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Mark Scheme (RESULTS)
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GCE

GCE Biology (6104/01)

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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**

Feature	**λ phage**	**TMV**	**HIV**
Nucleic acid	DNA ;	RNA ;	RNA ;
Shape of protein coat	complex ;	helical ;	polyhedral ;

Question Number	Answer	Mark
7 (a)	1. overall the number of cases caused by *Salmonella* increased whereas those caused by *Staphylococcus* decreased / eq ; 2. between 1985 and (some of) 1988 more cases were caused by *Staphylococcus* ; 3. after {1989 / second part of 1988} more cases were caused by *Salmonella* ; 4. there was a (very marked) increase in the number of cases caused by *Salmonella* from 1995 compared to {very little change / eq} in number of cases caused by *Staphylococcus* ; 5. credit correct manipulation of figures to compare numbers of cases in a stated time period ;	**max 3**

Question Number	Answer	Mark
7 (b)		**max 2**

Endotoxin	**Exotoxin**
Lipopolysaccharide	protein ;
Released from dead bacteria/damaged cell wall	released from living bacteria / eq ;
Delay in release	immediate release ;
Low toxicity / eq	high toxicity ;
Released from gram positive	released from Gram negative and Gram positive ;

Question Number	Answer	Mark
8 (a)	1. Gram positive bacteria / *S. aureus* {more sensitive to /shows greater effect / more susceptible to / shows less resistance} to ampicillin /eq ; 2. *S. aureus* / Gram positive have thick {cell wall / peptioglycan layer / eq} ; 3. ampicillin affects cell wall synthesis ; 4. inhibits formation of {peptidoglycan bonds (in cell wall) / eq} ; 5. weakening of cell walls ; 6. reference to osmotic shock / cell lysis / eq ;	**max 4**

Question Number	Answer	Mark
8 (b)	1. correct reason for existence of resistant bacteria ; 2. any resistant bacteria will multiply ; 3. (and) pass on {resistance gene/ plasmid} ;	**max 2**

Question Number	Answer	Mark
8 (c)	(48-36) ; /36 x 100 = 33.33% ;	**2**

Question Number	Answer	Mark
8 (d)	ampicillin doesn't fit active site / allosteric effect / eq ;	**1**

Question Number	Answer	Mark
9 (a)(i)	1. *L. bulgaricus* grew best at pH 5 ; 2. *L. bulgaricus* could grow at pHs 5, 6 and 7 (and 8) ; 3. *E. coli* grew best at pH 7 ; 4. *E. coli* could grow at pHs 6, 7 and 8 (and 5) ; 5. neither species could grow at pH 9 ;	**max 3**

Question Number	Answer	Mark
9 (a)(ii)	1. idea that pH affects enzyme activity ; 2. enzymes can only work in narrow pH range ; 3. enzymes needed to {replicate DNA/make protein} ; 4. *L. bulgaricus* adapted to grow in acidic conditions due to lactic acid production ; 5. *E. coli* adapted to live in alkaline conditions ;	**max 3**

Question Number	Answer	Mark
9 (b)	1. use sterile conditions / eq ; 2. could have seen more colonies (on any one plate) as contaminants grew too / could have seen colonies on plates where none were found before as the contaminants could grow at these pHs / could have seen fewer colonies due to inhibition/competition ; 3. shake culture before sampling ; 4. fewer colonies, as bacteria would have settled to bottom of container ; 5. spread samples over agar thoroughly ; 6. fewer colonies seen due to bacteria on top of each other / inaccurate counting due to overcrowding in one place ;	**max 4**

PAPER TOTAL : 70 MARKS