OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

BIOLOGY F214 MS

Unit F214: Communication, Homeostasis and Energy

Specimen Mark Scheme

The maximum mark for this paper is **60**.

Question Number	Answer	Max Mark
1(a)	islets of Langerhans;	[1]
(b)	glucagon;	[1]
(c)	1 fall detected by, pancreas / islets of Langerhans / alpha cells / beta cells; 2 fall inhibits insulin, secretion / production; 3 stimulates, secretion / production, of glucagon (by alpha cells); 4 into blood; 5 binds to <u>receptor</u> on, liver cell / hepatocyte; 7 stimulates conversion of glycogen to glucose / glycogenolysis; 8 <u>gluconeogenesis</u> / detail of gluconeogenesis; 9 glucose into blood stream;	[6]
	Total	[8]
2(a) (i)	chlorophyll; treat refs to a and b as neutral	[1]
(a) (ii)	electron carrier / cytochrome / protein / electron acceptor / ferredoxin / plastoquinone;	[1]
(b)	hydrogen ions are moved into the thylakoid space by action of electron carriers; higher concentration of / more, hydrogen ions / protons reduces the pH; **R** *hydrogen, H* **A** *hydrogen ions produced in lumen* hydrogen ions, move / diffuse, down concentration gradient ; across / through, (thylakoid) membrane / from lumen to stroma; through ATP synthetase / synthase / protein channel / stalked particles; generates ATP; AVP; e.g. ref. to by <u>chemiosmosis</u> ref. to an electrochemical gradient / proton motive force	Max[4]

Question Number	Answer	Max Mark
(c)	no photophosphorylation**;** no ATP produced**;** no reduced NADP produced**;** no Calvin cycle / no light-independent stage**;** no GP to TP / no TP to RuBP**;** no fixation of carbon dioxide**;** AVP**;** e.g. no production of, organic molecules / named molecules **A** *autotrophic nutrition stops* **R** *food* ref to no respiratory substrate	**max[3]**
	Total	**[9]**
3(a)	removal of, unwanted / toxic / waste, products**;** of metabolism**;**	**[2]**
(b)(i)	*award both marks for correct answer* *evidence of 14.7 - 2.2 = 12.5 or 14.7 / 2.2 gains one calculation mark* 12.5/2.2 x 100**;** = 568.2 / 568 / 570**;;**	**[2]**
(ii)	protein converted to amino acids**;** excess amino acids undergo deamination / removal of amino group**;** ammonia formed**;** ammonia converted to urea**;** AVP **;** e.g. ref. to <u>ornithine</u> cycle	**max[3]**
(c)	the longer the loop of Henle the lower the water potential (of urine)**;** ora ions pass out from ascending limb into, medulla / tissue fluid**;** creating lower water potential in the medulla / AW**;** water reabsorbed from collecting duct in medulla **;** by osmosis **;** (*linked to previous marking point*) AVP**;** e.g. ref to countercurrent multiplier	**max[3]**
	Total	**[10]**

Question Number	Answer	Max Mark
4(a)(i)	A glycolysis; B fermentaion / anaerobic respiration / reduction of pyruvate; C aerobic respiration / Krebs cycle and oxidative phosphorylation / ETC / electron transport chain;	[3]
(ii)	C; *allow ecf from (i)*	[1]
(iii)	A; *allow ecf from (i)*	[1]
(b)(i)	(when cyanide absent) complete homogenate can fully respire the glucose/pyruvate to produce carbon dioxide ; (when cyanide is present), pyruvate does not enter the mitochondria ; some carbon dioxide produced when pyruvate is converted to ethanal ; breakdown of the glucose / pyruvate is incomplete ; ref. to anaerobic respiration ;	max[3]
(ii)	pyruvate is end product of glycolysis; pyruvate can enter mitochondria ; carbon dioxide produced in the Krebs cycle and link reaction; by, decarboxylation / decarboxylase(s); glucose cannot enter the mitochondria ; AVP ; further detail e.g. no carriers for glucose in mitochondrial membranes glycolytic enzymes not found in mitochondria portion (of homogenate) glycolytic enzymes found in, cytoplasm / cytosol	max[3]
(iii)	pyruvate is converted to ethanal in cytoplasm ; ethanal is converted to ethanol ; does not involve, cytochromoes / ETC / oxidative phosphorylation; enzymes in cytoplasm not inhibited by cyanide;	max[3]
	Total	[14]

Question Number	Answer	Max Mark
5(a)	A axon terminal / synaptic knob / synaptic bulb**;** B cell body / centron**;**	**[2]**
(b)	*at X:* sodium channels open and sodium ions move into neurone**;** potential difference rises from –70mV to30mV**;** *at Y:* potassium channels open and potassium ions move out of neurone**;** potential difference falls from 30mV to –76mV**;** AVP**;;** e.g. ref. to voltage gated channels ref to movement by diffusion / passively ref to electrochemical gradient	**[4]**
(c)	*effect:* myelinated fibres conduct more quickly than unmyelinated / AW**;** ref. to one set of comparative figures from table**;** *explanation - max 4* myelin sheath acts as (electrical) insulator**;** lack of sodium and potassium gates in myelinated region**;** depolarisation occurs at nodes of Ranvier only**;** (so) longer local circuits**;** (action potential) jumps from one node to another ***/*** saltatory conduction**;**	**[5]**
	Total	**[11]**
6(a)(i)	a biological molecule that can be broken down in respiration to release energy **;**	**[1]**
(ii)	*award both marks for correct answer* 55/77**;** 0.7 / 0.71**;**	**[2]**
(iii)	1.0 **;**	**[1]**

Question Number	Answer	Max Mark
(b)	ref. to potassium hydroxide / soda lime**;** ref. to equilibration / use syringe to set manometer fluid (level)**;** leave for suitable length of time (minimum 20 minutes) and measure distance moved by fluid**;** repeats and calculate mean**;** calculate volume of oxygen taken up per minute**;** AVP**;** e.g. ref to set-up of control tube (e.g. same mass of beads as of fungus) or (same volume of inert substance as substance A) detail of how to calculate volume of oxygen (by multiplying distance moved by fluid in capillary by 2πr)	**max[4]**
	Total	**[8]**
	Paper Total	**[60]**

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	Total
1(a)		1		**1**
1(b)	1			**1**
1(c)	6			**6**
2(a)(i)		1		**1**
2(a)(ii)		1		**1**
2(b)	1	3		**4**
2(c)		3		**3**
3(a)	2			**2**
3(b)(i)		2		**2**
3(b)(ii)	3			**3**
3(c)		3		**3**
4(a)(i)		3		**3**
4(a)(ii)		1		**1**
4(a)(iii)		1		**1**
4(b)(i)		3		**3**
4(b)(ii)		3		**3**
4(b)(iii)		3		**3**
5(a)	2			**2**
5(b)	1	3		**4**
5(c)	3	2		**5**
6(a)(i)	1			**1**
6(a)(ii)		2		**2**
6(a)(iii)		1		**1**
6(b)			4	**4**
Totals	**20**	**36**	**4**	**60**
Targets	**20**	**36**	**4**	**60**

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