BY1

Question			Answer	Mark
1.	(a)	(i)	Mitochondrion/ mitochondria	1
		(ii)	Respiration/ aerobic respiration	1
			stores {energy/ ATP}/ release energy/ {synthesis/produce ATP}/ release energy / ATP for respiration =2 marks NOT production of energy	1
		(iii)	muscle / liver/ epithelial cells of small intestine / cells of proximal convoluted tubule/ neurones/ companion cells/ sperm/ secretary cells NOT muscle tissue/ the liver/ cardiac tissue	1
	(b)		A	1
	(c)		allows transport of { <u>messenger/ mRNA</u>}/ nucleotides/ ribosomes NOT out and in	1

(Total 6 marks)

Question		Answer	Mark
2.	(a)	nitrogen (not: N)	1
	(b) (i)	heat/boil with {Benedict's/ Fehlings A + B} solution; NOT boil	1
		with acid	1
		colour change from blue to {green/yellow/orange/brick red/ brown}	
	(ii)	A	1
	(c)	C	1
	(d) (i)	D	1
	(ii)	saturated- no double bonds/ all carbon atoms have/attached to two hydrogens ;	1
		Fewer hydrogen atoms (or converse)	1
		Must have comparison for each	

(Total 8 marks)

Question			Answer	Mark
3.	(a)	(i)	hydrogen/H	1
		(ii)	{Holds/binds} {cellulose/glucose} {chains/molecules} together/ forms microfibrils;	1
			strengthens (the wall)/ (cellulose fibres are) strong/ rigid/ gives structural stability/ can resist turgor/ osmotic pressure/ prevents plant cells bursting.	1
	(b)	(i)	condensation/ polymerisation	1
		(ii)	(Has) amino acid (added)/glucosamine (to form a mucopolysaccharide)/ amine/ NH_2	1
		(iii)	(exo)skeleton – strong/waterproof/ light/ rigidity/ tough NOT exoskeleton gives protection	1
	(c)	(i)	glycogen	1
		(ii)	starch (accept amylose/ amylopectin)	1

(Total 8 marks)

Question			Answer	Mark
4.	(a)	(i)	0.26	1
		(ii)	concentration of substrate NOT amount/ availability of Active sites	1
	(b)	(i)	Less/low <u>kinetic</u> energy ;	1
			fewer successful collisions/ {enzyme substrate/ES} complexes formed/ ORA	1
		(ii)	enzymes denatured/ alteration in tertiary structure/ 3D structure; breaking of H/ hydrogen bonds; NOT disulphide active site altered/ active site denatured; substrate cannot bind/ less enzyme substrate complexes formed (any three)	3
	(c)	(i)	Must be a curve starting at origin and may meet 30°C line but not levelling off	1
		(ii)	{shape/structure} of inhibitor similar to substrate/complementary to active site; {Fits/ fills/ bonds/ attaches} to active site/ competes for active site; (As it has a similar shape to the substrate it competes for the active site = 2 marks.) <u>At higher substrate concentration</u> there is a greater chance of Enzyme substrate complexes forming / effect of inhibitor is diminished/ the substrate outcompetes the inhibitor/ ORA	3

(Total 11 marks)

Question		Answer	Mark
5.	(a)	deoxyribose/ pentose/ 5 C sugar	1
	(b) (i)	A-T-A-G-C	1
	(ii)	Guanine pairs with cytosine/ G pairs with C = 60%/ G+ C = 60%; A+T= 40% A= 20% (any two) Correct answer = 2 marks	2

(Total 4 marks)

Question			Answer	Mark
6.	(a)	(i)	J K L H I	1
		(ii)	I = telophase	1
			L = metaphase	1
	(b)	(i)	interphase	1
		(ii)	ATP production/ metabolically active; Replication of DNA; NOT synthesis/ doubling {Making/ replacing} new organelles/ replication of mitochondria/ chloroplasts NOT replication of organelles Protein synthesis; Cell increase in size (not growth) (any two)	2
	(c)		DNA Doubled / DNA content increased from 20 to 40	1
			and then halved (to maintain DNA content) (in two daughter cells.) (ignore reference to chromosomes)	1
	(d)		Two genetically identical daughter cells are produced; {Genetically identical/ clone} of parent cell.	2

(Total 10 marks)

Question		Answer	Mark
7.	(a)	A = phospholipid head/hydrophilic head/phosphate/polar group;	1
		B = hydrophobic tails/ fatty acids/ non polar tails: (Not: tails/ lipid layer)	1
		C = transmembrane protein/ carrier protein/ channel protein/ intrinsic protein.	1
	(b) (i)	As lipid solubility increases the rate increases; NOT rate of reaction	2
		Membrane contains (a double layer) of phospholipids/ Lipid soluble substances can {move/pass/ diffuse} through the membrane (more easily than water soluble substances.) (any two)	
	(ii)	small molecules diffuse faster(or converse);	1
		Higher kinetic energy/ easier to pass between phospholipid molecules.	1
	(c)	concentration/ diffusion gradient/ concentration difference;	2
		{amount/number} of carriers/ channel proteins/ larger surface area contains more carrier proteins;	
		temperature. (any two)	

Question	Answer	Mark
(d)	vitamin B_1 – polar/ ionic; Cannot pass through phospholipid layer/ hydrophobic region; Uses protein channels/ carriers/ transport proteins/ Hydrophilic (lining to) channels; (any two)	2
	Vitamin K - non polar/non ionic; dissolves in phospholipid/ hydrophobic regions; so can pass (directly) through phospholipid/ hydrophobic regions; (any two)	2
		(Total 13 marks)

Question	Answer	Mark

8. (a)

A. enzyme (molecules) {fixed/ bound/ trapped} in an {inert support/ matrix}

B alginate beads/ gel membrane, /adsorbed (NOT absorbed)onto nylon/ gel capsule/ cellulose

C Product not contaminated

D reuse of enzymes/recovery/ easily separated.

E stable/ tolerate wider range of conditions

F for example pH, temperature/ higher temperatures than normal/ denatured at higher temperatures

G several enzymes can be used together/ with differing pH or temperature optima.

H rapid/ greater productivity

Biosensors

I accurate/ specific

J detect/sensitive to low concentrations/ clinistix

K used in diagnosis of diabetics/ diabetes

L {Biosensor/electrode probe} has a specific enzyme immobilised in a membrane/ glucose oxidase in context

M glucose diffuses into the immobilised enzyme layer/ through selectively permeable membrane

N (enzyme together with transducer) produces an electrical signal in response to substrate transformation/ chemical to electrical signal

O size of signal proportional to concentration of product/ substrate

(Any 10 out of 15 points)

Question		Answer	Mark
8. (b)	A	primary structure, {sequence/ order} of amino acids in its polypeptide chain	
	B	linked by peptide bonds	
	C	secondary structure consists of – α helix/ pleated sheet	
	D	hydrogen bonds	
	E	tertiary structure described - 3D folding/ irregular/ further folding	
	F	as shown by globular proteins	
	G	disulphide bridges/ ionic/ hydrogen/ hydrophobic (any two)	
	H	Quaternary structure described- combination of two or more polypeptide chains	
	I	Some proteins have non-protein groups/ prosthetic groups	
	J	enzymes – function or description of	
	K	antibodies/hormones/ plasmaproteins with function	
	L	haemoglobin – {carries/ transport} of oxygen	
	M	fibrous proteins + example connective tissue/ keratin/ collagen	
	N	Function of fibrous protein - strength	
	O	carriers in active transport/ facilitated diffusion /fibrinogen in blood clotting /histones/ ribosomal proteins	
		(Any 10 out of 15 points)	