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Mark Scheme (RESULTS)
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GCE

GCE Biology (6104/02)

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Question Number	Answer	Mark
1 (a)	B = medulla (oblongata) ; C = cerebellum ;	**2**

Question Number	Answer	Mark
1 (b)	1. to receive sensory input / eq ; 2. idea of {interpretation/coordination} (of information) ; 3. {initiates / transmits} impulses to effector ; 4. idea of control of voluntary action / eq ; 5. reference to {thought / learning / intelligence / memory } ; 6. reference to speech ; 7. reference to {personality / emotion} ;	**max 2**

Question Number	Answer	Mark
2 (a)	1. idea of a deviation from the {norm / normal level / eq } triggers mechanism to eliminate the deviation ; 2. increase in level of cortisol inhibits {CRH secretion /hypothalamus} ; 3. (which) reduces secretion {of ACTH / from (anterior) pituitary} ; 4. this causes drop in level of cortisol ;	**max 3**

Question Number	Answer	Mark
2 (b)	{follicle stimulating hormone / FSH / luteinising hormone / LH / thyroid stimulating hormone / TSH / growth hormone / prolactin } ;	**1**

Question Number	Answer	Mark
2 (c)	1. effect is longer lasting / eq ; 2. effect is slower / eq ; 3. effect is (often) not reversible / eq ; 4. reference to involvement of transport in blood system ; 5. reference to {several target organs/diffuse effect / eq} ; 6. hormonal involves chemical control, nervous involves electrical (and chemical) control ;	**max 3**

Question Number	Answer	Mark
3 (a)	1. reference to influx of calcium ions(into pre-synaptic knob) / eq ; 2. vesicles move to pre-synaptic membrane / eq ; 3. fuse with pre-synaptic membrane / eq ; 4. (acetylcholine released) by exocytosis ;	**max 3**

Question Number	Answer	Mark
3 (b)(i)	value between 0.85 and 1.95 (ms) ;	**1**

Question Number	Answer	Mark
3 (b)(ii)	3.0 ± 0.05 (ms) ;	**1**

Question Number	Answer	Mark
3 (b)(iii)	1. correct reading from graph of duration of one action potential ; 2. 1000 / reading from graph ;	**2**

Question Number	Answer	Mark
3 (c)	1. idea that the inside of the (post-synaptic) membrane is becoming {more negative / hyperpolarised} ; 2. therefore {more Na^+ channels must open / more Na^+ must enter} ; 3. to reach threshold level / eq ;	**max 2**

Question Number	Answer	Mark
4 (a)(i)	carbon dioxide / CO_2 ;	**1**

Question Number	Answer	Mark
4 (a)(ii)	1. to regenerate the {hydrogen carriers / NAD^+ } / oxidise reduced NAD ; 2. NAD^+ does not become limiting / eq ; 3. so that glycolysis can continue ; 4. to allow ATP to be formed (during glycolysis) ;	**max 2**

Question Number	Answer	Mark
4 (b)(i)	1. rate is {constant / steady / eq} for the first 6 minutes ; 2. rate {slows / decreases} from {6 to 14 minutes / for next 8 minutes} ; 3. no respiration from 14 – 20 minutes / eq ; 4. manipulation of figures e.g. calculation of rate for first 6 minutes ;	**max 3**

Question Number	Answer	Mark
4 (b)(ii)	rate is constant (throughout the 20 minutes) / rate is slower in sucrose than in glucose (in first 6 to 8 minutes) / respiration does not stop ;	**1**

Question Number	Answer	Mark
4 (b)(iii)	1. to prevent oxygen entering (solution) / keep conditions anaerobic ; 2. to prevent TTC being {oxidised / decolourised} / no TTC would be reduced ;	**2**

Question Number	Answer	Mark
4 (b)(iv)	1. maintain constant temperature / eq ; 2. respiration produces heat (energy) ; 3. change of temperature will affect rate of enzyme activity ; 4. idea that the experiment can be performed in 20 minutes ;	**max 2**

Question Number	Answer	Mark
5 (a)	1. (ultrafiltration) occurs in {glomerulus / Bowman's capsule / renal capsule} ; 2. reference to high pressure {of blood / in glomerulus} ; 3. because afferent arteriole is wider than efferent arteriole ; 4. {small molecules / eq} forced out (through capillary wall) / {large molecules / proteins} remain in blood ; 5. reference to {fenestrations / pores} in capillary walls ; 6. reference to basement membrane (acting as a filter) ; 7. reference to podocytes in (Bowman's capsule) ;	**max 4**

Question Number	Answer	Mark
5 (b)	1. all {glucose / amino acids} are reabsorbed ; 2. by (sodium) co-transport mechanism ; 3. {some / eq} urea is reabsorbed ; 4. by diffusion ; 5. sodium ions are {actively reabsorbed / co-transported} ; 6. {chloride ions / negatively charged ions} (follow) down electrochemical gradient ; 7. reference to microvilli (on epithelial cells) to increase surface area ; 8. reference to {many mitochondria for active transport / mitochondria produce ATP (for active transport) ;	**max 5**

Question Number	Answer	Mark
6		**6**

Enzyme	**Enzyme substrate**	**Product(s) of the reaction**	**Industrial use**
Glucose isomerase	Glucose	fructose ;	confectionery / soft drinks ;
Amyloglucosidase	(liquid) starch ;	Glucose	brewing / bread making / fruit sorbets ;
Lactase	Lactose	glucose and galactose ;	{lactose free / low lactose} products / whey syrup /ice cream ;

Question Number	Answer	Mark
7 (a)	1. between 16 and 34 diabetes is more common in women than men/eq ; 2. more common in men over 35 / eq ; 3. increase in prevalence in women with age / eq ; 4. increase in number of men with diabetes as age increase up to 74 / eq; 5. credit correct manipulation of data ;	**max 3**

Question Number	Answer	Mark
7 (b)	1. obesity ; 2. genetic ; 3. viral infection ; 4. high fat ; 5. high calorie ; 6. high sugar ; 7. reference to less insulin / inactivity of insulin ;	**max 2**

Question Number	Answer	Mark
8 (a)	supplies respiratory substrate / eq ;	**1**

Question Number	Answer	Mark
8 (b)	fungus / mould/ *Aspergillus* / *Saccharomyces* / *yeast* ; bacteria / *Lactobacillus* /*Bacillus* / *Pediococcus* ;	**2**

Question Number	Answer	Mark
8 (c)	1. changes due to activity of mould / eq ; 2. enzymes or named enzyme produced / eq ; 3. (amylases convert) carbohydrates into simple sugars / eq ; 4. (proteases convert) protein into amino acids / eq ; 5. reference to named product of fermentation ; 6. pH falls / eq ;	**max 3**

Question Number	Answer	Mark
8 (d)(i)	0.73-0.07 ; /0.07 x 100 ;	**2**

Question Number	Answer	Mark
8 (d)(ii)	ethanoic / formic / acetic / lactic / methanoic / carbonic ;	**1**

Question Number	Answer	Mark
9 (a)(i)	1. chilled vegetables have a higher vitamin C content throughout / eq ; 2. faster loss of vitamin C in vegetables at room temperature ; 3. both methods of storage result in a {greater / faster} loss of vitamin C in the first 2 - 3 days ; 4. at 7 days there is no vitamin C left in the vegetables stored at room temperature, but some vitamin C still remains in the chilled ones ; 5. there is still some vitamin C left in the chilled vegetables at the end of 20 days ; 6. comparative manipulation of figures to give quantitative comparisons ;	**max 3**

Question Number	Answer	Mark
9 (a)(ii)	1. vegetables should be chilled ; 2. because the vitamin C content stays higher ; 3. quantitative comparison of chilled with frozen ; 4. quantitative comparison of chilled with room temperature ; 5. freezing can result in damage to vegetables / or ref. to energy cost ;	**max 3**

Question Number	Answer	Mark
9 (b)	1. vitamin C is a reducing agent ; 2. DCPIP is a dye ; 3. blue in oxidised & pale yellow / brown / colourless in reduced state ;	**2**

Question Number	Answer	Mark
9 (c)	1. reference to use as antioxidant / eq ; 2. prevents oxidation of {fats / oils} ; 3. no rancid flavours develop /eq ; 4. correct description of prevention of rancidity ;	**max 2**

PAPER TOTAL: 70 MARKS