

BIOLOGY
PERFECT
SCORE
MODULE

FORM 4

NAME: _____
FORM: _____


ANSWER SCHEME

CHAPTER 2

a) Objective

1.	A	2.	A	3.	A	4.	D	5.	A
6.	B	7.	A	8.	B	9.	B	10.	B
11.	B	12.	B	13.	D	14.	D	15.	B
16.	D	17.	C	18.	D	19.	D	20.	D
21.	C	22.	B	23.	D	24.	B	25.	C
26.	C								

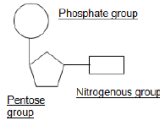
b) Structure

1	P : Rough endoplasmic reticulum Q: Golgi apparatus		1	2						
a)(i)			1							
(ii)	P1: ribosome at P synthesis protein P2: protein then being transported by P to the Q P3: modified protein into enzyme // Q packaged the enzyme/modified protein		1	3						
b)(i)			1	2						
(ii)	<table border="1"> <tr> <td>Cheek cell</td> <td>Epidermis cell</td> </tr> <tr> <td>Do not have cell wall</td> <td>Have cell wall</td> </tr> <tr> <td>Do not have vacuole</td> <td>Have vacuole</td> </tr> </table>	Cheek cell	Epidermis cell	Do not have cell wall	Have cell wall	Do not have vacuole	Have vacuole		1	1
Cheek cell	Epidermis cell									
Do not have cell wall	Have cell wall									
Do not have vacuole	Have vacuole									
c)	P1: cell cannot divide /mitosis/differentiate because P2: do not have gene /DNA (that control mitosis/differentiation)		1	2						
d)	P1: S is a mitochondria P2: generate energy (by cellular respiration) P3: (Meristematic) cell need a lot of energy P4: for mitosis / cellular division		1	2						

2(a)(i)	R: Jasad Golgi	1	1
(ii)	Q: tapak respirasi sel / tapak penjaan tenaga S: mengangkut protein yang disintesis oleh ribosom ke jasad Golgi / R (oleh vesikel rembesan)	1	2
(b)(i)	Tisu meristem (pada hujung pucuk dan hujung akar)/ tunas	1	1
(ii)	P1: berlaku proses respirasi sel P2: menghasilkan tenaga/ATP P3: Untuk pembahagian sel / mitosis	1	3
C(i)	Aras 2: Tisu Aras 3: Organ	1	2
(ii)	Proses pembezaan/proses pengkhususan	1	1

(iii)	P1: Tisu floem P2: Mengangkut hasil fotosintesis/sukrosa P3: melalui proses translokasi	1	2
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3(a)	Cell P – Epithelial cell Tissue Q – Smooth muscle tissue	1	2
(ii)	Tissue P P1- acts as a gastric glands P2-to produce gastric juices which contain pepsin and rennin Tissue Q- (Contract and relax) to allow peristaltic movement along the digestive tract	1	2
(c)	P1- made up (many) tissue P /epithelial tissues and tissue Q / smooth muscle tissues P2-perform / carry out (specific function) digestion of food / protein	1	2
(d)(i)	Digestive system	1	1
(ii)	Digest / breakdown complex food substances into simpler molecules		1
(iii)	Mouth/small intestine/liver/pancreas	2	2
(e)	P1-provide acidic medium P2-for the (optimal) reaction of enzyme pepsin P3-to stop the action of salivary amylase enzyme	1	2

4(a)(i)	K: Rough endoplasmic reticulum L :Golgi apparatus	1	2
(ii)	 <p>P1 - Drawing P2 - Labelling</p>	1	2
(iii)	Chromosome	1	1
(b)	P1: transport protein (synthesised by the ribosome) to Q P2: Q modified by the protein P3: into lipase / pancreatic amylase /trypsin	1	3
c)	P1-alters the nucleotide sequence P2-no specific protein synthesized for modification of trypsin P3-no/less trypsin produced P4-rate of digestion of polypeptide decreases // no/less polypeptide digested into peptide	1	4

c) Essays

1(a)	P1-the process is binary fission	1	4
	P2-when Amoeba sp. has grown to certain size	1	
	P3-the nucleus divide by mitosis	1	
	P4-then the cytoplasm divides// cytokinesis occurs	1	
	P5- form 2 genetically identical amoeba sp.	1	
(b)	P1-the living process is osmoregulation	1	6
	P2-osmoregulation in Amoeba sp. involved contractile vacuole	1	
	P3-fresh water is hypotonic to Amoeba sp.	1	
	P4: water diffuses into Amoeba sp. by osmosis	1	
	P5-water fills the contractile vacuole to its maximum size	1	
	P6-contractile vacuole contract	1	
	P7-expel the water out of amoeba sp.	1	
	P8-thus amoeba sp. does not burst	1	
c)	P1-the organ is skin	1	10
	P2-skin consists of epithelial tissues, nerve tissues, muscle tissues and connective tissues (at least two types of tissues)	1	
	P3-epithelial tissues specialised to form sweat gland	1	
	P4-sweat gland secrete sweat during hot day	1	
	P5-epithelial tissues specialised to form hair follicle/produce hair	1	
	P6-muscle tissues found in skin is erector muscle	1	
	P7-during hot day erector muscle relax, hair lies flat	1	
	P8-muscle tissues found at wall of arteriole is smooth muscle	1	
	P9-smooth muscle relax during hot day	1	
	P10-connective tissues found in the skin is blood tissues	1	
	P11-when smooth muscle of arteriole relax, more blood flow to the skin	1	
	P12-more heat is lost	1	
	P13-nerve tissues is the receptor	1	
	P14-receptor detect the increase of the temperature	1	
	P15-the function of the skin is to lower the body temperature to normal	1	
2(a)(i)	P1-mekanisma pembetulan untuk mengembalikan keadaan persekitaran dalam menjadi normal P2-apabila aras glukosa dalam	1	3

	darah meningkat, mekanisme pembetulan akan menurunkan semula aras glukosa kepada normal P3-apabila aras glukosa dalam darah menurun, mekanisme pembetulan akan meningkatkan semula aras glukosa kepada normal	1	
(ii)	P1-hormon X ialah insulin P2-hormon Y ialah glucagon P3-apabila aras glukosa dalam darah meningkat daripada aras normal, (sel beta pada kelompok sel Langerhans) di pancreas merembeskan hormon X ke dalam darah P4-di hati, Hormon X menukarkan glukosa berlebihan dalam sel darah kepada glikogen untuk disimpan di sel-sel hati dan sel-sel otot P5-aras glukosa dalam darah menurun daripada aras normal, (sel alfa pada kelompok sel Langerhans di) pancreas merembeskan hormone Y ke dalam darah P6-di hati hormone Y menukarkan glikogen kepada glukosa P7-aras glukosa dalam darah meningkat semula dan kembali ke aras normal	1 1 1 1 1 1 1 1 1	5

CHAPTER 3

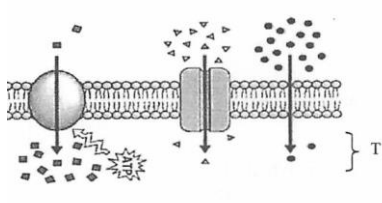
a) Objective

1.	D	2.	A	3.	D	4.	C	5.	D
6.	D	7.	D	8.	B	9.	C	10.	A
11.	A	12.	A	13.	C	14.	A	15.	A
16.	C	17.	D	18.	C				

b) Structure

Label	Function/Fungsi		
A	allow the movement of large molecules		
B	help cells recognize each other		
C	ensure stability, flexibility and rigidity		
(b)(i)	Hydrphilic (head) which attract water	1	1
(ii)	Easier for water molecule movement /osmosis	1	1
c)(i)	F- mineral ions / ions Ca ²⁺ , ion K ⁺ /any examples	1	2
	E-ion Ca ²⁺ in formation of bones// ion K ⁺ in muscle contractions / impulse transmission //any correct functions of minerals in F	1	
(ii)	F1-mineral ions/any examples is transported via carrier protein	1	2
	E1-by facilitated diffusion	1	
d)	P1-poison retard the respiration	1	2

	process P2-this is due to no formation of energy P3-active transport does not occur	1 1	
e)	P1-protein molecules embedded / floating randomly in phospholipid bilayer P2-protein molecules always moving / dynamic and fluid structure	1 1	2

2 a(i)		1	1								
(ii)	F:T is phospholipid bilayer P1: allow the molecules that can dissolve in lipid (lipid soluble molecules) / non polar/uncharged molecules/very small molecules P2:such as fatty acid & glycerol / oxygen and carbon dioxide / water molecules P3:to cross the plasma membrane freely P4: by osmosis (water)/ simple diffusion	1 1 1 1 1	3								
(b)	F: sodium ion//any suitable example P1: movement (of sodium ion is) against the concentration gradient P2: it needs energy / ATP molecules P3: ATP molecules bind to one site of carrier protein P4: at another site carrier protein bind with sodium ions//any suitable example P5: carrier protein changes its shape (to carry the sodium ions out of the cell) P6: through active transport	1 1 1 1 1 1	3								
(c)	Similarity: 1.both of Q and R are passive transport 2.energy is not required // No ATP/energy used 3. down the concentration gradient 4.occurs until reach dynamic equilibrium state Any 1 Differences: Any 2	1 1 1 1 1 1 1 1 1	3								
	<table border="1"> <tr> <th>Q</th> <th>R</th> </tr> <tr> <td>Facilitated diffusion</td> <td>Simple diffusion</td> </tr> <tr> <td>Need the help of pore/carrier protein</td> <td>Do not need any protein</td> </tr> <tr> <td>Allow the movement of</td> <td>Allow the movement of</td> </tr> </table>	Q	R	Facilitated diffusion	Simple diffusion	Need the help of pore/carrier protein	Do not need any protein	Allow the movement of	Allow the movement of	1 1 1	
Q	R										
Facilitated diffusion	Simple diffusion										
Need the help of pore/carrier protein	Do not need any protein										
Allow the movement of	Allow the movement of										

	molecules which are not soluble in lipid (but soluble in water)	molecules which are soluble in lipid		
	Example molecules that transported such as ions/nucleic acid/amino acid/glucose	Example molecules that transported such as small uncharged polar molecules / such as oxygen/ carbon dioxide/ water molecules// lipid-soluble molecules/ such as fatty acid / glycerol/ vitamin ADEK	1	
(d)	F1: plant wilt/die P1:cyanide inhibit cellular respiration in (the root hair)cell P2:no energy /ATP will be generated / produced P3: active transport cannot occur to transport mineral salt P4:the root cell become hypotonic than the soil water P5: no diffusion of water molecules into the root cell by osmosis P6:plasmolysis occurs// plant cell flaccid	Any 3	1 1 1 1 1 1 1	3

3(a)(i)	Osmosis	1	1
(ii)	P1-sucrose solution is hypertonic P2-water diffuse from distilled water into the sucrose solution P3-the level of sucrose solution in the capillary tube stop rising at the equilibrium stage/ the amount of water diffuse into and out from the visking tube is the same	1 1 1	2
(b)	F- Sucrose molecule are too large E-the visking tubing is semi permeable membrane/ which only allows certain substances to pass through	1 1	2
(c)(i)	Y: crenation Z: haemolysis		2
(ii)	P1- solution Z is hypotonic compare to red blood cell P2-osmosis occur P3-water leaves / diffuses into the cell P4-red blood cell expand/burst		3
(iii)	F-no P1-Plant cell consist of cell wall P2-cell wall is made up of cellulose / able to withstand pressure	1 1 1	2

4(a)(i)	Hypertonic solution	1	1										
(ii)	P1: 30% sucrose solution /solution in beaker Q is hypertonic compare to the cell sap P2: water molecules diffuse out from the vacuole P3: by osmosis P4: both vacuole and cytoplasm shrink // the plasma membrane pulls away from the rigid cell wall // the cells become flaccid, plasmolysis occurs	1 1 1 Any 2	2										
(iii)	P1: distilled water /solution in beaker P is hypotonic compare to the cell sap P2: water molecules diffuse into the vacuole/cell sap by osmosis P4: vacuole expand and swell up // plasma membrane pushes against the rigid cell wall P5: flaccid cell becomes fully turgid again P6: the cells are said to have undergone deplasmolysis	1 1 1 1 1	Any 3										
(b)	<table border="1"> <tr> <td>Red Blood Cell X</td> <td>Red Blood Cell Y</td> </tr> <tr> <td>Crenation</td> <td>Haemolysis</td> </tr> <tr> <td>The solution is hypertonic compare to the cytoplasmic of the red blood cell</td> <td>The solution is hypotonic compare to the cytoplasmic of the red blood cell</td> </tr> <tr> <td>Water diffuses out from red blood cell by osmosis</td> <td>Water diffuses into red blood cell by osmosis</td> </tr> <tr> <td>Red blood cells shrivels</td> <td>The red blood cell expands and burst</td> </tr> </table>	Red Blood Cell X	Red Blood Cell Y	Crenation	Haemolysis	The solution is hypertonic compare to the cytoplasmic of the red blood cell	The solution is hypotonic compare to the cytoplasmic of the red blood cell	Water diffuses out from red blood cell by osmosis	Water diffuses into red blood cell by osmosis	Red blood cells shrivels	The red blood cell expands and burst	1 1 1 1	3
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Red blood cells shrivels	The red blood cell expands and burst												
(c)	P1: Fruit / mangoes are immersed in vinegar which has low pH / acidic P2: vinegar diffuses into the tissues of the mangoes/fruit P3: the tissues of mangoes / fruit become acidic P4: the low pH prevent bacterial growth in the tissues/ mangoes/fruits P5: this prevents decay of the fruits / mangoes	1 1 1 1 1 Any 3	3										

5(a)(i)	P : resapan ringkas Q: resapan berbantu	1 1	2								
(ii)	R : sodium /ion potassium Q: Glukosa / asid amino (semua jenis monosakarida)	1 1	2								
(iii)	<p>Persamaan: P1-kedua-dua proses melibatkan struktur protein / protein pembawa</p> <p>Perbezaan:</p> <table border="1"> <tr> <td>Q</td> <td>R</td> </tr> <tr> <td>Molekul/bahan bergerak mengikut kecerunan kepekatan</td> <td>Ion/bahan bergerak melawan kecerunan kepekatan</td> </tr> <tr> <td>Tidak perlu tenaga</td> <td>Perlu tenaga/ATP</td> </tr> <tr> <td>Proses akan terus berlaku sehingga keseimbangan dinamik tercapai</td> <td>Proses yang mengakibatkan pengumpulan atau penyingkiran bahan daripada sel</td> </tr> </table>	Q	R	Molekul/bahan bergerak mengikut kecerunan kepekatan	Ion/bahan bergerak melawan kecerunan kepekatan	Tidak perlu tenaga	Perlu tenaga/ATP	Proses akan terus berlaku sehingga keseimbangan dinamik tercapai	Proses yang mengakibatkan pengumpulan atau penyingkiran bahan daripada sel	1 1 1 1	3
Q	R										
Molekul/bahan bergerak mengikut kecerunan kepekatan	Ion/bahan bergerak melawan kecerunan kepekatan										
Tidak perlu tenaga	Perlu tenaga/ATP										
Proses akan terus berlaku sehingga keseimbangan dinamik tercapai	Proses yang mengakibatkan pengumpulan atau penyingkiran bahan daripada sel										
(b)	F1-membran plasma bersifat separa telap P1-yang membenarkan hanya molekul tertentu/ kecil sahaja melaluinya P2-manakala yang lain tidak dibenarkan	1 1 1	3								
(c)	P1-larutan garam pekat bersifat hipertonic terhadap sel ikan P2-air meresap keluar daripada sel P3-secara osmosis P4-mikroorganisma tidak dapat membiak	1 1 1 1	2								

c) Essay

1(a)(i)	1. facilitated diffusion 2. active transport	1 1	2						
(ii)	1. absorption of nutrients into the villus 2. transport of ions into the plant root	1 1	2						
(ii)	<p>Similarities P1-both need carrier protein P2-both occur in living cells</p> <p>Differences</p> <table border="1"> <tr> <td>Facilitated diffusion</td> <td>Active transport</td> </tr> <tr> <td>D1-follow the concentration gradient</td> <td>Oppose the concentration gradient</td> </tr> <tr> <td>D2-molecule</td> <td>Molecule</td> </tr> </table>	Facilitated diffusion	Active transport	D1-follow the concentration gradient	Oppose the concentration gradient	D2-molecule	Molecule	1 1 1 1	6
Facilitated diffusion	Active transport								
D1-follow the concentration gradient	Oppose the concentration gradient								
D2-molecule	Molecule								

	move from higher concentration to lower concentration	move from lower concentration to higher concentration	1	
	D3-molecule move from both direction when crossing plasma membrane	Molecule move in one direction only across the plasma membrane	1	
	D4-molecule can move through protein pore without bonding	Molecule move through transport protein only which have the receptor site outside the membrane	1	
	D5- No ATP is needed	ATP is needed	1	
	Any 4			
b)	P1-sodium potassium pump has active site P2-one molecule ATP bind to the active site P3-sodium approach the pump P4-bind to the active site P5-one of the phosphate bond at ATP molecule is hydrolysed P6-release energy into the pump P7: the pump change its shape P8-release sodium ion out of the cell P9-phosphate group is released from the pump P10-potassium ion is release into the cell		1 1 1 1 1 1 1 1 1 1	10

2			1	4
(a)(i)	<p>Condition A / <i>Kruadun A</i></p> <p>Condition B / <i>Kruadun B</i></p>	1 1		
(ii)	P1-excessive fertiliser increases the solute concentration in soil (around the roots) compared to the cell sap (of the root) P2-the cell sap now has a higher concentration of water/hypotonic to the soil water P3-this results in water molecules diffusing from the cell sap into the soil by osmosis P4-plasmolysis occurs		1 1 1 1	5

	P5-vacuole/cytoplasm shrink P6-plasma membrane pulls away from the cell wall P7-plasmolysed cell lose turgidity and support causing the whole plant to wilt		1 1 1 Any 5	
(b)	P1-Pickling P2-at high concentration of salt /sugar solution is used P3-concentrated salt/ sugar solution is hypertonic compared to the cell sap (of the mango) P4-water molecules within the food cells diffuse out by osmosis P5-water molecules also diffuses out from the microorganism P6-food becomes dehydrated P7-without water, bacteria and fungus cannot survive		1 1 1 1 1 1 Any 5	5
c)	P1-plasma membrane is composed of phospholipid and protein P2-various types of proteins are dispersed throughout and inserted into the phospholipid bilayer P3-phospholipid bilayer are not rigid / static but form a dynamic /flexible structure P4-phospholipid molecule has a polar head (hydrophilic) and non-polar tail (hydrophobic) P5-contain cholesterol which links the fatty acids together and P6-helps to stabilise/strengthen the plasma membrane and make it more flexible P7-has various type of proteins (e.g. pore protein and carrier protein) either partially attached or wholly embedded in the membrane P8-the protein molecules float about in the phospholipid bilayer to form a mosaic protein that is always changing / fluid/ dynamic		1 1 1 1 1 1 1 1 1 Any 6	6

3(a)	Process P F1-process P is simple diffusion through phospholipid bilayer P1-examples of substances involved are small uncharged molecules such as oxygen/carbon dioxide/water P2-lipid soluble molecules such as glycerol/fatty acids/vitamin ADEK		1 1 1	10
	Process Q F2-Process Q is facilitated diffusion through carrier protein P1-examples of substances are large water soluble molecules such as glucose/amino acids		1 1	

molecule (so the mass is maintained)		
Point R	1	
F3-The mass of potato decrease	1	
E1-because the solution is hypertonic to the cell sap	1	
E2-the water molecule diffuse out from cells / from higher concentration to the lower concentration / solution at the surrounding	1	
E3-by osmosis	1	
E4-cell becomes flaccid (so the mass decreased)	1	
Any 10		

(e)(i)	P1: Food sample A have reducing sugar while food sample C not have reducing sugar. P2: Food sample A contain maltose but C contain sucrose P3: Maltose reduce CuSO ₄ in the Benedict solution into Cu ₂ O Any 2	1 1 1	2
(ii)	P1 : (Food sample C) need to boil with dilute HCl / acid P2 : Sucrose then is hydrolysed P3: into glucose and fructose. Or P1: (Food sample C) added with sucrose P2: sucrose hydrolysed P3: into glucose and fructose	1 1 1 1 1	3

CHAPTER 4

a)Objective

1.	B	2.	D	3.	D	4.	A	5.	B
6.	B	7.	D	8.	B	9.	C	10.	A
11.	C	12.	B	13.	C	14.	A	15.	A
16.		17.	C	18.	A	19.	B	20.	B
21.	C	22.	A	23.	B	24.	D		

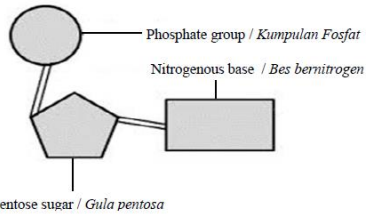
b) Structure

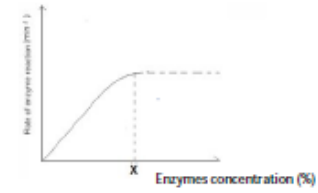
1(a)	DNA	1	1
(b)	Carbon, hydrogen, oxygen, nitrogen and phosphorus	1	1
(c)	-carry genetic information -direct protein synthesis	1 1	2
(d)(i)	Nucleotide	1	1
(ii)	X-phosphate group Y-pentose sugar Z-nitrogenous base	1 1 1	3
(iii)	Z	1	1
e)	RNA	1	1
f)	P: Adenine / Q: Thymine or P: Cytosine / Q: Guanine or P: Thymine / Q: Adenine or P: Guanine / Q: Cytosine	1 1 1 1	2

2(a)	Carbon / C, Hydrogen / H, Oxygen / O	1	1
(b)	Glucose	1	1
(c)	P : Starch Q : Glycogen R : Cellulose Notes :all correct = 2 marks, 1&2 correct = 1 mark	2	2
(d)	F : Saliva contain (salivary) amylase. P1 : Salivary amylase hydrolysed starch/ P into maltose P2 : By hydrolysis process	1 1 1	3

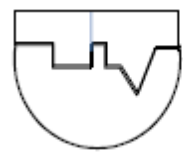
3(a)(i)	X: Fatty acids Y: water	1 1	2												
(ii)	Condensation	1	1												
(b)(i)	A: saturated fats B: unsaturated fats	1 1	2												
(ii)	<table border="1"> <tr> <td>Saturated Fats</td> <td>Unsaturated fats</td> <td rowspan="5">1 1 1</td> <td rowspan="5">3</td> </tr> <tr> <td>No double bond between atom carbon</td> <td>At least one double bond between atom carbon</td> </tr> <tr> <td>Not able to react with additional hydrogen atom</td> <td>Able to react with additional hydrogen atom</td> </tr> <tr> <td>Solid at room temperature</td> <td>Liquid at room temperature</td> </tr> <tr> <td>High cholesterol</td> <td>Low cholesterol</td> </tr> </table>	Saturated Fats	Unsaturated fats	1 1 1	3	No double bond between atom carbon	At least one double bond between atom carbon	Not able to react with additional hydrogen atom	Able to react with additional hydrogen atom	Solid at room temperature	Liquid at room temperature	High cholesterol	Low cholesterol		
Saturated Fats	Unsaturated fats	1 1 1	3												
No double bond between atom carbon	At least one double bond between atom carbon														
Not able to react with additional hydrogen atom	Able to react with additional hydrogen atom														
Solid at room temperature	Liquid at room temperature														
High cholesterol	Low cholesterol														
(c)(i)	E: Provide energy F: provide energy/insulator G: carry genetic material	1 1 1	3												
(ii)	P1: mutation occur P2: protein produced cannot function properly	1 1	1												

4(a)	Name of the hypothesis: Lock and key hypothesis Explanation: P1: the process of breaking down complex molecule P2:removal of (one) water molecule P3: to produce simple molecule Any 2	1 1 1 1	3
(b)	Hydrolysis	1	1
(c)	P1-process of break down complex molecule P2-expel water molecule to produce simple molecule	1 1	2

(d)(i)	DNA/ deoxyribonucleic acid	1	1
(ii)	 <p>Phosphate group / <i>Kumpulan Fosfat</i> Nitrogenous base / <i>Bes bernitrogen</i> Pentose sugar / <i>Gula pentosa</i></p>	2	2
(iii)	<p>P1-DNA in the nucleus determine the genetic information for the synthesis of amino acid</p> <p>P1-RNA messenger is synthesized by using the genetic information in the DNA</p> <p>P3-Genetic information is translated to polypeptide chain to form amino acid</p>	1 1 1	3

(ii)	 <p>Rate of enzyme reaction (mm³ s⁻¹) Enzymes concentration (%) X</p>	1	1
d)	Zymase	1	1
	<p>P1-Zymase enzymes found in yeast</p> <p>P2-it acts on starch and convert it into glucose</p> <p>P3-it acts on glucose and convert it into alcohol</p> <p>P4-through fermentation process</p>	1 1 1 1	2

5(a)(i)	X: amino acid Y: peptide bond	1 1	2
(ii)	L: secondary structure M: Quaternary structure	1 1	2
(b)(i)	Ribosome	1	1
(ii)	Hydrolysis	1	1
(iii)	Enzyme : K Haemoglobin : M	1 1	2
C)	F: Temperature in refrigerator is low P1: enzyme in bacteria is inactive P2: food cannot be decomposed	1 1 1	3
d)	F: 40°C is optimum temperature P1: enzyme activity is maximum P2: the cleaning is more effective	1 1 1	2

6(a)(i)	X:sucrose Y:Glucose Z:Fructose	3/ 2/ 2/	2 1 0
(ii)			1
b(i)	<p>P1-enzymes reaction is highly specific</p> <p>P2-enzyme does not change at the end of reaction</p> <p>P3-reversible in action</p>	1 1 1	2
C(l)	<p>F-increase of enzymes concentration will increase rate of enzymatic reaction (until it reach a maximum point)</p> <p>P1-due to more active site is available to bind with substrates</p> <p>P2-more substrates will bind at the active site of the enzymes to form enzymes-substrate complex</p> <p>P3-to produce more products</p>	1 1 1 1	3

c) Essay

1(a)	<p>P1: structure X is tertiary protein</p> <p>P2:such as enzyme/hormones/antibodies/plasma proteins</p> <p>P3:formed when secondary structure folded into three dimensional shape</p> <p>P4:structure Y is quaternary structure</p> <p>P5:such as haemoglobin</p> <p>P6: formed from 2 or more tertiary structure that folded into a large and complex molecule</p> <p style="text-align: right;">Any 2 points each</p>	1 1 1 1 1 1	4
b(i)	<p>F1-protease / papain P1-to tenderize meat</p> <p>F2-lipase P2-ripening of cheese</p> <p>F3-amylase/amyloglucosidase P3-convert glucose into sugar in syrup making</p> <p>F4-zymase P4-convert glucose to ethanol in making alcoholic drinks</p> <p>F5-trypsin P5-remove hair in leather products</p> <p>F6-cellulose P6-extract agar from seaweed</p>	1 1 1 1 1 1 1 1 1 1	6

2(a)(i)	<p>P1-enzymes are proteins which are synthesized by living organisms</p> <p>P2-enzymes bind to their substances and convert them to product in the enzymatic reaction</p> <p>P3-enzymes have specific sites called active sites to bind to specific substrates // enzymes are highly specific in their reaction</p> <p>P4-enzymes speed up the rates of chemical reactions but remain</p>	1 1 1 1	4
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	yang mengandung bilangan kromosom yang sama dengan induknya/2n/diploid P2: kandungan genetik sama dengan induknya P3: tidak berlaku pindah silang (antara kromatid bukan beradik) P4: tiada variasi genetik yang berlaku	1 1 1	
(d)(i)	P1: pertumbuhan semua anak pokok terbantut/terencat/musnah P2: kerana mempunyai rintangan /ciri genetik yang sama	1 1	2
(ii)	P1: tisu pada hujung pucuk mempunyai kromosom diploid P2: aktif membahagi secara mitosis P3: membentuk kalus/organisma lengkap	1 1 1	2

3(a)	6 chromosomes	1	1
b)	1. mitosis Number of chromosomes are 6 Same pattern and same size of chromosome as parent cell	1 1	2
	2. meiosis Number of chromosomes are 3 Pattern and size of chromosomes is different compare to parent cell	1 1	2
c)	In mitosis -during anaphase chromosome/sister chromatids separated and move to the opposite poles (cause the number of chromosome in daughter cell remain the same)	1	2
	In meiosis -during anaphase I homologous chromosomes separated and move to the opposite poles (cause the number of chromosome in daughter cell become half from the parent cell)	1	
d)	F1: mitosis produce no variation, while meiosis produce variation P1: caused by crossing over during Prophase I in meiosis	1 1	2
	e)	P1: albino buffaloes caused by gene mutation which control the production of skin pigmentation P2: in autosomes P3: controlled by recessive alleles P4: skin cells unable to synthesize (melanin) pigment// no melanin pigment	1 1 1 1

4(a)(i)	X: sentromer Y: kromosom homolog	1 1	2
(ii)	Metafasa I	1	1

(b)(i)	P1-kromosom homolog tersusun di satah khatulistiwa P2-berlaku pertukaran segmen DNA/ bahan genetik (di titik kiasma) P3-berlaku pindah silang	1 1 1	2	
	(ii)	P1-memastikan bilangan kromosom gamet separuh daripada induk/haploid P2-memastikan bilangan kromosom sel anak adalah diploid /sama dengan induk P3-menghasilkan variasi dalam organisma	1 1 1	1
	c)	P1-apabila nukleus sperma(haploid) bercantum dengan nukleus ovum (haploid) P2-melalui persenyawaan P3-membentuk satu zigot yang diploid	1 1 1	2
d(i)	F : sel A adalah sama dengan sel B tetapi berbeza dengan sel C P: Sel A dan sel B adalah hasil daripada proses mitosis manakala sel C adalah hasil daripada proses meiosis	1 1	2	
	(ii)	24 kromosom	1	1
	(iii)	Sindrom Down/ Sindrom Klinefelter	1	1

c) Essay

1(a)(i)	P1-Meiosis produces gametes/sperms and ovum P2-contain haploid number of chromosomes (23 chromosomes) P3-when fertilisation occur P4-diploid zygote is formed P5-the offspring has similar number of chromosomes as the parent	2	2						
	(ii)	P1-Both involve nuclear division P2-both involve the formation of spindle fibres P3-the nuclear membrane in both processes disintegrate during prophase P4-the nuclear membrane in both processes reform during telophase Any 2	1 1 1 1	6					
Differences									
	<table border="1"> <thead> <tr> <th>Meiosis I</th> <th>Meiosis II</th> </tr> </thead> <tbody> <tr> <td>(During Prophase 1), homologous chromosomes pair up/synapsis</td> <td>(During prophase II), homologous chromosomes DO NOT pair up/synapsis</td> </tr> <tr> <td>(During Prophase 1), crossing over / exchange of genetic</td> <td>(During Prophase II), crossing over / exchange of genetic</td> </tr> </tbody> </table>	Meiosis I	Meiosis II	(During Prophase 1), homologous chromosomes pair up/synapsis	(During prophase II), homologous chromosomes DO NOT pair up/synapsis	(During Prophase 1), crossing over / exchange of genetic	(During Prophase II), crossing over / exchange of genetic	1 1	
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(During Prophase 1), homologous chromosomes pair up/synapsis	(During prophase II), homologous chromosomes DO NOT pair up/synapsis								
(During Prophase 1), crossing over / exchange of genetic	(During Prophase II), crossing over / exchange of genetic								

b) Structure

1	Villus	1	1
a(i)			
(ii)	P1-the epithelial lining is only one cell thick P2-epithelial cell have a lining of microscopic projection called microvillus P3-each villus has a network of blood capillaries	1 1 1	2
	Any 2		
(b)	X:absorb fatty acid and glycerol/vitamin A,D,E,K Y: absorbed glucose/amino acids/minerals/vitamin B,C	1 1	2
(c)	P1: acts as checkpoint P2: which control the amount of nutrients released into blood circulatory system	1 1	2
(d)	F-Nutrient P is glucose P1-which is converted into glycogen & stored in the liver P2-when there is lack of blood glucose level, stored glycogen is converted back to glucose P3-glucose are transported to the cells to produce energy	1 1 1 1 Any 2	2
e)	F –lipids are not transported to the liver P1-fatty acids and glycerol/lipids are absorbed into lacteal not into blood capillaries P2-from lacteal lipids are transported through lymphatic system to blood circulatory system P3: excess lipid stored in adipose tissue	1 1 1 1 Any 3	3

2	Absorption	1	1
a(i)			
(ii)	P1-thin wall P2-for rapid absorption of nutrients P3-having microvilli on the epithelial lining P4-increase the surface area for more absorption to occur	1 1 1 1	2
(b)	Vessel P: hepatic portal vein Vessel R: lymphatic vessel	1 1	2
(c)	F-The concentration of glucose in vessel P is higher than in vessel Q P1-Glucose has been used by liver cells (to carry out cellular respiration) P2-excess glucose has been converted into glycogen (in the liver)	1 1 1	2
	(F + any 1P)		

(d)	P1-Protein is digested into amino acid P2-excess protein will produce excess amino acid P3-(in the liver) excess amino acid is broken down P4: into urea P5: the process is called deamination	1 1 1 1 1	4
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3(a)(i)	Diet which contain all the nutrient in correct proportion to meet the daily requirement of the individual	1	1
(ii)	Level 2 : Vitamin / mineral salt / fibre Level 3 : Protein	1 1	2
(iii)	Can cause obesity / stroke / thrombosis / arteriosclerosis / high blood pressure	1	1
(b)	F Very active man need 15100kj energy , but moderate active man only need 12600 kj energy E because very active man need more energy to carry out all the heavy / tough activity	1 1	2
c)	Deficiency disease : Ricket Cause : Lack of vitamin D / calcium & phosphorus	1 1	2

4(a)(i)	Ruminant	1	1										
(ii)	A: omasum B:reticulum C: Abomasum D: Rumen		2										
B(i)	Cellulase	1	1										
(ii)	To hydrolyse cellulose into glucose	1	1										
(iii)	P1-when food enter reticulum, cellulose is hydrolyse P2-the content of the reticulum/cud is the regurgitated into the mouth to be thoroughly chewed again P3-this process help to soften and break down cellulose, making it more accessible to further microbial action/reaction of enzymes`	1 1	2										
C)	<table border="1" style="width: 100%;"> <tr> <td>Human</td> <td>Rodent</td> <td rowspan="4">1</td> <td rowspan="4">3</td> </tr> <tr> <td>Small caecum</td> <td>Large caecum</td> </tr> <tr> <td>Cannot digest cellulose</td> <td>Can digest cellulose into simple sugar</td> </tr> <tr> <td>Cellulose producing bacteria is</td> <td>Cellulose producing bacteria is</td> </tr> </table>	Human	Rodent	1	3	Small caecum	Large caecum	Cannot digest cellulose	Can digest cellulose into simple sugar	Cellulose producing bacteria is	Cellulose producing bacteria is		
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	absent	present	Max3	
	Food passes through the alimentary canal once	Food passes the alimentary canal twice		
d)	P1-in goat cellulose is hydrolysed in the rumen whereas in rabbit cellulose is hydrolysed in the caecum P2-therefore rabbit need to ingest the faeces pellet to recover the nutrients initially list in their faeces P3-this allow the small intestine to absorb the nutrients		1 1 1	Max 2

5(a)	Chloroplast / Organel M contain chlorophyll to trap/ absorb/ capture light energy	1 1	Max 2
(b)(i)	P1-Photolysis of water / Light energy is used to split water molecule into hydrogen ion and hydroxyl ion. P2-Hydroxyl ion loses an electron to form hydroxyl group. P3-Hydroxyl group combine to form oxygen and water.	1 1 1	Max 3
(ii)	P1-Hydrogen atom and ATP from reaction P will be used in the reaction Q. P2-Hydrogen atom fix / reduce carbon dioxide to form glucose.	1 1	2
c)	F1-Dust particle will cover/ accumulate on the surface of the leaf, e1 -so less light energy will be trap by the chlorophyll. F2-Dust particle block the stomata, E2-so, less/ no supply of carbon dioxide (to the cell) E3-: rate of photosynthesis decreases. F1+ E1 + E3 or F2 + E2 + E3	1 1 1 1	Max 3
d)	F-In winter, temperature is very low// light intensity is low and the rate of photosynthesis is very low P2-In the greenhouse, light intensity/ concentration of carbon dioxide/ temperature are maintained at optimum level (for photosynthesis) throughout the year. P3-So the rate of photosynthesis is maintained at maximum level throughout the year (regardless of changes in light intensity or	1 1 1	Max 3

	temperature). P4-The plants are able to increase yields/ increase the crops production throughout the years.	1	
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6(a)(i)	water	1	1
ii)	F: photolysis of water P1: light energy is used to split the water molecules P2: into hydrogen ion (H+) and hydroxyl ion (OH-)	1 1 1	3
b)	Gas Q: dark reaction Gas T : light reaction	1 1	2
c)	F : no net gain or loss of the sugar produced P1: at compensation point P2: at low light intensity, the rate of carbon dioxide production during respiration is equal to the rate of carbon dioxide consumption during photosynthesis // explanation on oxygen P3: a point is reached whereby all the carbon dioxide is produced during respiration are used in photosynthesis P4: there is no net gain or loss in carbon dioxide by the plant	1 1 1 1	Max 3
d)	P1: remove carbon dioxide from the atmosphere P2: provide food for plant and animals in the form of carbohydrates or sugar or glucose P3: uses oxygen as a waste product which is released into the atmosphere P4: changes the energy from the sun into a usable form for living organism P5: provides the structural components in the cell walls of plants which is cellulose	1 1 1 1	Max 3

c) Essay

1(a)	(i) Teenagers P1 need food which are rich in carbohydrate P2 to provide energy for active lifestyle P3 need a lot of protein P4 for rapid growth P5 need a lot of calcium P6 for bones n tissues formation P7 need a lot of vitamin D P8 to help in absorption of calcium	1 1 1 1 1	Max 5
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	P3-causing the system in the body takes energy from fat (in the body as substitute food that is often taken)	1	
	P4-leading to weight loss	1	

3(a)	<p>i)Glukosa</p> <p><u>Asimilasi dalam hati</u> P1-Glukosa yang berlebihan ditukarkan kepada glikogen oleh hormone insulin dan disimpan dalam hati 1 P2-apabila aras gula dalam darah menurun, glikogen ditukarkan semula kepada glukosa oleh hormone glucagon 1 P3-glikogen yang berlebihan akan ditukarkan kepada lipid 1</p> <p><u>Asimilasi dalam sel badan</u> P4-glukosa dioksidakan untuk membebaskan tenaga melalui respirasi sel 1 P5-tenaga diperlukan untuk proses kimia dalam sel (untuk pegecutan otot dan sintesis protein) 1</p> <p>(ii)Asid Amino</p> <p><u>Asimilasi dalam hati</u> P6-asid amino disintesis menjadi protein plasma 1 P7-apabila kekurangan glukosa, hati menukarkan asid amino kepada glukosa 1</p> <p><u>Asimilasi dalam sel badan</u> P8-asid amino diguna untuk sintesis protoplasma baru/memperbaiki tisu yang rosak 1 P9-untuk sintesis enzim dan hormone 1 P10-asid amino berlebihan diuraikan oleh hati dan menghasilkan urea 1 P11-melalui proses pendeaminaan 1 P12-urea diangkat dari hati melalui aliran darah ke ginjal untuk dikumuhkan 1</p> <p>(iii)Lipid</p> <p><u>Asimilasi dalam sel badan</u> P13-lipid seperti lemak merupakan sumber utama tenaga 1 P14-fosfolipid dan kolesterol merupakan komponen utama membrane plasma 1</p>	10	
(b)	P1-klorofil menyerap tenaga cahaya menyebabkan klorofil teruja	1	6

	P2-dalam keadaan teruja electron boleh meninggalkan molekul klorofil 1 P3-tenaga cahaya juga digunakan untuk memecahkan molekul air kepada ion hidrogen dan ion hidroksil melalui proses fotolisis air 1 P4-ion hidrogen bergabung dengan electron yang dibebaskan oleh klorofil untuk membentuk atom hidrogen 1 P5-manakala ion hidroksil kehilangan electron dan didermakan kepada klorofil untuk membentuk kumpulan hidroksil 1 P6-kumpulan hidroksil akan bergabung sesame sendiri untuk membentuk air dan gas oksigen 1 P7-tindakbalas X dikenali sebagai tindak balas cahaya 1 Mana-mana 4		
	P8-atom hidrogen (dari tindakbalas cahaya) digunakan untuk menurunkan /mengikat karbon dioksida 1 P9-menyebabkan penurunan karbon dioksida kepada glukosa berlaku 1 P10-glukosa yang terhasil kemudian dikondensasikan untuk membentuk kanji 1 P11-tindak balas Y dikenali sebagai tindak balas gelap 1 Mana-mana 2		
(c)	P1-pencemaran udara daripada kilang 1 P2-asap/debu/jelaga (yang tebal) 1 P3-menyebabkan keamatan cahaya yang diterima oleh tumbuhan kurang // keamatan cahaya yang diserap oleh klorofil 1 P4-debu melekat pada permukaan daun (menyebabkan keamatan cahaya kurang diserap oleh klorofil/tumbuhan) 1 P5-debu juga menutup bukaan liang stoma tumbuhan 1 P6-kurang gas karbon dioksida diserap oleh daun 1 P7-menyebabkan kadar fotosintesis rendah/kurang 1 Mana-mana 4	4	

4(a)	Reaction in P F1: Light reaction occur (in P) 1 E1: P is grana 1 Reaction in Q F2: Dark reaction occur (in Q) 1 E2: Q is stroma 1	6	
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	Differences												
	<table border="1"> <tr> <th>Reaction in P</th> <th>Reaction in Q</th> </tr> <tr> <td>F2: Requires light energy</td> <td>Does not require light energy</td> </tr> <tr> <td>E2: To breakdown /photolysis of water molecules</td> <td>Need atom H to reduce carbon dioxide</td> </tr> <tr> <td>E3: To form ion H and ion OH</td> <td>To form glucose</td> </tr> <tr> <td>F3: Form ATP</td> <td>Uses ATP</td> </tr> </table>	Reaction in P	Reaction in Q	F2: Requires light energy	Does not require light energy	E2: To breakdown /photolysis of water molecules	Need atom H to reduce carbon dioxide	E3: To form ion H and ion OH	To form glucose	F3: Form ATP	Uses ATP	1	
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F3: Form ATP	Uses ATP												
		1											
		1											
		1											
(b)	F1: Epidermis is transparent E1: to allow sunlight to penetrate into the leaf	1 1	8										
	F2: Cuticle layer is waxy(water proof) E2: To prevent loss of water and to protect the leaf	1 1											
	F3:Cell X/palisade cells are closely arranged and at right angles to the surface of the leaf E3: They also contain many chloroplasts E4: received/absorb/trap maximum sunlight	1 1 1											
	F4: Cell Y/spongy mesophyll cells are loosely arranged and has large air space F5: (lower) epidermis layer has stomata E6: support photosynthesis by allowing exchange of gases	1 1 1											
	F6: veins contain xylem and phloem E7: to transport water and minerals E8: to transport the products of photosynthesis / (dissolves)organic product	1 1 1											
(c)	P1: at low light intensity, rate of photosynthesis low P2: increase light intensity will increase the rate of photosynthesis P3: until reach a maximum/saturated point/level P4: due to concentration of carbon dioxide become limiting factor P5: at extreme/very high light intensity, rate of photosynthesis decrease again P6: because enzyme in chloroplast denatured	1 1 1 1 1 1	6										

5(a)	1-klorofil menyerap tenaga cahaya menyebabkan klorofil teruja 2- dalam keadaan teruja electron boleh meninggalkan klorofil 3- tenaga cahaya juga digunakan untuk memecahkan molekul air kepada ion hidrogen dan ion hidroksil melalui proses fotolisis air 4-ion hidrogen bergabung dengan electron yang dibebaskan oleh klorofil untuk membentuk atom hidrogen 5-manakala ion hidroksil kehilangan electron dan didermakan kepada klorofil untuk membentuk kumpulan hidroksil 6-kumpulan hidroksil akan bergabung sesama sendiri untuk membentuk air dan gas oksigen 7-tindak balas X dikenali sebagai tindak balas cahaya 8-tindakbalas Y tidak memerlukan cahaya 9-atom hidrogen daripada tindak balas cahaya digunakan untuk mengikat karbon dioksida 10-menyebabkan penurunan karbon dioksida kepada glukosa berlaku 11-glukosa yang terhasil kemudian dikondensasikan untuk membentuk kanji serta merta 12-tindakbalas Y dikenali sebagai tindak balas gelap	1 1 1 1 1 1 1 1 1 1 1 1	10
(b)	1-dinegara 4 musim, keamatan cahaya /suhu berubah sepanjang tahun 2-pada musim sejuk, suhu adalah sangat rendah 3-pada musim luruh, daun tumbuhan gugur//keamatan cahaya/suhu adalah rendah 4-kadar fotosintesis adalah sangat rendah 5-pada musim bunga dan musim panas, keamatan cahaya/kepekatan karbon dioksida/suhu kekal pada tahap optimum untuk fotosintesis 6-jadi kadar fotosintesis adalah maksimum/paling tinggi pada masa ini 7-dalam rumah kaca, keamatan cahaya/kepekatan karbon dioksida/suhu dikekalkan pada tahap optimum sepanjang tahun 8-menyebabkan kadar fotosintesis dikekalkan pada tahap maksimum sepanjang tahun 9-tumbuhan berupaya meningkatkan hasil tanaman / keluaran sepanjang tahun	1 1 1 1 1 1 1 1 1 1	6
c)	1-pencemaran udara daripada	1	4

	kilang//atau kenderaan/pembakaran membebaskan asap /jerebu tebal	1	
	2-asap/jerebu yang tebal menyebabkan keamatan cahaya yang diterima oleh tumbuhan kurang	1	
	3-pencemaran udara daripada aktiviti kuari / pembakaran membebaskan debu yang banyak	1	
	4-debu melekat pada permukaan daun menyebabkan keamatan cahaya kurang diserap oleh klorofil/tumbuhan	1	
	5-debu juga menutup bukaan liang stoma tumbuhan	1	
	6-menyebabkan kadar fotosintesis rendah/kurang	1	

	wastage		
	3-crops can be planted / poultry can be reared in big scale	1	
	4-to prevent food shortage	1	
	5-to increase commercial values / easier to be transported	1	
	6-more varieties of food can be produced	1	
	Bad effects:		
	1-loss of nutrition value (under high temperature during processing)	1	
	2-contin preservative/colouring/dye which is carcinogenic	1	
	3- leas to mutation/ cancer/health problems	1	
	4-contain excessive salt/sugar	1	
	5-leads to high blood pressure/obesity	1	

6(a)	P1-hydroponic	1	4
	P2-grow plants in culture solution	1	
	P3-the root of the plants are immersed in solution	1	
	P4-which contains all the macronutrients and micronutrient in correct proportion	1	
	P5-culture solution is aerated	1	
	P6-to provide sufficient oxygen for respiration	1	
(b)	Advantages		6
	P1- used to produce disease resistant/pest resistant plants	1	
	P2-less pesticides are used	1	
	P3-less pollution to the environment	1	
	P4-increases yield of crops / profits	1	
	P5-help to solve problems of insufficient food	1	
	P6-increase resistance in plant to herbicide e.g. soya bean plantation	1	
	P7-higher vitamin A / beta carotene content in rice/ etc	1	
	P8- helps to solve problems of malnutrition	1	
	P9-produce crops with longer shelf life	1	
	P10-prevent food wastage	Any 4	
	Disadvantages	1	
	P11-pest resistant genes may be transferred to weeds cause difficult to control growth of weeds	1	
	P12-some genetic modified crops may have animals genes	1	
	P13-genetic modified organisms may affect the survival of other organisms in the ecosystem	1	
	P14-cause the imbalance of nature	Any 2	
c)	Good effects:		10
	1-food can be preserved longer	1	
	2-to prevent food poisoning /	1	

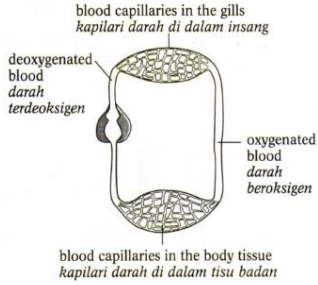
CHAPTER 7

a)Objective

1.		2.	B	3.	A	4.	C	5.	C
6.	D	7.	B	8.	A	9.	D	10.	C
11.		12.	C	13.	A	14.	B	15.	B
16.	A	17.	A	18.	D	19.	B	20.	B
21.	D	22.	D						

b) Structure

1			
a(i)	P1- the phospholipid molecules can move, making the plasma membrane fluid	1	1
	P2-the protein do not form a continuous layer but are scattered in the plasma membrane giving it a mosaic appearance	1	
		Any 1	
(ii)	P1-facilitated diffusion occurred	1	2
	P2-the glucose molecule binds to the specific binding site of a carrier protein	1	
	P3-the carrier protein alters its shape and the glucose molecules is moved by the carrier protein into the cell	1	
(b)(i)	Gills	1	1
(ii)	Gill filament	1	1
(iii)	Adaptation		
	F1-Filament have numerous thin walled lamellae // network of blood capillaries	1	2
	Explanation		
	E1-to increase surface area for gaseous exchange // to transport respiratory gases efficiently	1	
(iv)	P1-dissolved oxygen in the water	1	2

	diffuses into blood capillaries in the gill filaments While, P2-carbon dioxide diffuses out through the gill capillaries into the water	1	
c(i)		1	1
(ii)	F1-Fish have closed circulatory system Or F2-fish have single circulatory system E1-oxygenated blood flows from the gills to the cells directly	1 1 1	2

2.(a)(i)	X : oksigen Y: karbon dioksida	1 1	2
(ii)	F1:alveolus mempunyai dinding yang nipis/ setebal satu sel E1: gas boleh meresap masuk dan keluar melalui dinding lebih cepat F2:permukaan (dalaman) alveolus lembap E2:membenarkan oksigen untuk larut sebelum meresap keluar F3:permukaan luar alveolus diliputi oleh jalinan kapilari darah E3:meningkatkan luas permukaan untuk penyerapan gas yang lebih cepat	1 1 1 1 1	2
b)	F1: kepekatan gas X dalam salur darah Q adalah rendah berbanding dengan gas Y E1: oksigen telah digunakan oleh sel badan untuk respirasi sel E2:respirasi sel membebaskan gas Y	1 1 1	2
C)	F1: Asap rokok	1	3

	mengandungi karbon monoksida E1: karbon monoksida mempunyai keupayaan yang tinggi untuk bergabung dengan haemoglobin berbanding oksigen E2: oleh itu, kurang oksigen akan bergabung dengan haemoglobin untuk penghantaran dalam salur darah P	1	1
d)	E1: Kepekatan karbon dioksida yang tinggi merendahkan nilai ph darah E2: pH yang rendah dikesan oleh kemoreseptor pusat/kemoreseptor peripheral E3:impuls dihantar ke pusat respirasi dank e otot kardiak/otot interkosta/diafragma E4: meningkatkan kadar denyutan jantung dan kadar pernafasan E5: untuk menyingkirkan karbon dioksida berlebihan (oleh itu, peratusan karbon dioksida kemmbali normal)	1 1 1 1 1	3

3.(a)(i)	Lungs	1	1
ii)	Gaseous exchange//respiration	1	1
b)	Diagram 3.1 F1-oxygen diffuse from alveolus into blood capillaries E1-Oxygen concentration/partial pressure in alveolus is higher than in blood capillaries F2-carbon dioxide diffuses from blood capillaries to the alveolus E2-carbon dioxide concentration / partial	1 1 1 1	Ma x 2

	pressure in blood capillaries is higher than in alveolus Diagram 3.2 F1-oxygen diffuses into mesophyll cells E1-oxygen diffuses into the spaces between mesophyll cells through stoma F2-carbon dioxide diffuses out from the space (between cells/mesophyll cells) in the leaves to the atmosphere E2-carbon dioxide concentration/partial pressure in blood capillaries is higher than in alveolus	1 1 1	Ma x 2								
c)	<table border="1"> <tr> <th>Human</th> <th>Plant</th> </tr> <tr> <td>Alveolus</td> <td>Leaf</td> </tr> <tr> <td>Carry out respiration</td> <td>Carry out photosynthesis</td> </tr> <tr> <td>Absent of chlorophyll</td> <td>Presence of chlorophyll</td> </tr> </table>	Human	Plant	Alveolus	Leaf	Carry out respiration	Carry out photosynthesis	Absent of chlorophyll	Presence of chlorophyll	1 1 1	2
Human	Plant										
Alveolus	Leaf										
Carry out respiration	Carry out photosynthesis										
Absent of chlorophyll	Presence of chlorophyll										
d)	E1-carbon monoxide E2-bind with haemoglobin to form carboxyhaemoglobin E3-less oxygen combines with haemoglobin E4-tobacco war will be deposited E5-reduce diffusion of gases E6-heat from smoke E7-dry the surface of alveoli E8-oxygen cannot be dissolved	1 1 1 1 1 1	Any 4								

4.(a)	Pore M / Liang M : Stoma / Stoma Pore N / Liang N : Lenticel / Lenticel	2	2
(b)	Pore M P1- (During day time) stoma/M (on the epidermis of the leaf) opens P2-Oxygen from the	2	M ax 2

	atmosphere diffuses (through stoma) P3-into air spaces P4- then into mesophyll cells P5-follow the concentration gradient Pore N P1-Oxygen from the atmosphere diffuses (through lenticel) P2-into air spaces P3-between cork cells which are loosely arranged P4-then diffuses into the cells at the stem and (old) roots								
C(i)	P1-The roots are sunk in water P2-The plant carries out anaerobic respiration P3-Glucose is broken down in the absence of oxygen P4-Less gaseous exchange	2	2						
(ii)	<table border="1"> <tr> <th>Organ</th> <th>Leaves</th> <th>Roots</th> </tr> <tr> <td>Products of respiration</td> <td>Energy (ATP), carbon dioxide and water</td> <td>Energy/ATP, ethanol and carbon dioxide</td> </tr> </table>	Organ	Leaves	Roots	Products of respiration	Energy (ATP), carbon dioxide and water	Energy/ATP, ethanol and carbon dioxide		2
Organ	Leaves	Roots							
Products of respiration	Energy (ATP), carbon dioxide and water	Energy/ATP, ethanol and carbon dioxide							
d)	To living organisms P1-Cannot carry out respiration P2-No oxygen released by the plant	1 1	1						

c) Essay

1	F1: Spiracles have valves which can open and close	1	4
(a)	E1: to allow air to go in and out of the body F2: trachea are lined with ring of chitin E2: chitin is strong to which prevent them collapse F3: air sac to assist the control of air pressure in the body E3: speed up movement of gases (to and from tissues during vigorous body movement)	1 1 1 1	M ax 4
(b)	Organism Q/insect: P1: each muscle cell in the body of the insect has one tracheole which can	1	6

	P9-Carbon dioxide diffuses out from the red blood cells	1	
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3(a)	P1-semasa aktiviti cergas kadar respirasi / denyutan jantung meningkat	1	6
	P2-otot berada dalam keadaan kekurangan oksigen / hutang oksigen	1	
	P3-respirasi anaerob berlaku	1	
	P4-pengoksidaan separa glukosa kepada asid laktik	1	
	P5-tenaga yang dibebaskan kurang/sedikit/2 ATP/ 150 kJ	1	
	P6- masih banyak tenaga yang terperangkap diantara molekul asid laktik	1	

(b)	<table border="1"> <thead> <tr> <th>Respirasi aerob</th> <th>Respirasi anaerob</th> </tr> </thead> <tbody> <tr> <td>Berlaku pada semua sel hidup</td> <td>Berlaku pada sel tumbuhan tertentu, yis, bakteria, sel otot</td> </tr> <tr> <td>Memerlukan kehadiran oksigen</td> <td>Tidak memerlukan kehadiran oksigen</td> </tr> <tr> <td>Pengoksidaan glukosa lengkap</td> <td>Pengoksidaan glukosa tidak lengkap</td> </tr> <tr> <td>Menghasilkan karbon dioksida, air dan tenaga</td> <td>Menghasilkan asid laktik dan tenaga (dalam otot) atau etanol, karbon dioksida dan tenaga (dalam yis)</td> </tr> <tr> <td>Lebih banyak tenaga dibebaskan / 38ATP/ 2898 kJ</td> <td>Kurang tenaga dibebaskan / 2ATP/150Kj</td> </tr> <tr> <td>Berlaku dalam mitokondria dan sitoplasma</td> <td>Berlaku dalam sitoplasma</td> </tr> </tbody> </table>		Respirasi aerob	Respirasi anaerob	Berlaku pada semua sel hidup	Berlaku pada sel tumbuhan tertentu, yis, bakteria, sel otot	Memerlukan kehadiran oksigen	Tidak memerlukan kehadiran oksigen	Pengoksidaan glukosa lengkap	Pengoksidaan glukosa tidak lengkap	Menghasilkan karbon dioksida, air dan tenaga	Menghasilkan asid laktik dan tenaga (dalam otot) atau etanol, karbon dioksida dan tenaga (dalam yis)	Lebih banyak tenaga dibebaskan / 38ATP/ 2898 kJ	Kurang tenaga dibebaskan / 2ATP/150Kj	Berlaku dalam mitokondria dan sitoplasma	Berlaku dalam sitoplasma	1	4
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Mana-mana 4																		

(c)	P1-tekanan separa oksigen di P rendah	1	3
	P2-tekanan separa oksigen di Q tinggi	1	
	P3-tekanan separa oksigen di R tinggi	1	

(d)	Pengangkutan oksigen		7
	P1-oksigen diangkut dari peparu /alveolus ke seluruh bahagian badan / sel	1	
	P2-oksigen bergabung dengan haemoglobin di eritrosit	1	

	P3-membentuk oksihemoglobin	1		
	P4-oksihemoglobin dibawa ke sel/tisu badan	1		
	P5-oksihemoglobin terurai kepada haemoglobin dan oksigen	1		
	P6-oksigen meresap ke sel badan (untuk respirasi sel)	1		
	Mana-mana 4			
	Pengangkutan karbon dioksida			
	P1-karbon dioksida diangkut dari sel ke peparu /alveolus	1		
	P2-dalam bentuk ion hidrogen karbonat dalam plasma	1		
	P3-larut dalam plasma darah	1		
	P4-bergabung dengan haemoglobin membentuk karbaminohaemoglobin	1		
	P5-apabila darah tiba ke peparu, karbon dioksida dibebaskan dan meresap keluar daripada kapilari darah ke alveolus	1		
Mana-mana 3				

4(a)	Individual X		6
	F1-Anaerobic respiration / no oxygen required	1	
	P1-occur in cytoplasm	1	
	P2-the glucose is partially oxidised	1	
	P3-release less energy / 150kj of energy (per mole of glucose)	1	
	P4- produce lactic acid	1	
	Individual Y		
	F2-aerobic respiration / requires oxygen	1	
	P5-occurs in mitochondria (and cytoplasm)	1	
	P6-glucose is completely oxidised	1	
P7-release higher energy /2898kj of energy (per mole of glucose)	1		
P8-produce carbon dioxide and water	1		

(ii)	Wears track suit		6
	F-to prevent loss of heat	1	
	P1-heat that traps by the track suit is used to maintain the body temperature	1	
	P2-less oxygen is used to produce heat and the oxygen can be used to oxidise lactic acid	1	
	Takes a few long deep breaths		
	F – obtain more oxygen	1	
	P3- to pay oxygen debt	1	
	P4 – oxygen is used to breakdown lactic acid	1	
	Walks freely as a “cooling down” activity	1	
	F-to maintain the blood circulation rate (to transport the lactic acid to	1	

	the liver) P5-to ensure that oxygen is supplied continuously to the muscle cells	1	
b)	P1-the mountain climber is carrying /wearing the oxygen supply equipment / respirator P2-as the altitude increase, the atmospheric pressure decrease P3-the partial pressure / amount of oxygen decrease as well P4-low atmospheric pressure cause less air is drawn into the lungs P5-the mountain climber facing lack of oxygen (in the body) P6-oxygen supply equipment / respirator supply enough oxygen for the body P7-(it also) assists in maintaining the pressure of the lungs P8-the mountain climber also wearing thick clothes P9-as altitude increase, the temperature decreases P10-thick clothes help the climber to maintain the body temperature	1 1 1 1 1 1 1 1 1 Any 6	6

	kemasukan cahaya matahari ke dalam sungai P2- Menghalang proses fotosintesis P3-Oksigen akan berkurang P4-Organisma akan mati Mana-mana 3	1 1 1	
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CHAPTER 8

a)Objective


1.	D	2.	D	3.	C	4.	A	5.	B
6.	C	7.	A	8.	B	9.	C	10.	D
11.	A	12.	C	13.	B	14.	C	15.	C
16.	C	17.	C	18.	C	19.	D	20.	B
21.	A	22.	A						

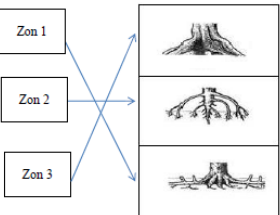
b) Structure

1(a)	i. 50kj ii. 5kj	1 1	2
(ii)	Tenaga hilang ke persekitaran melalui P1 - proses respirasi P2 - pembuangan bahan kumuh melalui air kencing P3 – pembuangan bahan kumuh melalui penyahtinjaan Mana-mana 2	1 1 1	2
B(I)	Komponen Biotik :Tumbuhan, ikan, penyu, katak, alga – Komponen abiotic :Udara, Air, cahaya matahari, pH tanah-	1 1	2
(II)	<pre> graph TD Pepatung --> Katak Katak --> Burung Ikan kecil --> Ikan besar Ikan besar --> Burung Cecacing --> Ikan kecil Cecacing --> Ikan besar Rumput --> Ikan kecil Rumput --> Ikan besar </pre>		3
c)	P1 – Pertumbuhan alga menghalang	1	3

2(a)	1.Light intensity 2.temperature	1 1	2
(b)	$\text{Density} = \frac{\text{total number of individuals of species in all quadrat}}{\text{Quadrat area} \times \text{num of quadrats}}$ $= \frac{28}{4 \times 5}$ =1.4 per meter square	1 1	2
(c)	F: light intensity E1:more light energy absorb by chloroplast in <i>Colocasia</i> leaf E2: rate of photosynthesis high E3: cause growth rate high	1 1 1 1	3
(d)	F1: pond water become toxic E1: damage the roots of plants in the pond E2:decrease the growth rate of plant Or F2:insecticide contain carcinogenic compound E1: lead to mutation in plant E2: due to gene alteration / change in DNA	1 1 1 1 1 1	3
e)	F1: Used biological method /prey and predator E1: using bird as predator to eat prey / grasshopper F2:using lime powder/ calcium carbonate /dolomite E2: neutralise acidic condition in pond	1 1 1 1	2

3(a)(i)	An ecosystem is a community of organisms / biotic components which interact with their non-living environment/abiosis components.	1	1
(ii)	Squirrel eat fruits from the tree // big bird eat mouse in the garden.	1	1
b(i)	<pre> graph TD grass --> bird grass --> rat rat --> owl </pre>		2

(ii)			2
C(i)	C1 : 10% x 1500 kJ C2 : = 150	1 1	2
(ii)	P1 lost to atmosphere as heat energy P2 used to decompose dead matter (by decomposer) P3 used to carry out metabolism reaction in cells P4 respiration	1 1 1 1	2

4a)	L: Sonneratia sp M : Rhizophora sp	1 1	2
	Zon K//Zon L	1	1
	Zon K : Avicennia sp // Zon L : Sonneratia sp	1	1
	F1 : Spesies perintis memerangkap sampah sarap / lumpur P1 : Kerana mempunyai akar pneumatofor / akar jangkang P2 : Tebing menjadi tinggi / keras / padat/ kurang subur P3 : yang tidak sesuai lagi untuk spesies perintis tetapi sesuai untuk spesies penyesar	1 1 1 1	2
C(i)		1 1 1	3
(ii)	-Apa-apa contoh tumbuhan daratan / Hutan hujan tropika -kerana selepas 100 tahun kawasan tersebut telah pun mencapai klimaks komuniti -di mana spesies penyesar telah berjaya mendominasi kawasan tersebut	1 1 1	3

5(a)	The capture and recapture technique.	1	1
B(i)	Mark the specimens using a non-toxic permanent ink marker.	1	1
(ii)	-The mark must not be lost and must not inhibit normal body activities. -The mark does not prevent the rat from randomly mixing with the other unmarked rats.	1 1	2
c)	Population = (100 x 140) / 40 = 350 rats	1 1	2

d)	To give sufficient time for the random dispersal and mixing among the rats in the population.	1	1
e)	Changes in the size of population after three months can be caused by: •increase in number of the rats due to increase in birth rate. •decrease in number of the rats due to death of old rats, diseases or eaten by predators. •migration (immigration or emigration) of the rats.	1 1 1	2
f)	•The nitrate fertilizer in the river water is absorbed by the algal cells. •Eutrophication occur •The algae grow and reproduce rapidly that they completely cover the water. •They block out the light for plants growing beneath them, which causes death. •Decomposing bacteria acting on the dead plants and algae compete for the oxygen in the water. •As a result, fish and other organisms in the river die due to the lack of oxygen.	1 1 1 1 1	4

c) Essays

1(a)(i)	P1: The Quadrat Sampling Technique P2: Percentage coverage is an indication of how much area of the quadrat is occupied by a species.//Percentage coverage is useful when it is not possible to identify separate individuals. P3: A clear trunk, without any boughs and has a lot of Pleurococcus sp colonies on the bark is selected. P4: The rope is tied around the trunk at the level with a lot of colony of Pleurococcus sp . P5: The distance of the rope from the ground is measured (x m) P6: A translucent Quadrat frame of 10 cm x 10cm in size is used for sampling. P7: The quadrat is placed on the bark at different aspects A,B,C,D and E (to determine the percentage coverage) P8: Each small quadrat is 1% or 1cm ² . Only squares that are covered by half or more than half of the species are counted P9: The squares that are covered by less than half are omitted. P10: Percentage coverage for all quadrats is estimated by using : = $\frac{\text{aerial coverage of all quadrats (m}^2\text{)}}{\text{number of quadrats x quadrat area}} \times 100\%$	1 1 1 1 1 1 1 1 1 1	6
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(ii)	<p>p1: At B population size/percentage coverage of Pleurococcus sp is high //at A and E Percentage coverage of Pleurococcus sp is lower.</p> <p>P2: At B Light intensity is optimum for Pleurococcus sp to carry out photosynthesis at maximum rate.</p> <p>P3: At B the growth rate of Pleurococcus sp is higher</p> <p>P4: At A, Light intensity is very high , dehydrate the cells of the Pleurococcus sp /less moist</p> <p>P5: At A, not suitable for the growth of Pleurococcus sp/the growth rate of Pleurococcus sp is low</p> <p>P6: At E, light intensity is low, the rate of photosynthesis is low</p> <p>P7: At E, the growth rate of Pleurococcus sp is low</p>	1 1 1 1 1 1	6
B(i)	<p>P1: Vector that transmit pathogen disease is Aedes (aegypti betina) /Aedes sp mosquito</p> <p>P2: Pathogen that cause dengue fever is virus,</p> <p>P3: Dengue viruses are transmitted to humans (host) through the bites of the (female striped) Aedes (aegypti) mosquito (vector).</p> <p>P4: These mosquito breeds easily during the rainy seasons / fresh water / any suitable example / e.g. water that is stored in plastic bags / cans / flowerpots / old tires.</p> <p>P5: causes / able to state any symptom: - High fever (104 F, 40°C) with severe body pain and rashes over parts of the body// deep muscle and joint pains (during first hours of illness) and Chills - Severe headache and vomiting /nausea - Red eyes, pain in the eyes - Enlarged lymph nodes Loss of appetite - Low blood pressure and heartbeat rate - Extreme fatigue [Any 3 symptoms]</p>	1 1 1 1 1	6
(ii)	<p>F1: keep environment clean</p> <p>P1: by carrying out „gotong-royong“ (in local community)</p> <p>P2: bury cans / bottles / old tyres / any example in the ground to avoid water retention</p> <p>F2: control the population of Aedes mosquitoes larvae</p> <p>P3: put medication to kill the larvae / abate / spray insecticides (reject: mention the brand / Ridsect)</p> <p>F3: Awareness campaign</p> <p>P4: carry out poster / colouring competition / talks / educate people</p>		5

	<p>about the importance of health / any suitable example</p> <p>F4: Restrict laws / Laws enforcement</p> <p>P5: compound / jail / any reasonable punishment</p>		
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2(a)(i)	<p>F-komensalisme</p> <p>P1- orkid ialah komensal / epifit manakala pokok adalah perumah</p> <p>P2-komensal /epifit mendapat keuntungan manakala perumah tidk mendapat keuntungan atau kerugian</p> <p>P3-orkid mendapat keuntungan // tidak mengancam perumah</p> <p>P4-dengan menumpang pokok lebih tinggi, orkid mendapat lebih banyak cahaya untuk fotosintesis [F + mana-mana 3P]</p>	1 1 1 1	4
(ii)	<p>P1-Burung hantu adalah pemangsa dan tikus adalah mangsa</p> <p>P2-peningkatan mangsa menyebabkan peningkatan pemangsa</p> <p>P3-ada makanan (mangsa)//lebih banyak makanan (mangsa) dalam habitat</p> <p>P4-apabila pemangsa memburu mangsa sebagai makanan, bilangan mangsa akan berkurang.</p> <p>P5-apabila populasi mangsa berkurang, populasi pemangsa juga akan berkurang</p> <p>P6-makanan berkurang</p> <p>P7-pengurangan pemangsa menyebabkan mangsa dapat terus hidup dan membiak.Oleh itu populasi mangsa akan meningkat kembali</p> <p>P8-kitaran populasi akan berulang dan dikatan sebagai keseimbangan dinamik</p>	1 1 1 1 1 1 1 1	6
c)	<p>E1-R/Nitrogen fixing bacteria/Azotobacteria sp./Nostoc sp./Clostridium sp./Rhizobium sp</p> <p>E2-convert nitrogen into ammonium compound</p> <p>E3-S/nitrifying bacteria/nitrosomonas sp convert ammonium compounds into nitrites</p> <p>E4-T/nitrifying bacteria / nitrobacter sp. convert nitrites into nitrates</p> <p>E5-(Nitrate) are absorbed by plants to make protein</p> <p>E6-when animals eats the plants, the protein is transferred to the animals</p>	1 1 1 1 1 1	10

E7-waste materials / faeces/ urea/ excretory nitrogenous plants	1	
E8-when animals/plants die	1	
E9-are decomposed by U/ decaying bacteria/saprophytic bacteria/fungi	1	
E10-break them down to ammonium compound in the soil	1	
E11-V /denitrifying bacteria converts nitrates into nitrogen		

	terrestrial plants such as <i>Nypa</i> sp/ <i>pandanus</i> sp began to replace <i>Bruguiera</i> sp. /Zone C P16: Tropical rain forest develops (Any 10)		
b)	P1 : natural biodegradation process P2 : add a chemical/ oil spill dispersants to the oil spill P3 : increase the surface area of oil molecule P4 : stimulate the growth of bacteria P5 : bacteria digest the oil spill P6 : by using enzyme lipase P7 : the oil will be broken down into small molecule P8 : by using natural fibre from plant /e.g wild lemon grass P9 : as an absorbent P10: absorb and coagulate the oil P11: the combination of fibre and oil will not harm other organism in mangrove ecosystem. P12 : physically removing the oil like using scoops P13 :Law enforcement to the oil company to fully responsible for the cleaning of affected mangrove swamp. (Any 10)		10

3(a)	<p>P1 : The mangrove zone become broader towards the sea from their original position (from 1995 to 2015) P2 : Colonisation and Succession has occurred Pioneer species: P3 : <i>Avicennia</i> sp /Zone A colonies of open area, exposed to the sea wave and wind. P4 : <i>Sonneratia</i> sp/Zone A colonies at shady area , not exposed to the seawater. P5 : <i>Avicennia</i> sp / Zone A has cable root system to withstand in the soft and muddy soil and wave action. P6:The roots of the pioneer species trap the mud, causing the soil to become more compact / soil level increases P7: (as the soil increases) exposure to the tides and this makes the soil unsuitable for the pioneer species.</p> <p>Primary successor P8: <i>Rhizophora</i> sp / Zone B replace <i>Avicennia</i> sp / Zone A P9: <i>Rhizophora</i> sp / Zone B has prop root P10: The roots of the primary successor species trap the mud, causing the soil to become more compact / soil level increases P11: (as the soil increases) exposure to the tides and this makes the soil unsuitable for the primary successor species.</p> <p>Secondary successor P12: <i>Bruguiera</i> sp / Zone C replace <i>Rhizophora</i> sp / Zone B P13 : when the land become higher/ firm P14: <i>Bruguiera</i> sp / Zone C is a larger species.</p> <p>Climax community: P15: (As the time passed),</p>		Any 10
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4(a)(i)	F1: colonization is a process by which living organisms conquer or occupy a new area that has never been occupied by other organisms F2: succession is the process of replacing a species by other species gradually and sequentially	1 1	2
(ii)	P1: the pioneer species in the pond is aquatic plants / phytoplankton/ algae/submerged plants / <i>Hydrilla</i> sp/, <i>cabomba</i> sp./ <i>elodea</i> sp P2: these plants have fibrous roots to penetrate deep into the soil to absorb nutrients and bind sand particles together P3: when the pioneer species die and decompose, more organic nutrients/ humus are released into the pond P4: the humus / and soil which erode from the pond apron are deposited at the base of the pond and this causes the pond to become shallow P5: the condition becomes unfavourable for submerged plants but more suitable for floating plants / duckweeds (<i>Lemna</i> sp.)/ water	1 1 1 1 1	8

	P2-less photosynthesis P3-less carbon dioxide absorbed by trees P4-accumulation of carbon dioxide in the atmosphere P5-trap the heat P6-increase the earth temperature P7-global warming	1 1 1	
c)	P1-limit deforestation P2-limit open burning P3-replanting P4-use alternative source of energy (solar energy)/hybrid car P5:car pool P6:use public transport	1 1 1 1 1 1	3
d(i)	Drought	1	1
(ii)	F1:crop yields decreases P1:water content in the soil decreases P2:depletion of minerals (in the soil) P3: the soil becomes infertile (F + Any 2ps)	1 1 1 1	3

c) Essays

1.(a)	<p>Good Effect</p> <p>G1: Build / Develop residence to accommodate the increase in population. G2: Industrial / factory to increase job opportunities / increase the income/ economic. G3: Develop road system to shorten travelling time / reduce traffic jam. G4: Restructuring of infrastructure facilities / upgrade the Infrastructure / example</p> <p style="text-align: right;">ANY 2</p> <p>Bad Effect</p> <p>F1: causes soil erosion / landslides / flash flood P1: forest floor stripped of it vegetation / absence of plant root system make the soil structure unstable P2: when it rains heavily, top layer of the soil removal and thinning / crumble and lead to soil erosion / landslides P3: eroded soil then carried and deposited at the bottom of river / flash flood P4: depletion of water catchment areas F2: results in loss of biodiversity P5: the loss of habitats of flora and fauna</p>		10
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	<p>P6: caused extinction of species and varieties of plant and animal P7: the removal of the base of numerous food chain / web / other source F3: caused climatic changes P8: disrupts the normal weather patterns / creating hotter / drier weather P9: removal of trees will reduces transpiration / rain fall / absorption of carbon dioxide P10: high level of carbon dioxide lead to greenhouse effect / global warming F4: disrupts the nutrient / carbon / nitrogen cycle P11: atmospheric carbon dioxide concentration may rise / less carbon dioxide removed for photosynthesis P12: atmospheric oxygen is less produced by photosynthesis P13: Reduction in soil fertility F5: Industries/ factories/ vehicles contribute to air pollution P14: Industries emit pollutants such as sulphur dioxide/ oxides of nitrogen/ smoke/fine solid particles which can cause respiratory problems/asthma/bronchitis P16: Acid rain makes the soil acidic / unsuitable for the cultivation of crops P17: smoke / haze reduce light intensity cause the rate of photosynthetic decrease. P18: Which subsequently reduces crop yield P19: Hot water is discharged into nearby lakes and river lead thermal pollution P20: cause instant death of aquatic species/ Any 8</p>		
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2(a)(i)	<p>-Graf menunjukkan hubungan antara kenaikan paras karbon dioksida dan kenaikan suhu global purata dari tahun 1890 hingga tahun 2000 -Daripada graf didapati peningkatan suhu global sejajar dengan peningkatan paras kepekatan karbon dioksida -Keadaan ini dikaitkan dengan fenomena kesan rumah hijau -Apabila sinaran matahari memancar ke bumi, sebahagian sinar dipantul balik ke angkasa</p>		8
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	<p>-Manakala sebahagian lagi sampai ke bumi dan dipantul balik ke angkasa</p> <p>-Kehadiran gas karbon dioksida yang banyak membentuk satu lapisan gas rumah hijau ruang angkasa</p> <p>-Menyebabkan sebahagian haba yang dipantulkan dari permukaan bumi diperangkap dan dipantul balik ke permukaan bumi</p> <p>-Pemerangkapan haba ini menyebabkan peningkatan suhu bumi</p> <p>-Maka apabila kepekatan karbon dioksida meningkat, suhu bumi juga meningkat</p>		
(ii)	<p>-Jika kepekatan karbon dioksida terus meningkat, kesan rumah hijau terus meningkat.</p> <p>-Ini menyebabkan air batu di kutub mencair</p> <p>-Dan paras laut akan meningkat</p> <p>-Banjir akan berlaku di sana sini</p> <p>-Perubahan arah tiupan angin</p> <p>-Menyebabkan musim akan berubah/ kemarau</p> <p>-Keadaan ini mengganggu / merosotkan hasil pertanian</p>		6
b)	<p>-Pembakaran hutan menyebabkan Pemusnahan habitat flora dan fauna liar akan pupus</p> <p>-Tiada kawasan tadahan hujan menyebabkan hakisan tanah/ tanah runtuh/ banjir kilat</p> <p>-tanah kurang subur dan hasil pertanian merosot</p> <p>-Menyebabkan kehilangan biodiversiti kerana tumbuhan dan haiwan pupus</p> <p>-Kitar karbon dan kitar oksigen akan terganggu apabila tiada tumbuh-tumbuhan</p> <p>-Pembakaran menghasilkan debu yang menyebabkan pencemaran udara</p> <p>-Menjejaskan proses fotosintesis (debu menutup permukaan daun)</p> <p>-Manusia terdedah kepada penyakit berkaitan dengan system respirasi</p>		6

3.(a)(i)	<p>P1 – only mature trees are removed.</p> <p>P2 – Reforestation // large scale replanting of trees.</p> <p>P3 – establishing forest reserve</p> <p>P4 – to maintain the equilibrium of the ecosystem</p> <p>P5 – law of forest enforcement continuously</p> <p>P6 – maximise recycle campaign.</p>		4
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	P7 – plant quick growing and deep-rooted trees to prevent soil erosion.		
(ii)	<p>P1 – to obtain timber for construction</p> <p>P2 - to obtain wood for producing paper and other wood products.</p> <p>P3 – wood for cooking and heating purposes</p> <p>P4 – to clear land for agricultural, such as planting crops and grazing livestock.</p> <p>P5 – for mining of mineral such as tin and iron.</p> <p>P6 – for urbanisation // building of roads and buildings.</p> <p>P7 – to build dam for water reservoir.</p> <p>P8 – to build hydroelectric power station.</p> <p>P9 – to build recreation park</p>		6
(b)	<p>F1 – CFC Free is used to reduce ozone depletion.</p> <p>P1 – the destruction of the ozone layer is mainly due to increasing levels of CFC (Chlorofluorocarbons) in the atmosphere.</p> <p>P2 – ozone layer absorb ultraviolet (UV) radiation</p> <p>P4 – and shield organisms from its damaging effects // mutation // skin cancer // reduce immune system of animals and humans.</p> <p>P5 – CFCs are used as coolants in air conditioners and refrigerator // propellants in aerosol cans // foaming agents in the making of Styrofoam packaging.</p> <p>P6 – CFCs are currently being replaced by HFC.</p> <p>P7 – HFC do not break down ozone molecule</p> <p>P8 – or replaced by HCFCs which has a low ozone breakdown.</p> <p>F2 – hybrid car using both conventional petrol engine and electric generators.</p> <p>P9 – it reduce emission of greenhouse gases / CO2.</p> <p>P10 – example: carbon dioxide (CO2)// nitrous oxide (N2O).</p> <p>P11 – an increase of carbon dioxide concentration in the atmosphere leads to greenhouse effect.</p> <p>P12 – also cause global warming // the Earth’s average temperature rises // melting of polar ice caps // causing sea levels to rise // flooded in low land area // drought</p>		10

	<p>// risk to human health such as heat related illness.</p> <p>P13 – use unleaded petrol is to reduce emission of lead from motor vehicles</p> <p>P14 – lead is an air pollutant which may leads to brain damage</p> <p>//kidney and digestive problems.</p> <p>[Any 10]</p>		
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4.	<p>P1-the activity cause noise pollution</p> <p>P2-if the noise above 80dB can cause deafness</p> <p>P3-can leads to stress related problems such as high blood pressure/headaches/ulcers</p> <p>P4-also stimulate adrenaline secretions</p> <p>P5-which also cause high blood pressure / increase in heart rate/respiration rate</p> <p>P6-also can cause muscle becomes tense</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	5
(b)	<p>Impact</p> <p>P1-hot water release from the plant cause thermal pollution</p> <p>P2-increases the temperature of water in the river</p> <p>P3-can cause instant death to certain aquatic organisms</p> <p>P4-hot water also cause oxygen becomes less soluble in water</p> <p>P5-increase growth rate of algae</p> <p>P6-leads to higher BOD</p> <p>Precautions</p> <p>P1-Treat/cool the water before released into the river</p> <p>P2-use cooling towers</p> <p>P3-us alternative energy/renewable energy/solar energy to generate power</p> <p>P4-have campaign to educate the public on effects of pollution</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	5