GCE BIOLOGY BY1

MARK SCHEME - SUMMER 2014

Question			Marking details	Marks Available
1	(a)	(i)	Cuboidal; Kidney tubule; Accept kidney/ liver/named gland/ureter/ovary/glands	2
		(ii)	Ciliated;NOT cilia Trachea / oviduct/fallopian tube/ bronchi/bronchioles;	2
	(b)			4

B	*nucleus*	contains DNA which {codes for/ controls} protein synthesis/ transcription/ DNA {synthesis/replication};
C	*nuclear pores*	{Transport/movement} of {mRNA/ nucleotides/rRNA}; Accept ribosomes NOT transport of mRNA in
D	Nucleolus;	Produces {rRNA/ribosomes/tRNA}; NOT produces RNA unqualified

(c) 1

Organelle A	Nucleus
Inner membrane is folded / Has cristae	No folding of inner membrane / no cristae;
No ribosomes attached	ribosomes attached;

must be comparative

(d) Ribosomes are not attached to {membranes/ ER} in prokaryotes (some) are in animal cells; 2
Ribosomes are {larger/80S} in animal cells than prokaryotes / 70S;
must be comparative

Question 1 Total [11]

Question			Marking details	Marks Available
2	(a)		(An organ) is an {aggregation/collection} of several <u>tissues</u>; To carry out a {specific/particular} {f<u>unction/task/job}</u> (for the whole organism);	2
	(b)	(i)	Carbohydrates; Accept polysaccharides	1
		(ii)	Any **two** from Alternating molecules rotated through 180º form <u>straight</u> chains; {Cross links/hydrogen bonds/ H bonds} form between chains; forming <u>microfibrils</u>;	Max 2
		(iii)	Proteins/amino acids/nucleic acids/ nucleotides/ {organic/nitrogenous} bases; NOT DNA/RNA	1
			Question 2 Total	**[6]**

Question		Marking details	Marks Available
3	(a)	Iron / $Fe2^{+}$;	1
	(b)	{Four polypeptide chains / two alpha and two beta subunits}; in tertiary form are {combined/joined};	2
	(c)	Add {biuret (reagent) / copper sulphate and sodium hydroxide}; Reject boil/heat Colour changes from blue to {purple/lilac/violet};	2
	(d)	Biosensor;	1
		Question 3 Total	**[6]**

Question			Marking details	Marks Available
4	(a)		A – Phosphate; Accept phosphoric acid B – Deoxyribose; NOT pentose C – {Organic/nitrogenous} base; NOT named base (can be neutral)	3
	(b)		Uracil in RNA thymine in DNA; NOT U in RNA and T in DNA RNA is (usually) single stranded, DNA is double stranded; DNA is <u>longer</u> molecule than RNA ; Sugar is ribose in RNA, deoxyribose in DNA;	Max 2
	(c)	(i)	Interphase;	1
		(ii)	Anaphase;	1
		(iii)	<table><tr><th>Meiosis</th><th>Mitosis</th></tr><tr><td><u>4</u> cells</td><td><u>2</u> cells produced;</td></tr><tr><td>Haploid/ half the number of chromosomes of the parent cell</td><td>Diploid/ same number of chromosomes as the parent cell</td></tr><tr><td><u>Genetically</u> different;</td><td><u>genetically</u> identical; Accept clone</td></tr></table>	3
			Question 4 Total	**[10]**

Question		Marking details	Marks Available
5	(a)	(Method) Diffusion; (Reason) Rate is proportional to concentration; NOT graph is proportional	2
	(b)	(Increasing ion concentration) increases chance that (a molecule will) {collide with/ pass through} {pump/carrier/protein};	1
	(c)	Active transport;	1
	(d)	$\Psi_S = \Psi - \Psi_P$ / i.e. -100 -200; -300 kPa; (Must have units) Correct answer + unit = 2 marks Correct answer + no unit = 1 mark	2
		Question 5 Total	**[6]**

Question			Marking details	Marks Available
6	(a)		7/8 **nm** (must have correct units); Accept range of 6-10	1
	(b)		Vitamin A - {Dissolves in /can pass directly through} {phospholipid layer/ hydrophobic regions}; By diffusion; Glucose – Cannot pass through phospholipid layer therefore uses {protein channels/ carriers/ transport proteins/ hydrophilic channels/intrinsic proteins}; By facilitated diffusion; Accept active transport	4
	(c)	(i)	Ethanol {dissolves/emulsifies} (phospho)lipids/ denatures protein; NOT cell membranes Creates {gaps/holes/pores} in the membrane/ makes membrane more porous; NOT makes membrane more permeable	2
		(ii)	Increased temperature increases kinetic energy of {dye/membrane} molecules; Increases (rate of) diffusion (of dye across membrane)/dye diffuses across the membrane more rapidly;	2
			Question 6 Total	**[9]**

Question			Marking details	Marks Available
7	(a)		Any **two** from Product not contaminated with enzyme; Enzyme can be re-used/ small quantity of enzyme required; Can {withstand/tolerate} a wider range of pH; Can be used in a continuous process;	Max 2
	(b)		Increases (contact) time between enzymes and substrate/ more time for pectinase to digest {apple pulp/pectin}; More successful collisions/more enzyme substrate complexes formed; NOT ESC	2
	(c)	(i)	40°C to 60°C {decrease in/less} (volume of) juice extracted; NOT less juice extracted above 40 °C Above 60 °C no juice extracted; Between 40 °C and 60 °C enzymes are denaturing/ above 60°C they are denatured; Hydrogen bonds break; {Tertiary structure deformed / active site changes shape} {Substrate can no longer fit/ fewer enzyme substrate complexes formed};	Max 4
		(ii)	(Free enzymes) can move; Increased chance of successful collision / more enzyme substrate complexes formed;	2
		(iii)	(Increased juice extracted with membrane bound enzymes) because membrane bound enzymes are {more accessible/OWTTE} to substrate; (Enzymes immobilised inside bead) substrate has to {diffuse/pass} into bead;	2
			Question 7 Total	**[12]**

Question			Marking details	Marks Available
8	(a)		**Carbohydrates**	Max 10
		A	Glucose for respiration;	
		B	Starch for storage of {glucose/energy}in plants;	
		C	Cellulose for structural support in plant cell walls/ chitin in {insect exoskeleton/ fungi};	
		D	Glycogen for storage of {glucose/energy} in animals;	
		E	{Glycogen/starch} <u>insoluble</u> so no osmotic effect;	
		F	Disaccharides or named + function (e.g. sucrose for transport in plants);	
			Lipids	
		G	Saturated fatty acids for storage in animals/ unsaturated fatty acids for storage in {seeds/plants};	
		H	Thermal insulation/buoyancy;	
		I	Waxes for waterproofing in leaves;	
		J	Good source of energy, twice as many as carbohydrates or value 38 kJ per g;	
		K	Correct ref to protection of organ <u>from physical damage</u> (e.g. kidney);	
		L	Electrical insulation in neurons (ref to myelin);	
		M	Source of metabolic water from <u>respiration</u> of lipids;	
			Used to make other molecules (CHO / glucose / lipids needed to make)	
		N+	Any two for one mark each from:	
		O	Chlorophyll *with* magnesium / phospholipids *with* phosphate/ {DNA/RNA/ATP} *with* nitrogen and phosphate / amino acids *with* nitrogen/ glycoprotein *with* protein;	

Question		Marking details	Marks Available
8	(b)	**Rough Endoplasmic Reticulum**	Max 10
	A	Flattened sacs/cisternae (or from diagram);	
	B	Continuous with nuclear membrane (or from diagram);	
	C	With attached ribosomes (must be clearly labelled on diagram);	
	D	Site of {protein synthesis/translation}/transport system;	
		Golgi	
	E	Golgi consists of a {series/system/group/stack} of (dynamic) flattened sacs (diagram must show at least 3);	
	F	Function in packaging proteins (for secretion);	
	G	Vesicles containing proteins from RER fuse with Golgi membrane and contents are shed into Golgi sacs/ coalescence of vesicles;	
	H	(Contents are built into more complex molecules such as) enzymes/glycoproteins;	
	I	Other Golgi function, e.g. carbohydrate secretion/ transporting or storing lipids;	
	J	{Vesicles containing product/lysosomes} are budded off;	
	K	Ref. to exocytosis of contents; NOT in context of lysosomes	
		Lysosomes	
	L	Lysosomes contain digestive enzymes/lysozyme;	
	M	Function is to {break down worn out organelles/digest foreign material/ cause autolysis/ intracellular breakdown};	
	N	{Lysosomes/vesicles} fuse with membrane of digestive vacuoles;	
	O	Enclosed by <u>phagocytosis;</u> NOT in context of lysosomes	
		Award Max 8 if only 2 organelles described	
		Points A,B,C and E can be accepted from clear diagram	
		Question 8 Total	**[10]**