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Coimisiún na Scrúduithe Stáit State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2009

BIOLOGY – HIGHER LEVEL

THURSDAY, 11 JUNE – MORNING, 9.30 TO 12.30

Section A Answer any **five** questions from this section.
Each question carries 20 marks.
Write your answers in the spaces provided on **this examination paper**.

Section B Answer any **two** questions from this section.
Each question carries 30 marks.
Write your answers in the spaces provided on **this examination paper**.

Section C Answer any **four** questions from this section.
Each question carries 60 marks.
Write your answers in the **answer book**.

It is recommended that you spend not more than 30 minutes on Section A and 30 minutes on Section B, leaving 120 minutes for Section C.

You must return this examination paper with your answer book at the end of the examination.

Section A
Answer any five questions.
Write your answers in the spaces provided.

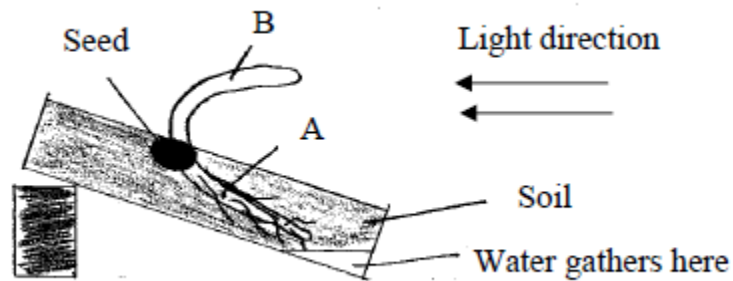
1. (a) In carbohydrates, which two elements are in the ratio 2:1? _____
- (b) Cellulose is a polysaccharide. Explain the term *polysaccharide*.

- (c) Name a polysaccharide other than cellulose. _____
- (d) Where precisely in a plant cell would you expect to find cellulose? _____

- (e) Name a test or give the chemicals used to demonstrate the presence of a reducing sugar.

- (f) In relation to the test referred to in (e) which of the following is correct?
1. No heat needed.
2. Heat but do not boil.
3. Boil.

2. The diagram shows a young plant growing in a tilted seed box.



- (b) Name the growth response shown by A. _____
- (c) Name the growth response shown by B. _____
- (d) Suggest a benefit to the plant of the growth response shown by B.

- (e) Give an example of a regulator in plants that inhibits growth. _____
- (f) Give **two** uses of plant growth regulators in horticulture.
1. _____
2. _____

1.		5(4) any FIVE points out of SIX	
	(a)	Hydrogen and Oxygen	
	(b)	(Made up of) many sugar units	
	(c)	Starch [accept other correct named]	
	(d)	Cell wall	
	(e)	Benedict's or Fehling's	
	(f)	2. (Heat but do not boil)	

2.		6(3) + 2	
	(a)	Radicle	
	(b)	Hydrotropism [<i>accept</i> geotropism]	
	(c)	Phototropism	
	(d)	Photosynthesis or described	
	(e)	Ethene or abscisic acid [<i>accept</i> other correct named]	
	(f)	Rooting powder / selective weedkiller / fruit ripening / seedless fruit /tissue culture (micro propagation) (ANY TWO)	

3. (a) Define *predation*. _____

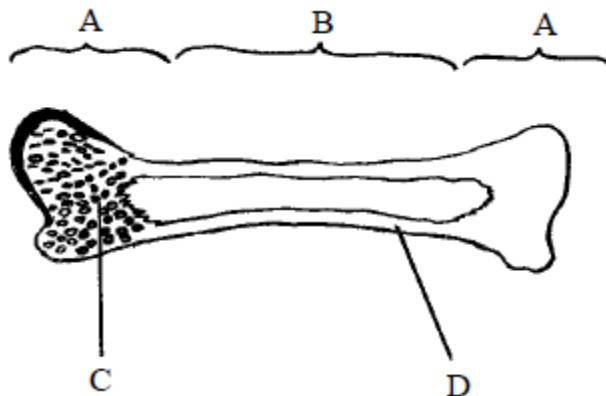
- (b) Give an example of predation by naming a predator and its prey.
 Predator: _____
 Its prey: _____
- (c) Explain the term *niche*. _____

- (d) Suggest a benefit to the plant of the growth response shown by B.

- (e) Explain the term *edaphic*. _____

- (f) Give an example of an edaphic factor. _____

4. (a) The diagram shows a longitudinal section of a long bone.



- (i) Name the parts of the diagram labelled A, B, C, D.
 A. _____ B. _____
 C. _____ D. _____
- (ii) Where are the discs in the human backbone? _____

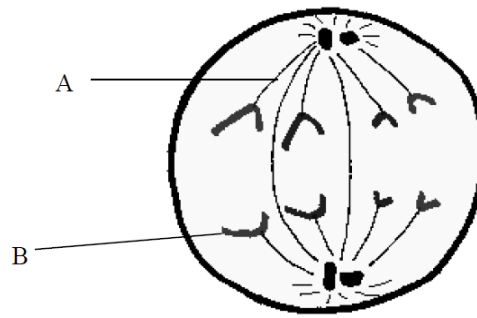
- (iii) What is the function of the discs in the human backbone? _____

- (b) Give a role for **each** of the following in the human body:
- (i) Yellow bone marrow. _____
- (ii) Red bone marrow. _____

3.		6(3) + 2	
	(a)	Killing (or catching) and eating another animal	
	(b)	Predator named	
		Its prey named	
	(c)	Organism's role in ecosystem or explained	
	(d)	Photosynthesis or protein synthesis	
	(e)	(To do with) soil	
	(f)	Particle size or soil type or pH or air content or water content or mineral content or temperature or humus content	

4.	(a)	(i)	A = Head (epiphysis)	2
			B = Shaft (diaphysis)	2
			C = Spongy bone	2
			D = Compact bone	2
		(ii)	Between the vertebrae	3
		(iii)	Shock absorption or friction-free movement or prevention of wear and tear	3
	(b)	(i)	Fat storage or can convert to red marrow	3
		(ii)	Blood cell formation	3

5. The diagram shows a stage of mitosis.



- (a) Name this stage of mitosis. _____
- (b) Give a feature from the diagram which allowed you to identify this stage.

- (c) Name the parts of the diagram labelled A and B.
- A. _____
- B. _____
- (d) What is the function of mitosis in single-celled organisms? _____
- (e) Give **one** function of mitosis in multicellular organisms. _____
- (f) Give **one** location where mitosis occurs in flowering plants. _____

6. (a) What is *genetic engineering*? _____

- (b) Name **three** processes involved in genetic engineering.
1. _____
2. _____
3. _____
- (c) Give an example of an application of genetic engineering in each of the following cases:
1. A micro-organism. _____
2. An animal. _____
3. A plant. _____

5.		6(3) + 2	
	(a)	Anaphase	
	(b)	Chromosomes separated or chromosomes near poles	
	(c)	A = Spindle (fibre) B = Chromosome	
	(d)	Reproduction	
	(e)	Growth or (cell) replacement or repair or renewal or spore formation	
	(f)	Meristematic tissue or root tips or shoot tips or buds or ovule or embryo sac or pollen	

6.		6(3) + 2	
	(a)	Manipulation or alteration of genes or of genotypes	
	(b)	Isolation / cutting (or restriction) / transformation (or ligation) / introduction of base sequence (changes) / expression	Any three
	(c)	1. Micro-organism example: 2. Animal example: 3. Plant example:	

Section B

Answer any two questions.

Write your answers in the spaces provided.

Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

7. (a) (i) Why is a dicotyledonous (dicot) plant so called? _____
(ii) Name a dicotyledonous plant. _____

- (b) (i) Describe in detail how you prepared a microscope slide of a transverse section of the stem of a dicotyledonous plant.

- (ii) Give an account of the procedures that you followed in order to view your slide under the microscope.

- (iii) In the space below draw enough of your section to show and label the location of **each** of the following:

1. Phloem. 2. Xylem. 3. Ground tissue.

7.	(a)	(i)	Two embryonic leaves or two seed leaves	3
		(ii)	Any dicot named	3
	(b)	(i)	(Cut) thin (section) / (cut) away from self / with blade or scalpel or microtome / how transferred to slide / cover slip / how applied / (use of) water	3(3)
		(ii)	(Slide) onto stage / lamp on or mirror / adjust (light) / start with low power lens / how focused	3(3)
		(iii)	<i>Diagram:</i>	3, 0
			<i>Labels:</i>	3(1)

8. (a) (i) What is meant by *germination*? _____

- (ii) Why is digestion necessary in a germinating seed? _____

- (b) (i) Digestive activity during germination can be demonstrated by using agar plates.
What is an agar plate? _____

- (ii) An extra food material is added to the agar plate for **this** demonstration.
Give an example of such an extra food material. _____
- (iii) Outline the procedures that you carried out in setting up this demonstration.

- (iv) What control did you use for this demonstration?

- (v) What procedure did you carry out in order to show that digestive activity had taken place?

- (vi) Describe the results that you obtained in:
1. The experimental plate. _____

 2. The control plate. _____

8.	(a)	(i)	Growth of seed (or embryo part or of embryo)	3
		(ii)	To make (food) soluble or to make (food) transportable	3
	(b)	(i)	Petri dish containing a jelly (or solid medium)	3
		(ii)	Starch or milk	3
		(iii)	Soak (seeds) / split (seeds) / how sterilised correctly / position (seeds) on agar / keep plate warm or stated temperature (max. 35°C)	2(3)
		(iv)	Boiled seeds	3
		(v)	Starch agar: Iodine (solution) or milk agar: biuret solution.	3
		(vi)	1. No blue-black (under seeds) or no purple (under seeds)	3
			2. Blue-black (under seeds) or purple (under seeds)	3

9. (a) (i) To which group of biomolecules do enzymes belong? _____

(ii) Name a factor that influences the activity of an enzyme.

(b) In the course of your practical investigations you prepared an enzyme immobilisation.

Answer the following questions in relation to that investigation.

(i) Describe how you carried out the immobilisation.

(ii) In the space provided draw a labelled diagram of the apparatus that you used to investigate **the activity** of the immobilised enzyme.

(iii) Briefly outline how you used the apparatus referred to in (b) (ii) above.

9.	(a)	(i)	Proteins	3
		(ii)	Temperature or pH	3
	(b)	(i)	Named enzyme [<i>accept yeast</i>] / mix (or stir) / with alginate / add to CaCl ₂ soln. / how added / (allow to) harden	3(3)
		(ii)	<i>Diagram:</i>	2,0
			<i>Labels:</i> named substrate / enzyme [<i>accept yeast</i>] or beads / named product / any one apparatus label	2(2)
		(iii)	Add substrate (to immobilised enzyme) / test for named product / how tested / test at set intervals or control described	3(3)

Section C
Answer four questions.

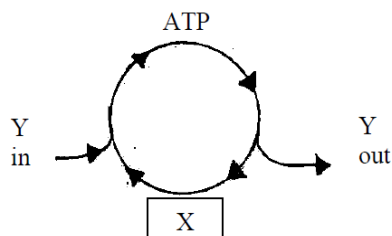
Write your answers in the answer book.

10. (a) (i) State Mendel's Law of Segregation.
(ii) Name two cell organelles, other than the nucleus, that contain DNA. (9)
- (b) In guinea pigs the allele for black hair (B) is dominant to the allele for brown hair (b) and the allele for short hair (S) is dominant to the allele for long hair (s). The alleles governing hair colour are located on a different chromosome pair to those governing hair length.
- (i) Explain the terms *alleles* and *dominant*.
(ii) What term is used to describe alleles that lie on the same chromosome?
(iii) Why is it significant that the two pairs of alleles, mentioned above in relation to guinea pigs, are located on different chromosome pairs?
(iv) Determine all the possible genotypes and phenotypes of the offspring of a cross between the following guinea pigs:
- Brown hair, heterozygous short hair X Heterozygous black hair, long hair
- (c) (i) Explain the term *species*.
(ii) Within a species a considerable degree of variation is usually seen.
1. What is meant by *variation*?
2. State **two** causes of variation.
(iii) What is the significance of inherited variation in the evolution of species?
(iv) State **two** types of evidence used to support the theory of evolution.
11. (a) (i) What does an ecologist mean by the term *conservation*?
(ii) Give an outline of **one** conservation practice used in agriculture **or** fisheries **or** forestry.
- (b) Read the following passage about foxes and answer the questions that follow:
Red foxes are found in many ecosystems. A pair of foxes will occupy a territory and will defend it from other foxes in the breeding season. Territory boundaries are marked with scent and urine. Red foxes are usually solitary and hunt alone except during the breeding season, when they hunt in family groups. The young accompany the parents while hunting and foraging in order to learn skills. Red foxes do not hibernate and are active all year round though they are nocturnal in habit. They are omnivores but they prefer animals such as small rodents, frogs, insects and birds. Preferred plant foods include acorns, grasses, fruits and berries. In urban areas they scavenge for discarded human food. They also eat roadkill whether in a rural or urban setting.
(Adapted from: Ontario Ministry of Natural Resources fact sheet: Red fox ecology, 6th June 2007)
1. Give **two** activities of adult foxes, apart from breeding itself, which are associated with the breeding season.
2. How is the territorial boundary marked?
3. How do young foxes learn to hunt?
4. Suggest a reason why wheelie bins are making life more difficult for urban foxes.
5. What is meant by the term omnivore?
6. Suggest an advantage to the fox of being "nocturnal in habit".
7. In general, are urban foxes or rural foxes more successful at finding food? Give a reason for your answer. (27)
- (c) (i) In relation to ecological surveys, explain the meaning of the terms:
1. *Qualitative*.
2. *Quantitative*.
(ii) In the course of your ecological studies you investigated an ecosystem. Name this ecosystem and describe how you conducted a **quantitative** survey of plants present in it.
(iii) How did you present the results of your survey?
(iv) Suggest a possible source of error in your survey. (24)

10.	(a)	(i)	Two factors that separate at gamete formation (each gamete receiving one factor)	3
		(ii)	Mitochondrion / chloroplast	2(3)
	(b)	(i)	<i>Alleles</i> = Different forms of a gene <i>Dominant</i> = An allele that masks its (recessive) partner or an allele that is always expressed	3 3
		(ii)	Linked	3
		(iii)	Independent assortment (or described) can occur or more variation (in offspring)	6
		(iv)	BbSs Bbss bbSs bbss	4(2)
			black + long black+ short brown + short brown + long	4(1)
			Each excess incorrect cancels a correct answer	
	(c)	(i)	Interbreeding organisms / producing fertile offspring	2(3)
		(ii)	1. Differences (between individuals) 2. Sexual reproduction / mutation / environment / meiosis	3 2(3)
		(iii)	Produces new genotypes or allows natural selection (or explained)	6
		(iv)	Fossils or embryos or anatomy or genetics or example Any ONE	3

11.	(a)	(i)	The management of the environment or of organisms	3
		(ii)	Example / conservation benefit	2(3)
	(b)	1.	Occupying territory / defending territory / marking territory boundaries / hunting in family groups or foraging in family groups	2(3)
		2.	With scent and urine	3
		3.	By accompanying the parents (on hunting trips)	3
		4.	They make waste food harder to get at or explained	3
		5.	Eats plants and animals	3
		6.	Avoids competition or more prey or enhance survival or less visible	3
		7.	Valid reasoned argument	6
	(c)	(i)	1. The types of organisms present 2. Numbers of individuals or number of species	3 3
		(ii)	Name of ecosystem Quadrat / random / how random achieved / many times / count or estimate / record OR Belt (or line) transect / stations / at intervals / place quadrat / count or estimate / record	3 3(3)
		(iii)	(Bar) chart or table or graph	3
		(iv)	Not enough samples taken or example of human error	3

12. (a) ATP and NAD / NADP+ play important roles in cell activities.



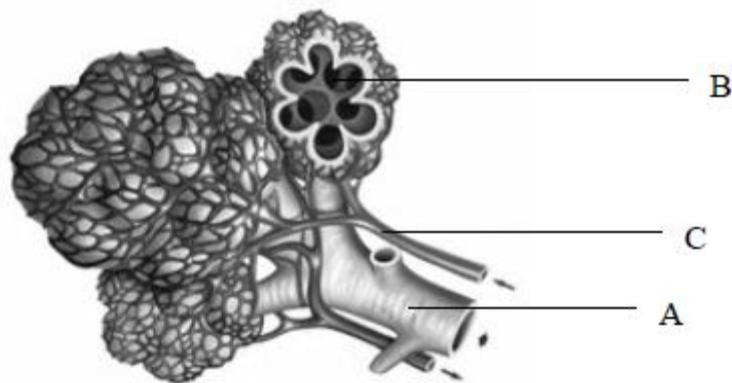
The ATP Cycle

- (i) Name the substance X, formed by the loss of a phosphate group.
- (ii) The ATP cycle is kept going by Y. What is Y?
- (iii) Suggest a role for NAD / NADP+ in cell activities. **(9)**
- (b) (i) What name is given to the first stage of respiration?
- (ii) The first stage ends with the formation of pyruvate (pyruvic acid).
In **anaerobic** conditions, what is produced from this pyruvate:
1. In muscle cells?
 2. In yeast cells?
- (iii) If conditions are **aerobic**, pyruvate next passes to an organelle in which the second stage of respiration takes place. Name this organelle.
- (iv) In this organelle pyruvate is broken down to CO₂ and a two-carbon compound. Name this two-carbon compound.
- (v) This two-carbon compound passes directly into a series of reactions in the second stage of respiration.
Name this series of reactions **and** give **one** product, other than electrons, of these reactions.
- (vi) The electrons released from the above reactions pass along a transport chain and in the process energy is released.
1. To what use is this energy put?
 2. At the end of the transport chain what happens to the electrons?
- (c) One laboratory activity that you carried out demonstrated the influence of light intensity **or** of carbon dioxide concentration on the rate of photosynthesis. Answer the following in relation to this activity:
- (i) Explain how you measured the rate of photosynthesis.
 - (ii) Explain how you varied light intensity **or** carbon dioxide concentration.
 - (iii) State how you kept another **named** factor constant.
 - (iv) Draw a graph with labelled axes to show the results that you obtained.
 - (v) Briefly explain the trend in your graph. **(24)**

12.	(a)	(i)	ADP	3
		(ii)	Energy	3
		(iii)	Capturing or transferring electrons or protons or hydrogen (ions)	3
	(b)	(i)	Glycolysis	3
		(ii)	1. Lactate (lactic acid) 2. Ethanol (and CO ₂)	3 3
		(iii)	Mitochondrion	3
		(iv)	Acetyl (Co-enzyme A)	3
		(v)	Krebs cycle CO ₂ or ATP or Hydrogen ions or protons	3 3
		(vi)	1. Forming ATP (or described) 2. To oxygen or involved in H ₂ O formation	3 3
	(c)	(i)	Counted bubbles (or measure volume) per unit time or use a (datalogging) sensor	3
		(ii)	Light source at different distances (from plant) or different wattages or different concentrations of NaHCO ₃ solution	3
		(iii)	Temperature / how OR light (if not given in (c) (ii)) / how OR CO ₂ concentration (if not given in (c) (ii)) / how	2(3)
		(iv)	Axes labelled correctly Curve matching axes given	3 3
		(v)	Increasing (or decreasing) / (more or less) light (energy) for light phase or (more or less) CO ₂ for dark phase OR Levels off / saturation (or explained)	2(3)

13. (a) The human circulatory system has two circuits.
- (i) Give the name of each of these circuits.
 - (ii) Which of these circuits involves the pumping of blood by the left ventricle? **(9)**
- (b) (i) Write a short note on **each** of the following:
1. Pulse.
 2. Blood pressure.
- (ii) Comment on the effect of **each** of the following on the circulatory system:
1. Diet.
 2. Exercise
- (iii) Give **two** ways, other than colour, in which a red blood cell differs in structure or composition from a typical body cell such as one in the cheek lining.
- (iv) What is the role of the SA (sinoatrial) and AV (atrioventricular) nodes in the heart?
- (v) Give the **precise** locations of **both** the SA and the AV nodes in the heart. **(27)**

(c)

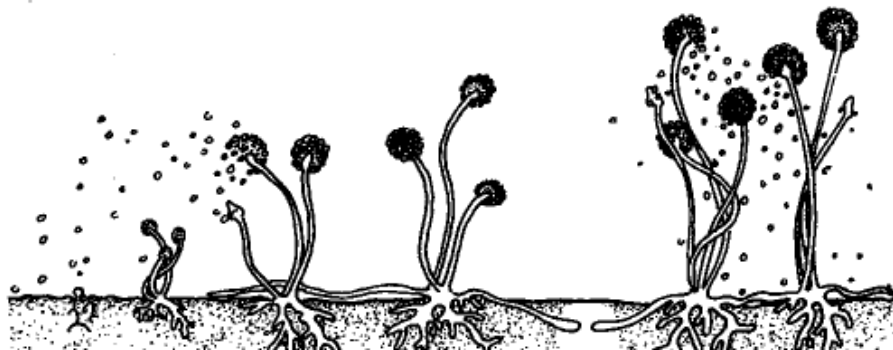


The diagram shows microscopic detail from a human lung.

- (i) Name the parts labelled A, B and C.
- (ii) Give **two** features of the structures in the diagram that allow for efficient gas exchange.
- (iii) Name a disorder of the breathing system and say how it may be:
 1. Caused.
 2. Prevented.
 3. Treated.
- (iv) Which gas, dissolved in the blood, can trigger deeper or faster breathing? **(24)**

13.	(a)	(i)	Pulmonary circuit	3
			Systemic circuit	3
		(ii)	Systemic or described	3
	(b)	(i)	1. Pulse: contraction of (wall of) artery or expansion of artery or due to pumping of heart (or of left ventricle) or rate at which heart beats [<i>accept</i> relevant medical reference]	3
			2. Blood pressure: Force exerted by blood (or by heart) [<i>accept</i> relevant medical reference]	3
		(ii)	1. Comment on diet: Dietary factor + matching effect	3
			2. Comment on exercise: Comment + matching effect	3
		(iii)	Contain haemoglobin / no nucleus (or other named organelle) / comment on shape	2(3)
		(iv)	Causes contraction (of heart muscle) or Pacemaker (or described) or impulse generation	3
		(v)	SA (In wall of) right atrium or indicated on diagram	3
			AV In (or near) septum or near tricuspid valve or between atrium and ventricle or indicated accurately on diagram	3
	(c)	(i)	A = Bronchiole	2
			B = Alveolus	2
			C = Arteriole or Capillary	2
		(ii)	Thin walled / moist surfaces / proximity (of alveoli and capillaries) / large surface area / large number (of alveoli or capillaries)	Any two 2(3)
		(iii)	Named disorder	3
			1. Cause	2
			2. Prevention	2
			3. Treatment	2
		(iv)	*CO ₂	3

- (a) (i) Draw a diagram of the reproductive system of the human female.
On your diagram indicate where the following occur:
1. Meiosis.
2. Fertilisation.
3. Implantation.
- (ii) Give an account of the role of either oestrogen **or** progesterone in the menstrual cycle.
- (iii) Name a human female menstrual disorder. In the case of this disorder give:
1. A possible cause.
2. A method of treatment.
- (b) (i) Give an account of the importance of the placenta during human development in the womb.
- (ii) From what tissues is the placenta formed?
- (iii) Outline how birth occurs.
- (iv) What is meant by *in-vitro fertilisation*?
- (v) After implantation, the embryo first develops into a *morula* and then into a *blastocyst*. Explain the terms in italics.
- (c)



- (i) Identify the organism shown in the diagram.
- (ii) To which kingdom does this organism belong?
- (iii) Name the parts labelled A, B and C.
- (iv) 1. Give a role, other than anchorage, for structure X.
2. Describe how X carries out this role.
- (v) Which term describes the mode of nutrition of this organism.
- (vi) The cells of this organism are described as eukaryotic.
Give **two** characteristic features of eukaryotic cells.
- (vii) What corresponding term is used to describe bacterial cells?

14.	Any two of (a), (b), (c)		(30, 30)	
14.	(a)	(i)	Diagram <i>Indicate sites of:</i> Meiosis: (Ovary) indicated on diagram Fertilisation: (Fallopian) tube indicated on diagram Implantation: (Uterus) indicated on diagram	6, 3, 0 3 3 3
		(ii)	<i>Oestrogen</i> : repairs endometrium / inhibits FSH / stimulates LH OR <i>Progesterone</i> : thickening (or maintenance of) endometrium / inhibits FSH / inhibits LH production	2(3)
		(iii)	Named menstrual disorder: 1. Cause 2. Treatment	3 3 3
14.	(b)	(i)	Example of transport in (or out) / example of barrier / produces progesterone	2(3)
		(ii)	Uterine and embryonic	3
		(iii)	Change in hormone levels (or correctly described) / contractions / waters break / cervix dilates / delivery / cord cut / afterbirth	3(3)
		(iv)	Sperm and egg fuse / outside the body (or described)	2(3)
		(v)	<i>Morula</i> : (Solid) ball of cells <i>Blastocyst</i> : Fluid-filled (or hollow) ball of cells	3 3
14.	(c)	(i)	Rhizopus	3
		(ii)	Fungi	3
		(iii)	A = Sporangiphore B = Sporangium C = Spore	2 2 2
		(iv)	1. Comment on nutritional role or spreading 2. Secretes enzymes or absorbs products or growth (on substrate) (Answers 1. and 2. must match)	3 3
		(v)	Saprophytic	3
		(vi)	<u>Nucleus</u> Membrane-bound organelles or other named organelle	3 3
		(vii)	Prokaryotic	3

15. Answer any **two** of (a), (b) and (c).

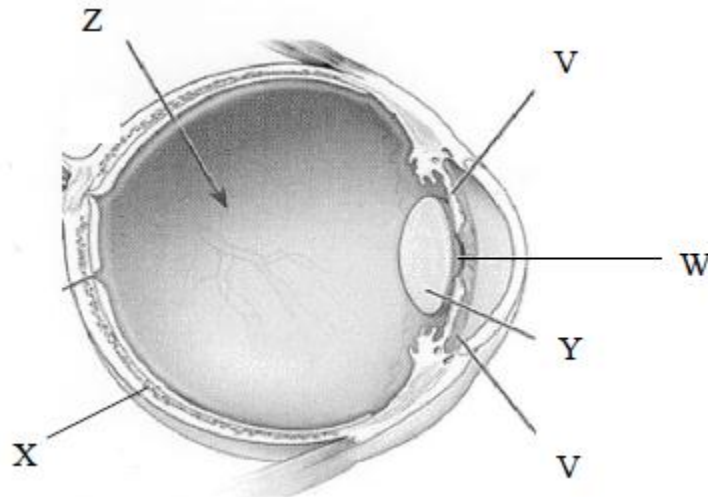
(30, 30)

- (a) (i) What is meant by *vegetative propagation*?
(ii) Horticulturists use a number of methods to artificially propagate plants. Suggest **one** advantage of artificial propagation.
(iii) Describe **two** methods used by horticulturists to artificially propagate plants.
(iv) Give **two** differences between vegetative propagation and propagation involving seeds.
(v) Seeds and fruits need to be dispersed.

Give:

1. **Two** methods of dispersal.
2. **Two** advantages of dispersal to the plant.

(b)



The diagram shows the human eye.

- (i) Name the parts labelled V, W and X.
(ii) Give the functions of parts Y and Z.
(iii) 1.Suspensory ligaments. 2. Cones. 3. Optic nerve. 4. Brain.
Outline the roles in vision of any **three** of the above structures.
(iv) Explain how the iris works.
(v) Suggest a reason why two eyes are better than one.

(c) Write notes on **three** of the following topics:

- (i) The role of lymphocytes.
- (ii) Neurotransmitters.
- (iii) Homeostasis.
- (iv) Adaptations of wind-pollinated flowers.
- (v) The economic and medical importance of viruses.

15.	Any two of (a), (b), (c)			(30, 30)
15.	(a)	(i)	Production of new plant from root or from stem or from leaf or plant asexual reproduction (or described)	3
		(ii)	Fast or preserves desirable features or cheap or more reliable	3
		(iii)	Cuttings (or described) / layering (or described) / grafting (or described) / micro propagation (or described)	2(3)
		(iv)	No gametes (or one parent) / identical plants or example / rapid production / no outside agent	2(3)
		(v)	1. Wind / animal / self (or mechanical) / water 2. Colonisation / reduces competition / elaboration of competition	2(3) 2(3)
15.	(b)	(i)	V = Iris W = Pupil X = Choroid	2 2 2
		(ii)	<i>Function of Y (Lens):</i> To focus (light) onto the retina <i>Function of Z (Retina):</i> To convert light into nerve impulses or image forms on it OR <i>Function of Z (Vitreous Humour):</i> Gives shape (to eye)	3 3
		(iii)	1. Holds lens in place or (involved in) changing shape of lens 2. (Detects) colour (or explained) 3. Brings impulses from retina or brings impulse to brain 4. Interprets information (received from retina)	Any three 3(3)
		(iv)	(muscular) contraction in response to light intensity or pupil size changes or allows more (or less) light in	3 3
		(v)	Increased visual field or to judge distance (depth) or 3D vision (accept other reasonable suggestion)	3
15.	(c)			Any three 3(4+3+3)
		(i)	Immune system (or described) / B lymphocytes / produce antibodies / T lymphocytes / any function of T lymphocyte	
		(ii)	Secreted by neuron (or vesicle) / presynaptic (neuron) / in response to impulse / chemical transmission / across synaptic cleft / cause impulse in next neuron / destroyed by enzymes / recycled or reabsorbed by pre-synaptic neuron	
		(iii)	Maintenance of / constant internal environment / example how / example why (Example = pH, solute concentrations or examples of such solutes, temperature, water)	
		(iv)	Long stamens / long stigmas / feathery stigmas / large numbers of pollen grains / smooth pollen or light pollen / no showy colours or no scent or no nectar or small petals or no petals	
		(v)	At least one from each category: <i>Economic importance:</i> Crop damage / example of viral crop disease / animal disease / example of viral animal disease / human medical costs <i>Medical importance:</i> Human diseases / examples of viral human diseases / used in medical research /	