

GCE BIOLOGY BY4

Questions	Marking details	Marks Available
1. (a) (i)	28.0 - 13.8/13.8 OR 14.2/13.8; 102.9 / 103%; (2 marks for correct answer) (1 mark for calculation if answer incorrect)	2
(ii)	Any 2 from: Genes switched on; Synthesis of enzymes / protein synthesis; Replication DNA; Cells increase in size / storage of nutrients; Digestion / absorption; Getting used to new medium / OWTTE; NOT reference to small number	2
(iii)	Population grows at an increasing <u>rate</u> / <u>doubles in unit time</u> / is growing logarithmically; NOT birth rate.	1
(iv)	{Competition for / Lack of} nutrient; build-up of waste products; oxygen supplied; Accept ref to competition with other species / predation (qualified); Accept carrying capacity has been <u>exceeded</u> .	2

Questions	Marking details	Marks Available
(b)	<p>Any 3 from</p> <p>Suitable / optimum / stated / best / temperature;</p> <p>Suitable optimum / stated / best / pH;</p> <p>Source of carbon / named carbohydrate / sugar / lipids / glycerol;</p> <p>Source of nitrogen / amino acids / nitrates / ammonium;</p> <p>Or nutrients (1 mark alternative if above not named);</p> <p>Mineral ions;</p> <p>Absence of Oxygen / anaerobic conditions;</p> <p>If state oxygen <u>needed</u> = Max 2 marks.</p>	3
(c)	<p>234 x 10 000;</p> <p>2.34 million / 2 340 000; (2 marks for correct answer / 1 for calculation if answer incorrect)</p>	2
(d)	<p>Sterile equipment / autoclave equipment;</p> <p>Flame loop;</p> <p>Disinfectant bench;</p> <p>Flame neck of tube;</p> <p>Work next to flame / updraft;</p> <p>Ref to lid of petri dish;</p> <p>NOT wash hands / wear lab coat / shut windows</p>	2
Question total		14

Questions	Marking details	Marks Available
2. (a)	<p>(i) A Dorsal root <u>ganglion</u>;</p> <p>B Central canal / spinal canal / (accept Cerebro Spinal fluid);</p> <p>C Ventral root;</p> <p>D Spinal nerve/ nerve (fibres) / collection of neurones;</p>	4
	<p>(ii) White matter made of myelin (sheath) / Schwann cells / lipid / phospholipid;</p> <p>NOT fat.</p> <p>Grey matter made of cell bodies / nuclei;</p>	2
(b)	<p>(i) 1 mark for each neurone correctly labelled and in correct position, including position of cell bodies.</p> <p>Sensory neurone – labelled, connecting receptor to grey matter, passing through dorsal root, with correct cell body;</p> <p>Relay nerve – labelled, connecting sensory and motor, inside grey matter;</p> <p>Motor nerve – labelled, connecting relay to effector, through ventral root on opposite side;</p> <p>Reject continuous line.</p>	3
	<p>(ii) Dendrite conducts {impulse / electrical signal / action potential} towards {cell body / nucleus}, axon conducts away from {cell body / nucleus};</p> <p>NOT message / information.</p>	1
Question total		10

Questions	Marking details	Marks Available
3. (a) (i)	<p>A Glycolysis;</p> <p>B Calvin cycle / light independent reactions;</p> <p>C Krebs cycle / citric acid cycle / tricarboxylic acid cycle (Accept TCA cycle);</p>	3
(ii)	<p>Different places within <u>cell</u>; NOT different places in the chloroplast;</p> <p>Different enzymes;</p> <p>A Cytoplasm / glycolysis takes place in cytoplasm;</p> <p>B Chloroplast / calvin cycle takes place in chloroplast;</p> <p>C Mitochondria / krebs cycle takes place in mitochondria;</p> <p>Reference membrane separation / compartmentalisation;</p>	3
(iii)	<p>Dependent;</p> <p>Grana / thylakoid (membranes);</p> <p>NADPH₂ / reduced NADP / NADPH; } can be either way round</p> <p>ATP; }</p>	4
(b)	<p>Oxygen;</p> <p>Organic materials / compounds / named organic material / fixing carbon;</p> <p>NOT nutrients / food / ref to CO₂.</p>	2
(c) (i)	<p>DNA;</p> <p>Nucleic acids;</p> <p>RNA;</p> <p>chlorophyll;</p> <p>ATP;</p> <p>NAD;</p> <p>FAD;</p>	1
(ii)	<p>Chlorophyll;</p> <p>NOT chloroplast.</p>	1
Question total		14

Questions	Marking details	Marks Available
4. (a)	Response controlled by relative length of the light and dark periods; Accept Response controlled by relative length of the {light / day} / {dark / night} periods;	1
(b) (i)	{Photoperiod / duration of light / day length} detected by <u>leaf</u> OR only one leaf needs to be exposed to light for flowering to occur; Makes {Hormone / plant growth substance / chemical / florigen}; High PFR / P730;	2
(ii)	Expose whole plant / leaf to short day periods;	1
(c)	Hormone same in all species / both plants; Transported from long day to short day plant; In phloem;	3
Question total		7

Questions	Marking details	Marks Available
5. (a) (i)	<p>(Stimulation) causes sodium ions to {move in / diffuse};</p> <p>NOT active transport.</p> <p>Inside becomes less negative / <u>some</u> depolarisation;</p> <p>Threshold not reached / Ref to 'all or nothing' law;</p> <p>Sodium voltage gated channels remain closed / no action potential;</p>	3
(ii)	<p>Sodium ions in; NOT pumped / active transport;</p> <p>Threshold reached;</p> <p>Sodium (voltage gated) channels open;</p> <p>Depolarisation;</p> <p>Inside becomes +ve / (from -60 to) +40mV;</p> <p>Action potential;</p> <p>Sodium (gated) channels close <u>and</u> Potassium channels open;</p> <p>K⁺ move (down concentration gradient) / diffuse out;</p> <p>Repolarised;</p> <p>Ref hyperpolarisation / refractory period;</p> <p>sodium potassium pump restores resting potential;</p>	6
(b)	<p><u>Excitatory</u></p> <p>Mimic normal transmitter;</p> <p>Inhibit breakdown of transmitter / cholinesterase;</p> <p>Blocks uptake back into presynaptic knob;</p> <p>Increases number of receptors on post synaptic membrane;</p> <p><u>Inhibitory</u></p> <p>Prevent exocytosis / stop release of transmitter substance;</p> <p>Bind with receptors on post synaptic membrane and block it;</p> <p>Prevents Ca²⁺ entry into presynaptic knob;</p>	2
Question total		13

Questions	Marking details	Marks Available
6.	Endocrine; Homeostasis; Negative feedback; Hypothalamus; {Water / solute} potential; <u>Posterior</u> pituitary; Blood; Collecting duct / distal convoluted tubule; NOT DCT; Receptors / glycoproteins; Osmosis; Tissue fluid; Urine;	12
Question total		12

Questions	Marking details	Marks Available
7. (a)	<p>A Afferent vessel wider than efferent; NOT bigger.</p> <p>B Increase in blood pressure;</p> <p>C Gaps / pores between / in endothelial cells;</p> <p>D Gaps / pores in basement membrane;</p> <p>E Podocytes <u>feet / filtration slits</u>;</p> <p>F Ultra filtration {into Bowman's capsule / from glomerulus};</p> <p>G Example of substance which can pass through <u>and</u> one which cannot;</p> <p>H Proximal convoluted tubule cells have microvilli to give large surface area / Folded base membrane / basal channels;</p> <p>I Large numbers mitochondria for active transport / ATP synthesis;</p> <p>J Selective re-absorption in proximal convoluted tubule;</p> <p>K Ascending limb loop of Henle pump Na⁺ / out;</p> <p>L But impermeable to water;</p> <p>M Decreases water potential in medulla;</p> <p>N Descending limb permeable to water / water moves out by osmosis;</p> <p>O Collecting duct walls receptors for ADH;</p> <p>P Collecting duct / distal convoluted tubule walls variable permeability / OWTTE;</p>	

Question total 10

Questions Marking details

**Marks
Available**

(b) **Similarities**

- A Both involve transport of electrons;
- B {ETC / cytochrome chain / carriers} in membrane;
- C Energy released used to pump;
- D Protons;
- E Creates Proton gradient / pH gradient across the membrane;
- F Protons diffuse down concentration gradient;
- G Stalked particles / ATP synthetase;
- H ref to Chemiosmosis in correct context;

Differences

	RESPIRATION	PHOTOSYNTHESIS
I	Substrate level phosphorylation /	No Substrate level phosphorylation;
J	Electrons from hydrogens produced in respiration / reduced carriers /	Electrons come from chlorophyll / water;
K	Hydrogen from glucose / fats / amino acids /	OR Production of NADPH ⁺ increases the proton gradient;
L	Electrons combine / reduce H ⁺ and O to form water / oxygen is final electron acceptor;	
M		Cyclic phosphorylation - electrons back to chlorophyll/ {Non cyclic to NADP / final electron acceptor is NADP};
N	Chemiosmosis occurs - Mitochondria, inner membrane /	on the thylakoid membranes (of the chloroplasts);
O	Low pH / H ⁺ mitochondria inter membrane space /	Chloroplasts thylakoid cavity;
P	3 (types of) proton pump in mitochondria /	1 (type of) proton pump in chloroplasts;

Question total 10