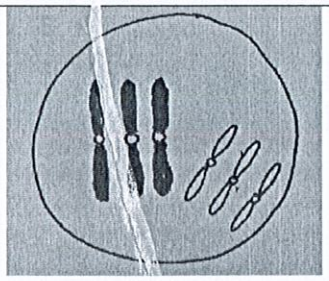
QUESTION 1			
BIL	**SUGGESTED ANSWER**	**MARK**	
(a)(i)	X: Animal cell	1	1
(ii)	• Contain the green pigment / chlorophyll • To trap energy from sunlight for photosynthesis	1 1	2
(iii)	• Site for cellular respiration • Generate/ produce/ release/ provide/ more energy in the form of ATP// require more energy for muscle contraction (to fly)	1 1	2
(iv)	**Similarity:** • Both cell X and Y have cytoplasm/ plasma membrane / nucleus / Golgi apparatus / smooth endoplasmic reticulum / rough endoplasmic reticulum / ribosome / mitochondria **Any 1 similarities** **Difference:** • Cell X has no cell wall while cell Y has cell wall • Cell X does not contain chloroplast while Cell Y has chloroplast • Cell X does not have fixed shape while cell Y have fixed shape • Cell X has centriole while cell Y does not have centriole • Cell X does not have vacuole //small vacuole while cell Y has large vacuole **Any 1P**	1 1 1 1 1	1 1 2
(b)(i)	L : Golgi apparatus M: Ribosome	1 1	2
(ii)	• Extracellular enzyme is a protein • Ribosome synthesis protein • Ribosome use the information carried by the chromosome/ DNA (to make these protein) • The information/ genetic code/ protein code is copied/ translated by RNA. **Any 3P**	1 1 1 1	3
		TOTAL	12

QUESTION 2			
BIL	**SUGGESTED ANSWER**	**MARK**	
(a)(i)	Phase P: Prophase	1	1
(ii)	• Chromosomes condense (and tightly coiled) • Shorter and thicker/ visible under light microscope • Consists a pair of sister chromatid (jointed together at the centromere) **Any 2P**	1 1 1	2

(iii)	 Correct size of chromosome : 1m Correct number of chromosome : 1m	1 1	2
(b)(i)	- Tissue culture	1	1
(ii)	• explant/ tissue/ aggregate cells is taken from the mother / parent plant • cells divide repeatedly • by mitosis • in differentiated mass of tissue **Any 2P**	1 1 1 1	2
(iii)	• Easy and faster (technique) • Increase the production/ number of banana plants in short time • Continuous supply of young plants throughout the year • Can choose only the good genetics/ high quality (of parent plants) • Produce genetically identical to parent plant **Any 2P**	1 1 1 1 1	2
(iv)	• clones will have same characteristic/ genetically identical as it parent cell • same level of resistance to diseases • because same DNA/genetic as its parent cell **Any 2P**	1 1 1	2
	TOTAL		12

QUESTION 3			
BIL	**SUGGESTED ANSWER**	**MARK**	
(a) (i)	Capture, mark, release and recapture technique	1	1
(ii)	$\frac{62X\ 78}{37} = 130.7$ **<u>Population size = 131</u>** **Calculation – 1mark** **Answer – 1 mark**	1 1	2
(iii)	• Mice are dispersed evenly within the restricted area • Mice are captured randomly • Marking is non-toxic / harmless / permanent / do not limit the movement the mice • Mice that been released able to mix freely with other unmarked mice • Population is stable// rate of birth and rate of death is same **Any 1P**	1 1 1 1 1	1
(iv)	Prediction: **The population size of mice increase**		2

	Explanation: More food/ more birth rate/ more mice emigrate	1 1	
b)(i)	• Level I: Species • Level III: Family	1 1	2
b)(ii)	P1- Monera P2 - Protista P3 - Fungi P4 – Animalia P5 – Plantae **Any 2P**	1 1 1 1 1	2
(c)(i)	Genus	1	1
(ii)	**Marking guide:** • Name is in Latin • each organisms has two names • the first name which begins with a capital letters(of O / Oryza), second name begins with the small letter (of s/ sativa) • The genus and species are written in italics//under line separately • First name refers to genus, second name refers to species **Any 1P**	1 1 1 1 1	1
	TOTAL	**12**	

QUESTION 4

BIL	SUGGESTED ANSWER	MARK	
(a) (i)	Phase S: Rapid Growth Phase// exponential phase	1	1
(ii)	• Decrease in mass • due to respiration / depletion of stored food/ breakdown of stored food • Provide energy for formation of radicle & plumule • Stage R is germination (of seed) **Any 2P**	1 1 1 1	2
(iii)			

Diagram 4.1	Diagram 4.2	
S shape / sigmoid curve	Staircase shape	1
Do not has intermittent growth/ has continuous growth	Has intermittent growth/ not continuous growth/ discontinuous	1
Not undergoes series of ecdysis	Undergoes series of ecdysis/ moulting process	1
Not have instar stage	Have instar stage	1
Slow growth continuously	Periodically growth	1

Any 2P — 2

(iv)	• Q is Instar (phase) • Indicates a zero growth of grasshopper • caused by/ limited by hard exoskeleton • Unable to expand the body	1 1 1 1	

	Any 2P	1	2
(b)(i)	Vascular cambium/ Cambium/ Lateral meristem		1
(ii)	• Cambium develop into complete cylinder / ring • Cells of cambium divide actively • by mitosis **Any 2P**	1 1 1	2
(iii)	• No secondary xylem • No secondary phloem • Diameter of stem smaller / decrease • no secondary growth occur • Stem become weaker • cannot give support to plants • No complete cambium ring **Any 2P**	1 1 1 1 1 1 1	2
	TOTAL	**12**	

QUESTION 5			
BIL	**SUGGESTED ANSWER**	**MARK**	
(a)(i)	Discontinuous variation	1	1
(ii)	• Controlled by one gene • Crossing over (during Prophase I) • Independent Assortment (during Metaphase I in meiosis) • Random fertilisation of gametes Reject: Mutation **Any 2P**	1 1 1 1	2
(iii)	• because it is determining by genetic factor • not influenced by environment • permanent characteristic • determine by one allele **1st P + Another 2P**	1 1 1 1	3
(b)(i)	• chameleon can change the skin colour same with the environmental factors (and genetic factors) • enables to adapt better to changes in environment • called as camouflage • able to protect itself from predators • population become increase **Any 3P**	1 1 1 1 1	3
(ii)	Similarities: • Both create varieties in the population of the same species • Caused by environmental factors or genetic factors or both Differences:	1 1	

Discontinuous (Diagram 5.1)	**Continuous (Diagram 5.2)**		
Distinctive	Not distinctive	1	
No intermediate characteristics	Has intermediate characteristics	1	
Qualitative	Quantitative	1	
		1	

	Not influenced by environmental factors	Influenced by environmental factors (and genetic factor)	1
	A single gene control the trait of character	Two or more genes control the same character	1
	Phenotypes controlled by a pair of alleles	Phenotypes controlled by many alleles	
		Any 1 + 2 or 2 + 1 (S & M)	3
		TOTAL	**12**

QUESTION 6

BIL.	SUGGESTED ANSWER	MARKS
(a)	Sample answer • Name: Red blood cell/ erythrocyte • Biconcave shape / No nucleus • TSA/V is higher • Carry / increase diffusion of oxygen to cell • To do cellular respiration • elastic membrane • Easy to squeeze and faster • Contain haemoglobin • To transport oxygen to cell in form of haemoglobin • Contain haem group/ iron (as site of oxygen binding) **Any 4E**	1 1 1 1 1 1 1 1 1 1 **4**
(b)	Sample answer SIMILARITIES • Both have closed circulatory system. • Both blood flows in blood vessels • Both has blood as the transport medium • Both have heart • Both heart have atrium & ventrical • Both heart do not have septum DIFFERENCES	1 1 1 1 1 1

P	Q	
Organism P is fish	Organism Q is frog/ amphibian	1
Heart of P has two chambers // one atrium and one ventricle	Heart of Q has three chambers // two atria and one ventricles	1
Single circulatory system	Double circulatory system	1
P has systemic circulation only	Q has systemic circulation and pulmonary circulation	1
Oxygenated blood flows from the gills	Oxygenated blood flows from the lungs	1

	<table><tr><td>Blood flows through the heart once</td><td>Blood flows through the heart twice</td></tr><tr><td>Oxygenated blood is transported directly to the body</td><td>Oxygenated blood is transported to the heart first before to the body.</td></tr></table> **At least 2S, 2D**	1 1 **4**
(c)	• The immune system decrease/ less • No/ less antibody to fight pathogen// low antibody concentration • Easy to get an infection / any disease • easy to transmit / spread disease to other person • died • no / less protection at a time when they are vulnerable • No immunity (at all to fight the disease) • Shorterhis lifetime **Any 3P**	1 1 1 1 1 1 1 1 **6**
	TOTAL	**20**

QUESTION 7			
BIL	**SUGGESTED ANSWER**	**MARK**	
a) (i)	Sample answer • M is biceps muscle, N is triceps muscle • Biceps/ M muscles contract (triceps/ N relaxes) • Both muscles act antagonistically • (Contraction of biceps muscles) produced pulling force • Tendon transmits pulling force to the radius (and ulna) • Ulna and radius/arm pulled upward • The forearm bend	 1 1 1 1 1 1 1 **Max:**	 **4**
(ii)	<u>Sample answer</u> • Receptor in the eye (retina) detects the shuttlecock / stimulus • (Receptor) trigger / produce nerves impulses • The nerve impulses transmit / pass from receptor to spinal cord/ CNS through afferent neurons. • Afferent neuron transmits impulse to interneuron • Brain interprets/ integrate/ analyse the impulse/ informations • Nerve impulses are transmitted through interneurons • Nerve impulse are transmitted through efferent neuron to • effector/ arm muscles • Both (arm) muscle act antagonistic// triceps contracts while biceps relaxes • to straighten the forearm	 1 1 1 1 1 1 1 1 1 **Max**	 **6**
(b)(i)	**Able to explain the graph at phase X and Y** Phase X • Bone mass is increased from age of 0 to 30/ during phase X	 1	

	• Bone undergoes growth • Oestrogen level is enough high to • stimulate absorption of calcium // sufficient calcium intake **Any 2P** Phase Y • Bone mass starts to decrease after age of 30/ during phase Y • Low oestrogen level • insufficient calcium intake • Bone more brittle / more porous / more fragile • Fracture of bones / vertebrae / wrists / hips • Stooped posture • Loss of height **Any 2P**	1 1 1 1 1 1 1 1 1 1	2 2
	• Adequate / enough / high intake of calcium / phosphorus • Increase the formation of bones cells and teeth / strengthen the bones • Adequate intake of Vitamin D • Aids absorption of calcium / phosphorus • Regular physical exercise • Delay bone fractures / reduce bone mineral loss / increase bone density • Take medication as prescribed by doctor • Slow down bone mineral loss **Any 3 (Facts + Exp)**	1 1 1 1 1 1 1 1	6
	Total	**20**	

QUESTION 8			
BIL	**SUGGESTED ANSWER**	**MARK**	
(a)	• P is gastric gland • no/less gastric juice is produced • no/less enzymes pepsin produced • no hydrolysis of protein to polypeptide • no/less enzymes rennin produced • no conversion of caseinogen into casein • no/less hydrochloric acid produced • medium less acidic//less optimum reaction/less bacteria killed • less mucus is produced **Any 6P**	1 1 1 1 1 1 1 1 1	6
(b)	<u>PREGNANT WOMAN</u> • Need **more** proteins • for foetus growth /build new cells • Insufficient protein cause stunted growth in foetus	1 1 1	

	• Need **more** carbohydrate • for **more** energy to mother • Insufficient carbohydrate cause tiredness to mother • Need **more** vitamin D // vitamin C • aid in absorption of calcium // (vit C) maintains good health • insufficient in vitamin D cause stunted growth in baby // insufficient in vitamin C cause scurvy for mother ***Reject** : vitamin only ***Accept** : any vitamins with correct effect • Need **more** calcium/phosphorus (mineral salts) • Need more iron • for formation of teeth and bone in foetus • Insufficient intake of calcium cause stunted growth of bone and teeth in baby • Iron for building red blood cells • Lack of iron leads to anemia **Any 2P + Correct 2Exp** <u>LABOUR WORKER</u> • Need **more** carbohydrate • for **more** energy • Insufficient carbohydrate cause tiredness • Need **more** protein • to repair the damage tissue/ build muscle • Need **more** vitamin D • for absorption of calcium. • insufficient vitamin D cause stunted growth of bone // insufficient • vitamin C cause scurvy • Need **more** calcium (mineral salts) • for strong bones • insufficient calcium cause bones to be more porous/ brittle. **Any 2P with correct 2Exp** <u>TODDLER/ CHILD</u> • Need **more** protein • for growth/ build new tissues • Insufficient protein will cause kwashiorkor disease • Need **more** carbohydrate	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4 4

	• for **more** energy • Insufficient carbohydrate cause marasmus disease • Need **more** vitamin D • for absorption of calcium • insufficient vitamin D cause stunted growth of bone // insufficient vitamin C cause scurvy • Need **more** calcium (mineral salts) • for strong bones • lack of calcium cause stunted growth of bone and teeth. **Any 2P with correct 2Exp**	1 1 1 1 1 1 1 Max:	 4 10
(c)	• Less / no growth of plant • (At compensation point) the rate of photosynthesis is equal to the rate of respiration • no net gain or loss of carbon dioxide// Absorption of CO_2 is equal to release of CO_2 • no net gain or loss in sugar produced/consumption • no excess sugar can be used for growth/reproduction/seeds production/living process • minimum/less production of crop yield **Any 4P**	1 1 1 1 1 1 4
	TOTAL	**20**	

QUESTION 9			
BIL	**SUGGESTED ANSWER**	**MARK**	
(a)	• heavy metal/copper/mercury/zinc/chromium/lead • highly toxic • accumulate in the organism via food chains • oil/grease/suspended solids (high) • less oxygen dissolve in the water • rate of respiration low for aquatic organism • rate of photosynthesis aquatic plant decrease • light intensity less penetrate into the water • heat from hot water discharged into the river • increase water temperature • less oxygen dissolve • BOD value high • lead to aquatic organism died **Any 4P**	1 1 1 1 1 1 1 1 1 1 1 1 1	4
(b)	• Treat effluents (before they are discharged into water source) • to filter the river water • free from poisonous/ death of aquatic organism. • Take legal action/restrict the law (against illegal dumping of toxic wastes from factories) • to avoid the release of more pollutants to the river • Plants the tree at river bank • to prevent soil erosion to provide more oxygen to aquatic organism • Awareness campaign on clean environment by school/college/university/media/others • to sustain/maintain the river ecosystem **Accept any suitable answer**	1 1 1 1 1 1 1 Max:	6
(c)	• combustion of fossil fuels in power station / factories / domestic boilers • produce sulphur dioxide • and oxides of nitrogen **Reject: nitogen dioxide** • (gases) dissolved / combine with water vapour • form sulphuric acid / nitric acid • rainwater fall to the Earth with pH less than 5.0 // becomes more acidic • acid rain occurs **Any 6P**	1 1 1 1 1 1 1	6
(d)	• As cash crop//food • source of nutrition/income • providing timber • for building/construction/paper/furniture • medicine/herb • cure certain disease/raw material to make traditional medicine • water catchment	1 1 1 1 1 1 1	

	• providing clean water for drinking/bathing/household needs • for education • area for academic research • recreation • for stress reliever/relaxation **Any 4P**	1 1 1 1 1	4
		TOTAL	**20**