes / sperm cells / sex cells / produce haploid cells for reproduction;	1
		(v)	Meiosis / reduction division; Spelling must be correct.	1
		(vi)	Genetic variation (in the offspring) / restore diploid number (in zygote) OWTTE;	1
	(c)		Fertilised eggs will develop into females, unfertilised eggs into males; (both for 1 mark); Accept: fertilised will give genetically varied ants, unfertilised would give clones; IGNORE haploid / diploid.	1
			Question total	**12**

Questions			Marking details	Marks Available
5.	(a)	(i)	OH and H removal shown on diagram; formation of water (H_2O) shown; dipeptide correctly drawn with C joined to N;	3
		(ii)	Condensation;	1
		(iii)	Peptide; NOT dipeptide;	1
	(b)	(i)	Mosaic: <u>Proteins</u> are scattered (in lipid layer); Fluid: molecules / components / (phospho)lipids / proteins are free to move around;	2
		(ii)	B;	1
		(iii)	Drawing shows a lipid bilayer with A and B in the correct places, B intrinsic (through the middle) A extrinsic (on top or bottom, outside phosphate heads); Need not use N and P, but must be clear which is A and B any 1 correct label from phospholipid / hydrophobic / hydrophilic / cholesterol / phosphate (head) / lipid or fatty acid (tails);	1 1
		(iv)	<u>Cell</u> {recognition / interaction / identification / cell to cell recognition / adhesion / signalling} / receptor qualified e.g. {hormone receptor / antigens};	1
	(c)	(i)	Secondary;	1
		(ii)	Ribosomes / rough endoplasmic reticulum; Accept nucleus; NOT golgi body / nucleolus.	1
	(d)	(i)	Endocytosis (accept phagocytosis / pinocytosis); NOT exocytosis.	1
		(ii)	Any 2: Diffusion / osmosis; Facilitated diffusion; Active transport;	2

Questions			Marking details	Marks Available
6.	(a)	(i)	0.4M; no units no marks.	1
		(ii)	-1052 (kPa); allow ECF	1
	(b)		correct reference to osmosis; bathing solution {has a lower water potential / is more concentrated / is more negative / hypertonic} than the water potential of beetroot cells / ORA; water leaves / moved {out of / from} cells / into bathing solution; bathing solution became less dense / lighter than original sucrose solution; REJECT reference to water moving into or out of the drop.	4
	(c)		$-790 = -1100 + \Psi_p$; $\Psi_p = 310$ kPa; 2 marks for correct answer.	2
	(d)	(i)	Diagram shows cell plasmolysed (any stage); Mark diagram using labels. No labels = 0 marks. Any **2** correct labels from cell wall; plasma / cell membrane (part or all of which must be away from cell wall); tonoplast or vacuolar membrane; vacuole; IGNORE incorrect labels.	1 2
		(ii)	Plasmolysed / plasmolysis;	1
			Question total	**12**

Questions		Marking details	Marks Available
7. (a)	A	Nucleus;	1
	B	Contains DNA code for amino acid sequence; NOT genetic information alone;	1
	C	Carries out transcription / makes RNA copy;	1
	D	Nucleolus;	1
	E	Makes ribosomes / organises transcription / makes rRNA;	1
	F	{Rough ER / Ribosomes} { translate mRNA / put amino acids together / protein synthesis};	1
	G	Endoplasmic reticulum;	1
	H	Transports protein;	1
	I	(To) Golgi;	1
	J	Packages protein into vesicle;	1
	K	Modifies protein or description;	1
	L	Secretory vesicle;	1
	M	Vesicle migrates towards plasma membrane; (can award M and N if use vesicle instead of secretory vesicle)	1
	N	Vesicle fuses / merges with plasma membrane;	1
	O	Contents of vesicle emptied by exocytosis;	1
		Question total	**10**

Questions		Marking details	Marks Available
7. (b)	A	Temperature;	1
	B	description of (exponential) increase to optimum / maximum / certain temperature then (sudden) decline / sketch graph showing;	1
	C	Increasing temperature increases rate because of increased energy / moving molecules faster / kinetic energy / ORA;	1
	D	{Increasing frequency of / more / more likely} successful collisions / Enzyme Substrate Complexes forming / ORA;	1
	E	pH;	1
	F	description of optimum pH and declining activity further from optimum in both directions / sketch graph / optimum pH and narrow range;	1
		(Award G, H, I, J in context for Temp and/or pH)	
	G	(3D) shape of active site changes;	1
	H	Changing away from optimum affects bonds holding tertiary structure / structure of enzyme molecules;	1
	I	Correct reference to hydrogen / covalent / ionic bonds; NOT disulphide / peptide	1
	J	Substrates do not fit into active site / is not complementary (so rate reduced);	1
	K	Substrate concentration; NOT amount;	1
	L	Enzyme concentration; NOT amount;	1
		(Award M,N, O in context for Enzyme conc and/or Substrate conc)	
	M	Activity increases up to maximum when it levels off / sketch graph showing / ORA;	1
	N	Increasing substrate / enzyme conc. increases number of active sites occupied / Enzyme Substrate complexes / successful collisions / ORA;	1
	O	Maximum rate when all active sites occupied / saturated correct reference to limiting factors;	1