

SECTION A

QUESTION 1

NO.	ANSWER SCHEME	
S1	(a)(i)	Smooth muscle (tissue)
	(a)(ii)	Digestive system/ Blood circulatory system/ Excretory system/ Reproductive system
	(b)	<ul style="list-style-type: none"> • Smooth muscles/ Tissues Q contract decreases the size/ volume of lumen (of artery)/ artery become narrower • Vasoconstriction occurs • Blood flow become restricted// Less blood flows
	(c)	<ul style="list-style-type: none"> • Resulting in tiredness/ fatigue/ pale/ anaemia/ unable to carry out vigorous activity/ short breath • Less haemoglobin to combine with oxygen/ less formation of oxyhaemoglobin • Less oxygen is transported to the body cells • Less energy produced/ cellular respiration

QUESTION 2

NO.	ANSWER SCHEME	
S2	(a)	X : Lipase Y : Lipase-lipid complex Reject : Enzyme-substrate complex
	(b)(i)	<ul style="list-style-type: none"> • Enzyme is (highly) specific// have active site • (Involve in) reversible reaction// can be reuse • Not destroyed/ structure remain the same/ unchanged at the end of the (chemical) reaction
	(b)(ii)	<ul style="list-style-type: none"> • Medium become acidic • Changes the charge (ion H⁺) of the active site of enzymes active • (The shape of) active site is not complementary (to substrate)/ substrate cannot bind to active site • Enzyme-substrate/ lipase-lipid complex/ Y cannot/ less be formed • Less/ no product is produced • Enzyme (is) denatured <p style="text-align: right;">reject: destroyed</p>

QUESTION 3

	NO.	ANSWER SCHEME
S3	(a)	S : Aerobic respiration T : Anaerobic respiration/ lactic acid fermentation
	(b)	Individual S: Glucose + Oxygen → Carbon dioxide + water + Energy Individual T: Glucose → Lactic acid + Energy Reject: if write in chemical formula
	3(c)	<ul style="list-style-type: none"> • Muscle generate/ produce/ synthesize more mitochondrion • More cellular/ cell respiration// increase rate of cell respiration • More oxidation of glucose • More energy produce

QUESTION 4

	NO.	ANSWER SCHEME
S4	4(a)	J : Synaptic vesicle K : Neurotransmitter
	(b)	<ul style="list-style-type: none"> • Dopamine • Tremor in the limb/ jaw/ foot/ face • Difficulty maintaining body posture/ balance • Slowed movement • Speech changes • Rigid muscles
	(c)	<ul style="list-style-type: none"> • Transmission of nerve impulse stop/ slow down • Painkiller stop/ reduce the release of neurotransmitter • Less/ no neurotransmitter across synapse • Less/ no formation of new impulse • Slow down/ no respond action

QUESTION 5

	NO.	ANSWER SCHEME
S5	(a)(i)	Lymphocyte/ B-lymphocyte/ B-cell. Reject: white blood cell
	(a)(ii)	Action X: Lysis Action Y: Agglutination
	(b)(i)	(Acquired) Artificial Active Immunity
	(b)(ii)	<ul style="list-style-type: none"> • Vaccine in 1st injection, stimulate less lymphocyte (in the body) • (First injection) produce low level of antibodies • It is insufficient to protect from covid-19 (infection) • Second injection as a booster dose • Increase antibodies production to a (higher) level/ above immunity level • Individual able get/ gain immunity towards the covid-19 (infection)
	(c)	<ul style="list-style-type: none"> • Vaccinated close contact may not infected/ not severely infected/ mild infected by Covid-19 • Close contact will not/ less spread the Covid-19// unvaccinated people get indirect protection from Covid-19 • Break the chain of Covid-19 • Community/ group become immune to covid-19

QUESTION 6

	NO	ANSWER SCHEME						
	(a)(i)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; padding: 5px;"> Not all response is slow and not apparent <i>Bukan semua gerak balas adalah gerak balas pertumbuhan.</i> </td> <td style="width: 40%;"></td> </tr> <tr> <td style="padding: 5px;"> The response is temporary and influenced by plant hormones <i>Gerak balas adalah sementara dan dipengaruhi oleh hormon pertumbuhan</i> </td> <td></td> </tr> <tr> <td style="padding: 5px;"> The response direction is dependent on the direction of the stimulus <i>Arah gerak balas bergantung kepada arah rangsangan</i> </td> <td style="text-align: center; vertical-align: middle;">/</td> </tr> </table>	Not all response is slow and not apparent <i>Bukan semua gerak balas adalah gerak balas pertumbuhan.</i>		The response is temporary and influenced by plant hormones <i>Gerak balas adalah sementara dan dipengaruhi oleh hormon pertumbuhan</i>		The response direction is dependent on the direction of the stimulus <i>Arah gerak balas bergantung kepada arah rangsangan</i>	/
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S6	(a)(ii)	<ul style="list-style-type: none"> • Auxin is diffuse/ move away from the bright/ exposed side/ region to the shaded side/ region • Auxin accumulate/concentration is higher/ increase at shaded side/ region • Cell on the shaded side/ region of the stem elongate more (from those on the bright side/ region) • Shoot bends in the direction of light/ bend towards light// shoot shows positive phototropism 						
	(b)	<ul style="list-style-type: none"> • Rate of photosynthesis in 6.2a higher/ faster than 6.2b • LED has strong blue (and red) wavelength • LED light produce more blue (and red) light • Chlorophyll/ chlorophyll a/ chloroplast/ plant in 6.2a will absorb more light energy 						
	(c)(i)	(Treatment) method which uses sunflower to degrade/ extract/ eliminate radioactive (substance from soil)						
	(c)(ii)	<ul style="list-style-type: none"> • Water hyacinth • Can accumulate heavy metal in water OR <ul style="list-style-type: none"> • Water lettuce • Treat waste water OR <ul style="list-style-type: none"> • Water spinach • Absorb mercury in soil • Absorb cadmium in water 						

QUESTION 7

NO.	ANSWER SCHEME
	(a)(i) P : Hydrophytes Q : Halophytes
	(a)(ii) <ul style="list-style-type: none"> • Low oxygen content • Water flow resistance • (Receive) less light intensity
	(b) <ul style="list-style-type: none"> • Have thin/ (and) small leaves • Increase total surface area over volume/ TSA/ V • Increase the diffusion of water/ (dissolved) carbon dioxide/ dissolved gases • Have small/ (and) hollow stem • Help the plant float upright • (To) absorb maximum sunlight/ light energy
S7	(c) Protection zone <ul style="list-style-type: none"> • Act as natural barrier to re-cure the impact of strong waves and wind • As a protected site for small aquatic organisms from predator • Act as a preserve area for various species of migratory birds <p>Accept any correct answer</p> <p>Fisheries resources</p> <ul style="list-style-type: none"> • Become a conducive area for fish rearing in floating cages • Become source of income for fisherman • Area for fish/commercial species breeding

QUESTION 8

NO.	ANSWER SCHEME	
S8	(a)	<ul style="list-style-type: none"> • Genetic engineering is a technique used to manipulate genes/ alter/ modify genetic materials • To create/ produce new combinations of genes in organisms/ bacteria.
	(b)	<ul style="list-style-type: none"> • Human insulin gene cut/ sliced • Using restriction enzyme/ endonuclease • Plasmid is cut/ sliced • Using restriction enzyme/ endonuclease • Insulin gene and are mixed/ combined/ placed into plasmid • By using DNA ligase enzyme
	(c)	<ul style="list-style-type: none"> • Diabetes mellitus/ Diabetes type I/ Diabetes type II • (Reject : Diabetes only/ Diabetes insipidus) • Bacteria can reproduce asexually (very) fast • Can be produce in large quantities • The cost is low/ cheaper (and purer) • (Chemically) the same as hormone insulin produce naturally/ in human body • Acceptable to people with a range of religious belief

SECTION B

QUESTION 9

NO.	ANSWER SCHEME															
S9	(a)(i)	<ul style="list-style-type: none"> • (Cross) pollination • transferring the pollen grain from anther/ male/ flower P to stigma/ female/ flower Q • bee as pollinating agent 														
	(ii)	<p>Similarities:</p> <ul style="list-style-type: none"> • Both produce gametes • Both are located at the flower's (organ) • Both undergo (mitosis and) meiosis <p>Differences:</p> <table border="1" data-bbox="440 734 1094 1115"> <thead> <tr> <th></th> <th>Male flower part/ Flower A</th> <th>Female flower part/ Flower B</th> </tr> </thead> <tbody> <tr> <td>D1</td> <td>(Consist of) stamen</td> <td>(Consist of) carpel</td> </tr> <tr> <td>D2</td> <td>Has filaments and anther</td> <td>Has stigma, style and ovary</td> </tr> <tr> <td>D3</td> <td>Produce pollen grain</td> <td>Produce embryo sac</td> </tr> <tr> <td>D4</td> <td>Projecting out from the base of the flower</td> <td>Located in the middle of the flower</td> </tr> </tbody> </table>		Male flower part/ Flower A	Female flower part/ Flower B	D1	(Consist of) stamen	(Consist of) carpel	D2	Has filaments and anther	Has stigma, style and ovary	D3	Produce pollen grain	Produce embryo sac	D4	Projecting out from the base of the flower
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NO.	ANSWER SCHEME	
S9	(iii)	<ul style="list-style-type: none"> • (After Process X) pollen grain will germinate and form a pollen tube • The pollen tube grows down towards the ovule through style • The generative nucleus will move along the pollen tube towards the ovule • At the same time, the generative nucleus will divide by mitosis to forms two male gametes/ L • The end of the pollen tube will secrete an enzyme to digest the tissues of the style/ the tips of pollen tube will burst • Pollen tube will penetrate the ovule through the micropyle • The tube nucleus will degenerate • both males gametes/ L enter the embryo sac • One of the male gamete fertilises the egg cell/ N to form a diploid zygote (2n) • The second male gamete fuses with the two polar nuclei/ M to form a triploid endosperm nucleus (3n) • this process is known as double fertilization • (After double fertilisation) the ovule develops into a seed
	(b)	<ul style="list-style-type: none"> • Parthenocarpy • using phytohormone treatments • spray flower with (hormone) auxin • (promotes) ovary undergo repeated cell division/ Mitosis • forms seedless fruit/ fruit without seed • without (double) fertilization • doesn't need pollination agent • time interval (for) fruit ripening become shorter

QUESTION 10

NO.	ANSWER SCHEME
S10	(a)(i) <ul style="list-style-type: none"> • Ball and socket joint • Allow rotational movement in all direction/ plane/ axis • allows leg to swing in a circular motion • Examples: the shoulder joints/ between humerus and pectoral girdle, the hip joint between the femur and pelvic girdle
	(ii) <ul style="list-style-type: none"> • Muscles act antagonistically • When the S/ quadriceps femoris (muscle) contracts • produce a pulling force to tibia • (pulling force) transmit by tendon • (at the same time,) R/ biceps femoris (muscle) will relax • tibia (and fibula) pulled forwards • leg become straighten • tibialis contract • to bring/ pull down the heel
	(b) <ul style="list-style-type: none"> • P is pectoralis major and Q is pectoralis minor • Q/ Pectoralis minor cannot contracts • P/ Pectoralis major cannot relaxes • Tendons of pectoralis minor/ Q (passes over groove on the caracoid) cannot transmit pulling force to upper side of humerus • Humerus cannot lift upward • Wings cannot pulled upwards • No air pressure to provide upthrust • Cannot provide the lift for young bird • Young pigeon cannot fly
	(c) <p><u>Similarity</u></p> <ul style="list-style-type: none"> • Both have skeletal system • Enable them to move from one place to another in search of food, partner or to escape from predators and threats • Both have a pair of muscle • Work antagonistically/one muscle contracts, the other one will relaxes <p><u>Differences:</u></p>

NO.	ANSWER SCHEME
S10	<ul style="list-style-type: none"> • Grasshopper have exoskeleton while earthworm have hydrostatic skeleton • Exoskeleton to support and protect body organs/enable insect to moves while hydrostatic skeleton to maintain a rigid body shape of an earthworm • Muscle in grasshopper are flexor and extensor muscle while muscle in an earthworm are circular and longitudinal muscle • Grasshopper movement is jumping/leaping while the earthworm movement in a wave of peristalsis along the body • Grasshopper use legs while earthworm use chaetae to anchor the body
	<p>(d) Advantages</p> <ul style="list-style-type: none"> • Carbon nanotube material is lightweight • Carbon nanotube material is high mechanical strength • Chemical properties similar to collagens, main component of the extracellular matrix of these tissues • Lack of toxicity in patients' body • Do not experience rejection issues in the patient's body • Real bones grow back • Biodegradable after real bones grow back • High Elasticity • Fatigue resistance <p>Disadvantage</p> <ul style="list-style-type: none"> • The cost of materials is expensive • Need expert to prepare the carbon nanotubes solution • High technology machines needed • Non-biodegradable materials

SECTION C

QUESTION 11

	NO.	ANSWER SCHEME
	(a)	<ul style="list-style-type: none"> • Quartered of plate comes from carbohydrates/ examples (rice, bread) • <u>Sufficient</u> carbohydrate intake for energy requirement • Excess carbohydrates lead to obesity/ diabetes mellitus/ cardiovascular disease • Quartered of plate comes from protein/ examples (chicken, fish, egg) • Sufficient protein intake for cell growth/ repair (accept other function of protein) • Excess protein intake lead to gout/ obesity • Half of plate comes from vitamin & minerals • Sufficient vegetable/ fruits/ fibre for body health/ prevent disease • To prevent constipation colon cancer/ haemorrhoid/ help in peristalsis movement/ stimulate bowel movement
S11	(b)	<p>Justify:</p> <p>Total energy intake no/ does not (satisfy) the woman daily energy requirement.</p> <p>Able to explain</p> <ul style="list-style-type: none"> • Total energy value intake less than total energy needed • Total energy value intake: • Calculation: $800 + 640 + 525 + 630 + 7000 + 504 + 500 + 900$ • = 11,499 kJ • She takes less rice • Less carbohydrates • Less source of energy • She takes less bread • Less carbohydrates • Less of energy • She takes more butter • More fat/ lipid • Lead to cardiovascular disease/ obesity

		ANSWER SCHEME
S11	(c)	<p>Justify: Obese person should/ should not undergo gastric bypass surgery</p> <p>Able to discuss the advantages and disadvantages of gastric bypass surgery.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Get fuller (easier)/ less food intake/ stomach get full easier due to reduction of stomach size • Less calorie absorbed • Become more healthy • Reduce blood glucose level • Easy to control blood pressure • Increase self-confidence level • Body size become smaller/ decrease in body weight <p>Disadvantages</p> <ul style="list-style-type: none"> • Cause acid reflux • Cause vomiting • Stomach ulcer • Increase/ higher concentration of gastric juice • Malnutrition/ less nutrient being absorbed • Length of small intestine is shorten • Costly/ Expensive/ use high technology/ less affordable • Cause bacterial infection • Surgery can cause internal bleeding
	(d)	<ul style="list-style-type: none"> • Consuming high protein/ white meat/ milk/ fish/ dairy product • Help in healing and repairing/ replace tissue • Consuming high calorie food/ high carbohydrates • To provide sufficient energy during cancer treatment • For optimum health condition • Consuming green vegetable/ fruits containing phytonutrients/ mineral and vitamins • To increase immunity • To stimulate the release of enzymes that break down cancer - causing chemicals/ inhibit early tumour growth

	NO.	ANSWER SCHEME
		<ul style="list-style-type: none">• Fruits and vegetables contain high fiber that help in digestion• Consuming orange-coloured/ any suitable food (contain carotenoids, alpha- and beta-carotene)• To protect body cells from damage caused by free radicals/ can prevent (lung) cancer• Avoid food that containing carcinogenic substances/ Artificial colouring/ artificial preservatives• That can increase the risk of cancer cells development• Avoid preserved food/ flavoured food• Because high salt intake can cause primary cellular damage that can increase the risk factor for (stomach) cancer• Avoid consuming red meat• That can increase the risk of (bowel) cancer• Avoid alcohol• Can cause liver malfunction

