

GCE BIOLOGY BY5

Question	Marking details	Marks Available
1. (a)	A	1
(b)	I	1
(c)	H/C	1
(d)	F	1
(e)	G	1
Question total		5

Question	Marking details	Marks Available
2. (a)	The transfer of pollen from the anther to the stigma.	1
(b) (i)	Embryo sac.	1
(ii)	Through stigma, style, ovary wall, micropyle. (Must travel through ovary wall to bottom before going into micropyle)	1
(c) (i)	Oviduct / fallopian tube;	
(ii)	<ul style="list-style-type: none"> • (Acrosome / Y) <u>contains enzymes</u>; Not Y is an enzyme • which {<u>hydrolyse / dissolve / breakdown / digest / softens</u>} the {<u>zona pellucida / jellycoat</u>}; 	2
(d)	<ul style="list-style-type: none"> • <u>Formation / growth</u> of <u>tube</u>; • <u>nucleus</u> travels along a {<u>tube / channel / pathway</u>} (into the egg / ovule); • <u>enzymes are produced</u> which {<u>allow a tube to grow / which digests a path</u>}; • both are chemotropic; • membranes burst to release male gametes; 	2
Question total		8

Question	Marking details	Marks Available
3. (a)	1. Smooth, coloured; 2. Wrinkled, colourless; Accept non- coloured;	2
(b)	Linked / on same chromosome / (genes) are inherited together; NOT sex linked;	1
(c) (i)	Smooth, colourless AND wrinkled, coloured;	1
(ii)	Crossing over / exchange of alleles; Not independent assortment / recombinants / chiasmata alone.	1
(d)	F1 SsCc	1
	F2 Sscc or SScc or ssCc or ssCC	1
Question total		7

Question	Marking details	Marks Available
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4.

Part	Correct	Ignore	Reject
(a)	4 and 5	3	1,2
(b)	2		1,3,4,5
(c)	1 and 3	5	2,4
(d)	1 and 3	5	2,4
(e)	2		1,3,4,5
(f)	3	5	1,2,4

6

Question total **6**

Question	Marking details	Marks Available				
5. (a) (i)	Inserting a {normal / correct} {gene / DNA sequence} / <u>Replacing</u> {defective / faulty} genes with {copies of a new DNA sequence / normal allele / normal gene} / (owtte);	1				
(ii)	<table border="1"> <tr> <td>Somatic cell therapy</td> <td>Germ line therapy</td> </tr> <tr> <td>1 and 4</td> <td>2 and 3</td> </tr> </table> <p>(Must have both for 1 mark)</p>	Somatic cell therapy	Germ line therapy	1 and 4	2 and 3	2
Somatic cell therapy	Germ line therapy					
1 and 4	2 and 3					
(b) (i)	<ul style="list-style-type: none"> CFTR is a {Channel protein / carrier protein / ion pump}; Not active transport alone Blocks {transport / movement} of chloride ions out of cells (into mucus) / ORA; Water retained in cell / water prevented from leaving / no osmosis; Unable to remove mucus in lungs; {Infection/ more susceptible to disease} / coughing {more likely / increased}; <u>{Narrowing / blocking}</u> of air passages (so reduced air flow); <u>{Increased diffusion distance / reduced surface area}</u> for <u>gas exchange</u> / insufficient oxygen received / not enough oxygen absorbed; 	4				
(ii)	<ul style="list-style-type: none"> (Modified / normal / correct) genes are inserted; into liposomes / virus (as vector); Liposomes fuse with cell membrane / virus infects cell / ref to endocytosis; (Modified) gene passes through membranes / into cell; Applied by aerosol / spray / inhaler; <p>(Any 3 points)</p>	3				

Max 2 for symptoms only

Question	Marking details	Marks Available
(c) (i)	Each new DNA molecule consists of one {original / parent / old / template} strand and one new strand of DNA;	1
(ii) I	To (break bonds between DNA strands or bases to) <u>separate</u> original DNA into two single strands;	1
II	Triggers / Allows {primers / short pieces of RNA / single-strand DNA / free nucleotides} to {bind / attach / join} (to single stranded DNA);	1
III	TAQ / DNA polymerase {makes nucleotides join / makes a strand of DNA / catalyses the synthesis of a complementary strand};	1
(iii)	<ul style="list-style-type: none"> • (Percentage) risk is too high (for <i>human</i> application) / Incorrect base sequence; • Incorrect mRNA; • Different tRNA / brings incorrect amino acid; • Structure of protein synthesised unknown / folding of protein is different / sequence of amino acid altered; • Protein {non-functional / function altered} / chloride ions not transported / thick mucus still produced / gene therapy not effective; 	3
	(Any 3 points)	
	Question total	17

Question	Marking details	Marks Available
6. (a)	RNA polymerase;	1
(b) (i)	CGT TAC CAA;	1
(ii)	CGU UAC CAA;	1
(c) (i)	Alanine;	1
(ii)	<ul style="list-style-type: none"> • Mutation 1 – no change to sequence of amino acids; • Codon for alanine / degenerate codon / same amino acid coded for; Neutral mutation;	2
	<ul style="list-style-type: none"> • Mutation 2 – valine replaced by alanine / codon for alanine; • (Tertiary) {structure / shape of protein} may change / position of bonds may change / sequence of amino acids changing / structure of protein changing / protein non functional; 	2
(d)	<ul style="list-style-type: none"> • Translation prevented; • Tetracycline {binds to / blocks / inhibits} {mRNA triplet / codon / CGC / second attachment site}; • {Anticodon / tRNA triplet} cannot pair with {mRNA triplet / codon} / cannot form codon-anticodon complex; • Amino acid not added to polypeptide chain / peptide bonds not formed; 	3
	(Any 3 points)	
	Question total	11

Question	Marking details	Marks Available
7. (a) (i)	C and D;	1
	(ii) Fragments 64 and 36 (kb);	1
(b) (i)	1, 2, 3 & 6 AND 1 and 3;	1
	(ii) <ul style="list-style-type: none"> • Colonies {1, 2, 3 & 6 / shown / present} have taken up {plasmid / ampicillin resistant gene}; Reject taken up human gene; Ignore recombinant plasmid; • Because they are resistant to ampicillin / able to grow on ampicillin; • 4 and 5 have not taken up the {plasmid / ampicillin resistant gene}; • And so are not resistant to ampicillin; 	2
	(iii) <ul style="list-style-type: none"> • Colonies 1 and 3 do not have the gene / recombinant plasmid; • As they (remain) resistant to tetracycline / gene for tetracycline resistance has not been {disrupted / destroyed}; • Colonies 2 and 6 do have the gene / recombinant plasmid; • Tetracycline resistance destroyed / prevents gene from being expressed; 	3
Question total		8

Question	Marking details	Marks Available
8. (a) (i)	<ul style="list-style-type: none"> • Change in structure in a <u>community</u> over time; • Change in {composition of species / species present} (in a community) over time; • Either due to change in environmental / (named) abiotic factors; 	2
(ii)	A stable community which {undergoes no further change / reached equilibrium} / no further succession;	1
(b)	<ul style="list-style-type: none"> • (Increased) interspecific competition / other plant species compete with heather / heather outcompetes other plant species; • For light / nutrients / minerals / named nutrient / water (linked to competition); Reject resources unqualified. 	2
(c)	<ul style="list-style-type: none"> • More energy used in respiration; • Higher respiration relative to {photosynthesis / GPP} / NPP decreases; • {Fewer leaves / less surface area} for photosynthesis; • Less energy / glucose to {produce new biomass / for growth / synthesis of protein or named compound}; • (Heather increases in size / ages / more competition from other species) soil fertility decreases / less minerals or nutrients available / greater competition for named resources; • Growth rate decreases / fewer leaves produced; • (As heather increases in size) less light penetrates the centre of the plant; • Loss of central leaves, (therefore woody parts increase); <p>(Any 3 points)</p>	3
Question total		8

Question	Marking details	Marks
		Available
9 (a)	A Extinction is the loss of species;	1
	B Conservation is the <u>planned</u> preservation of wildlife / the {enhancement / maintenance} of biodiversity;	1
	C To ensure the survival of the species;	1
	D Conservation of existing <u>gene pools</u> ;	1
	E To conserve potentially useful {genes / genetic sources} (for future generations);	1
	F Qualification / Example of E – resistance to disease or other;	1
	G Use of plants / animals as a gene bank to cross with highly cultivated varieties;	1
	H Conservation of <u>plants</u> with medicinal properties;	1
	I (Planned) preservation of habitat, with example – wetlands, coral reef, sand dune;	1
	J Seed / sperm banks;	1
	K Re-introduction programmes, e.g. Red Kite;	1
	L Protection / breeding of endangered species in specialised zoos / captive breeding programmes / rare breeds;	1
	M Trade restrictions on endangered species / reference to CITES / ivory / whaling;	1
	N Relevant reference to NGOs {e.g. WWFN / government agency / CCW / SSSI / National Parks / nature reserves} / ecotourism / education;	1
	O Correct reference to relevant <u>legislation</u> e.g. to prevent over-grazing / over-fishing / hunting / poaching in context / collecting birds eggs / picking wild flowers / collecting plants;	1
Question total		10

Question	Marking details	Marks Available
9 (b)	A (Embryo cloning) {in vitro fertilised egg / zygote} divides to form {a ball of cells / embryo} / undergoes mitosis;	1
	B Embryo is split into separate cells;	1
	C Before differentiation / 8 cell stage;	1
	D (Nuclear transplant) nucleus / DNA may be removed from diploid / somatic / udder;	1
	E (Nuclear transplant) nucleus / DNA may be removed from egg / ovum / secondary oocyte;	1
	F Introduce nucleus to donor egg / Donor and recipient cells are fused together;	1
	G The embryo is allowed to develop in a surrogate;	1
	H Animal born is genetically identical to the original donor;	1
	I Reference to totipotent / cells are able to differentiate into more than one cell type / form a whole organism;	1
	J Example of tissue that contains stem cells – bone marrow, testes, embryonic stem cells;	1
	K Human stem cells could be used to {grow into required organ or tissue / therapeutic uses (treat range of diseases) / or named example};	1
	L Less likelihood of rejection / no need for immunosuppressant drugs	1
	(Any 8 from 13)	
M Embryos have to be destroyed to provide the stem cells/ Pro-life issues -embryos have the potential for independent life (in the future);	1	
N Unknown long term side effects of stem cells;		
O Genetic modification of humans for non-medical reasons / eugenics issues related to selection of embryos;	1	
(Any 2 from 13)		
Question total		10