

BIOLOGY

PAPER 1

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|-------|-------|
| 1. C | 26. C |
| 2. A | 27. B |
| 3. A | 28. A |
| 4. B | 29. B |
| 5. C | 30. B |
| 6. C | 31. B |
| 7. B | 32. B |
| 8. A | 33. A |
| 9. C | 34. D |
| 10. D | 35. C |
| 11. B | 36. D |
| 12. D | 37. B |
| 13. C | 38. A |
| 14. A | 39. B |
| 15. B | 40. A |
| 16. D | 41. B |
| 17. B | 42. C |
| 18. B | 43. B |
| 19. C | 44. D |
| 20. B | 45. A |
| 21. B | 46. D |
| 22. C | 47. D |
| 23. D | 48. B |
| 24. C | 49. B |
| 25. C | 50. B |

BIOLOGY SECTION A PAPER 2 [4551/2]		
1	15°C , 63°C , 38°C	3m
(a) (i)	Towel P : moderate amount of stain left indicating some enzymes action. Some enzyme were inactive at low temperature.	1m
(ii)	Towel Q : a lot of stain left indicating little enzyme action. Some enzymes were denatured at 3°C.	1m
	Towel R : a little stain left indicating a lot of enzyme action. The 38°C is near the optimum working temperature.	1m
(ii)	Protein molecules which act as biological catalysts that sped up the rate of metabolic reactions in the cell without chemically changed at the end of the reaction.	1m
(b) (i)	More washing powder	1m
(ii)	Longer incubation time	1m
(c)	Lipase	1m
(d)	Protease	1m
		<u>11 m</u>
2(a)	(i) & (ii) Refer to the diagram	2m
(b)	Refer to the diagram	2m
(c)	- progesterone will stimulate the thickening of the endometrium as a preparation for the attachment of the zygote.	1m
	- progesterone will prevent the release of the follicle-stimulating hormone (FSH) and this will cause the release of oestrogen to be reduced.	1m
	- if the ovum is fertilized, progesterone is released continuously to maintain the thickening and growth of the blood vessels in the endometrium for the needs of the embryo.	1m
	- if the ovum is not fertilized, the corpus luteum will degenerate and the production of progesterone will decrease starting from 20 th day.	1m
(d)	- the thickening of the endometrium will increase the numbers of blood vessels for the zygote to attached itself to the endometrium. This process is called implantation.	1m
	- transport the nutrients/oxygen/antibodies from the mother's blood to the foetus for the growth of the foetus/removed the excretory products such as carbon dioxide from the foetus to the mother's blood that can affect the development of the foetus.	1m
(e)	- a woman Fallopian tubes may be blocked.	1m

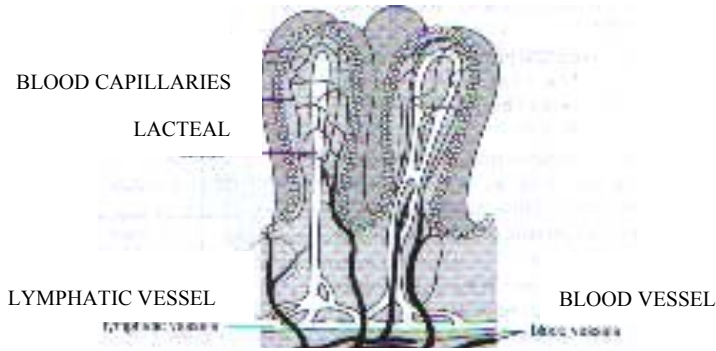
3 (a)	P : tricuspid valve Q : left ventricle R : interventricular septum	
(b)	They allow movement of blood only in one direction to prevent backflow; so that oxygenated blood does not mix with deoxygenated blood.	
(c) (i)	The wall of the left ventricle is thicker than the wall of the right ventricle.	
(ii)	The left ventricle has to pump blood to all parts of the body while the right ventricle only pumps blood to the lungs.	
(d)	No; it is because of the myogenic nature of the cardiac muscle by which it contracts and relaxes without nerve stimulation.	
(e)	haemolymph	
(f)	- it has one atrium and one ventricle - the blood flows into the heart only once for each complete cycle	
4 (a)	the nephron	
(b)	K : glomerulus L : Bowman's capsule M : renal artery N : collecting duct	
(c)	The hydrostatic pressure in the glomerulus causes many constituents of the blood to be filtered out from the glomerulus into the Bowman's capsule.	
(d) (i)	Urine	
(ii)	uric acid and mineral salts	

(e) (i)	the gland : posterior pituitary gland	
(ii)	the hormone : antidiuretic hormone (ADH)	
(f)	A large volume of urine is excreted and the body loses a lot of water (diabetes insipidus)	
5 (a)	(peripheral) receptor; located in the skin.	
(b)	in the form of nerve impulses; through the afferent neurone.	
(c)	effector; skeletal muscle.	
(d) (i)	synaptic vesicle	
(ii)	neurotransmitter	
(e)	When electrical impulses reach the presynaptic membrane, the synaptic vesicles are triggered to release neurotransmitter into the synaptic cleft; the neurotransmitter diffuses across the synapse to bind to the receptor proteins on the postsynaptic membrane; this leads to the generation of new electrical signals in the postsynaptic membrane and thus impulses are passed on.	
(f)	to generate energy in the form of ATP.	

SECTION B		
6. (a) (i)	<p>P : Secondary structure Q : Tertiary structure R : Quaternary structure</p> <p>(ii) Secondary structure :</p> <ul style="list-style-type: none"> • Polypeptide chain can be twisted or folded to form a helix or pleated sheet. • The structure is maintained by hydrogen bonding. <p>Tertiary structure :</p> <ul style="list-style-type: none"> • The three-dimensional structure of a single protein. • The secondary structure folds onto itself to form a tertiary structure. • Structure is maintained by disulphide, ionic and hydrogen bonding. • Examples : Lysozyme and myoglobin. <p>Quaternary structure :</p> <ul style="list-style-type: none"> • Complex structure consisting of more than one polypeptide chain. • Sometimes combine with associated non-protein groups. • Examples : Haemoglobin and channel protein. 	<p>1m 1m 1m=3m</p> <p>1m 1m</p> <p>1m 1m</p> <p>1m</p> <p>1m=6m</p>
(b)	<p>Intracellular enzymes :</p> <ul style="list-style-type: none"> • Enzymes that catalyses metabolic reaction within a cells. • Found in cytoplasm, nucleus, mitochondria and the chloroplast. • Examples : DNA polymerase, Thiokinase, ATPase, Carbonic anhydrase. <p>Extracellular enzymes :</p> <ul style="list-style-type: none"> • Enzymes that leave the cells and catalyse reactions outside. • Mainly catalyse the digestion of foods. • Examples : Amylase, Pepsin, Trypsin, Lipase, Maltase. 	<p>1m</p> <p>1m</p> <p>1m 1m=4m</p>
(c)	<p>(c) The uses of enzymes :</p> <p>Home :</p> <ul style="list-style-type: none"> • Detergent proteases degrade coagulated proteins into soluble short-chain peptides. • Detergent lipase degrade fat or oil stains into soluble fatty acids and glycerol. • Detergent amylase degrade starch stains into soluble short-chain polysaccharides and sugars. 	<p>1m 1m 1m</p>

	<p>Industry :</p> <ul style="list-style-type: none"> • Protease is used in the breakdown of proteins in flour for biscuit manufacture. • Amylase is used in the breakdown of some starch to glucose in flour for white bread, buns and rolls. • Rennin to coagulate milk protein in cheese production. • Protease to remove of hairs from animal hides and soften leather in leather tanning industry and to tendering the meat. • Ligninase to produce smoother paper by filling in the gaps between fibres with partial breakdown of starch. 	<p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>Any 7 =7m</p> <p>20 m</p>
7. (a) (i)	<p>Genes :</p> <ul style="list-style-type: none"> - Units of inheritance that carried down to the next generation. - Arranged as DNA segments in a chromosomes. - Every genes is in specific position and referred to as a locus on the chromosomes. <p>Alleles :</p> <ul style="list-style-type: none"> - The genes found at the same locus on different homologous chromosomes. - Genes that are alleles of one another always control the same trait. <p>Dominant allele :</p> <ul style="list-style-type: none"> - the gene that can show the phenotypics expression for a character that controlled in homozygous or heterozygous state. - The alleles are represented by an upper-case letter. <p>ii) Recessive gene :</p> <ul style="list-style-type: none"> - the gene that can only show its phenotypics expression for a particular character that is under control in a homozygous state. - The corresponding recessive gene is represented by the lower case of the same letter. 	<p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m=8m</p>
(b)	<p>Mendel's First Law states that the characteristic of an individual organism is determined by a pair of alleles present on the same loci in homologous chromosomes.</p> <p>Mendel's Second Law states that during the formation of gametes the alleles segregate independently of each other and during fertilization combine at random with the other alleles from the other partner.</p>	<p>1m</p> <p>1m=2m</p>

<p>(c)</p>	<ul style="list-style-type: none"> • After meiosis, the gametes cells contain 23 chromosomes : the ovum with 22 autosomes + X and the sperms with 22 autosomes + X or Y. • During fertilization, if the sperm with 22 + X fuses with an ovum so the child's chromosome will be 44 + XX. • The child is a female. • During fertilization, if the sperm with 22 + Y fuses with an ovum so the child's chromosome will be 44 + XY. • This child is male. <p style="text-align: center;">Sperm Ovum</p> <p>Gamete : </p> <p>Fertilization :</p> <p>Children : </p> <p style="text-align: center;">Girl Boy</p>	<p>2m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>4m = 10m</p> <p>Total <u>20 m</u></p>
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SECTION C		
8. (a)	<ul style="list-style-type: none"> • Excess glucose that is produced from digestion will be converted by liver cells into glycogen and stored in the liver. • If blood sugar level falls, the glycogen converted back to glucose. • If short supply of glucose and glycogen, liver converts amino acid to glucose. • If glycogen stored in the liver is full, excess glucose converted into lipids by the liver. • The liver uses the amino acids to synthesise enzymes, hormones and plasma proteins. • Excess amino acids are broken down in the liver, this process is called deamination. Excess lipids are stored in the adipose tissue 	<p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>Any 5=5m</p>
(b) (i)	<ul style="list-style-type: none"> • The wall of the ileum is covered with epithelial cells that are specialized to complete digestion and absorb the resulting nutrient molecules. • It is the longest section of the alimentary canal about 6 m. • They are fold in the small intestine. • The entire inner surface of the small intestine covered by villi. • The epithelial cells of a villus have microvilli. • The epithelial lining is only one cell thick. • Each villus has a network of blood capillaries and lacteal. 	<p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p> <p>1m</p>
(ii)	 <p>The diagram illustrates the internal structure of villi. It shows a network of blood capillaries and a central lacteal (lymphatic vessel) within each villus. Labels include: BLOOD CAPILLARIES, LACTEAL, LYMPHATIC VESSEL, and BLOOD VESSEL. The caption below the diagram reads 'STRUCTURE OF VILLI'.</p>	4m
(iii)	Vitamins A, D, E and K.	2m
(c)	<ul style="list-style-type: none"> • Eating habits refer to what a person eats, the frequency a person eats and the amount a person eats automatically without thinking and without control. • Obesity is a health problem that is caused by overeating of fattening food (carbohydrates and fats) and a lack of exercise. 	<p>1m</p> <p>1m=2m</p>

9(a)	<ul style="list-style-type: none"> • Supports and gives shape to the body. • Locomotion – joint and antagonistic. • Attachment of muscles. • Protection for delicate internal organs. • Storage of calcium and phosphorus. • The formation of blood cells. • A pump for respiratory purpose. 	1m 1m 1m 1m 1m 1m 1m Any 6=6m
(b)	<ul style="list-style-type: none"> • It has an exoskeleton of chitin with jointed leg. • Adapted to walking, climbing on three pairs jointed legs. • Can fly short distances using its pair of transparent membranous hind wings. • A pair of large hind legs with a powerful pairs of flexor and extensor muscles for jumping. • For jumping, it first contracts its flexor, bringing its tibiae close to its femurs in a 'Z' position. • Then the extensor contracts, flexing its tibiae to push its feet on the leaf, propelling the grasshopper forward into the air. 	1m 1m 1m 1m 2m 2m=8m
(c)	<ol style="list-style-type: none"> 1. Pitching <ul style="list-style-type: none"> • Vertical plane movement. • Pectoral fin for steering and stops forward movement. • Pelvic fins prevent pitching and as a brakes and rudders. 2. Rolling <ul style="list-style-type: none"> • Transverse plane movement. • Pelvic fin and median fins prevent the fish from rolling. 3. Yawing <ul style="list-style-type: none"> • Sideway movement. • Median fins and caudal fin prevent from yawing. • Caudal fin drive the fish's body forward, provides thrust and controls the direction. 	1m 1m 1m 1m 1m 1m=6m Total <u>20 m</u>

BIOLOGY PAPER 3 [4551/3]																						
2 (a)	Day 0 = 5, Day 2 = 7, Day 4 = 9, Day 6 = 15, Day 8 = 23, Day 10 = 30, Day 12 = 35, Day 14 = 37	3m																				
(b)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Time (Day)</th> <th>No. of <i>Lemna</i> sp.</th> <th>Time (Day)</th> <th>No. of <i>Lemna</i> sp.</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>5</td> <td>8</td> <td>23</td> </tr> <tr> <td>2</td> <td>7</td> <td>10</td> <td>30</td> </tr> <tr> <td>4</td> <td>9</td> <td>12</td> <td>35</td> </tr> <tr> <td>6</td> <td>15</td> <td>14</td> <td>37</td> </tr> </tbody> </table>	Time (Day)	No. of <i>Lemna</i> sp.	Time (Day)	No. of <i>Lemna</i> sp.	0	5	8	23	2	7	10	30	4	9	12	35	6	15	14	37	3m
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0	5	8	23																			
2	7	10	30																			
4	9	12	35																			
6	15	14	37																			
(c) (i)	The population is increase.	3m																				
(ii)	Pond water contains the necessary nutrients that support population growth of <i>Lemna</i> sp.	3m																				
(d)	1. The population growth is slow from day 0 to day 4. 2. From day 4 to onwards the population growth speeds up but gradually slows down from day 12 onwards.	3m																				
(e)	1. The population growth is slow from day 0 to day 4. 2. From day 4 to onwards the population growth speeds up but gradually slows down from day 12 onwards.	3m																				
(f)	i. Plants adapting to the new situation. ii. Plants complete for space and nutrients.	3m																				
(g)	Manipulated variable : Time Responding variable : Population (number) of <i>Lemna</i> sp. Controlled variable : Culture, temperature, light.	3m																				
(h)	The population growth of <i>Lemna</i> sp. Is sigmoid.	3m																				
(i)	Overall population growth increases.	3m																				