Set (1)

2025
MATRICULATION EXAMINATION
DEPARTMENT OF MYANMAR EXAMINATIONS

BIOLOGY **Time Allowed : (3) Hours**

WRITE YOUR ANSWERS IN YOUR ANSWERS BOOKLET.

DO NOT COPY THE QUESTIONS.

SECTION (A)

1. Write TRUE or FALSE to the following statements. Do not copy the statements. (10 marks)

i. Livestock are key drivers for substainable development in agriculture.

ii. DNA polymerase replicates the two original strands differently.

iii. Xylem tissue contains dead, empty hollow cells with end walls.

iv. The best protection against malaria is to avoid being them.

v. Reflex arcs are simple connections of only two neurons to transmit messages.

vi. Genetic pollution is desirable gene flow into wild populations.

vii. Pomology is the production of fruits and nuts.

viii. In transcription, mRNA is synthesized based on the RNA template of a gene.

ix. Double circulatory system is found in birds and mammals.

x. Most of the water from tissue fluid reenters capillaries by diffusion.

2. Complete the following statements with appropriate words. Do not copy the statements. (10 marks)

i. The life stages of silkworm include egg, caterpillar, --------- and adult moth.

ii. Each time the DNA replicates, some --------- from the chromosome are lost.

iii. Arteries carry blood away from the heart towards the --------- of the body.

iv. Viruses are --------- pathogenic particles that infect other living organisms.

v. Planks lack a --------- system like animals.

vi. Forest ecosystems are a --------- sink and stabilize soils.

vii. Phytohormones are essential --------- compounds required in very small quantities.

viii. Habitat size and number of --------- are systematically related.

ix. Maggots are small, --------- eaters that feed on diseased and dying flesh.

x. The uptake of water is a passive process and occurs by ---------.

3. **Choose the correct answer for the following statements. Do not copy the statements.** **(10 marks)**

i. The genetic information is encoded in the (A. nucleotide B. nucleoside C. nucleic acid D. ribonucleic acid) sequences of DNA.

ii. Each (A. mRNA B. codon C. tRNA D. RNA) carries the specific amino acid at a time at its acceptor stem.

iii. Stomata must be opened during the day to allow (A. oxygen B. carbondioxide C. nitrogen D. water) to diffuse into the leaf for photosynthesis.

iv. Biotic diseases are caused by (A. living organisms B. non-living organisms C. pathogenic organism D. unfavourable growing conditions).

v. (A. Cytokinin B. Abscisic acid C. Ethylene D. Auxin) is an example in the group of hormones that promote dormancy in plants.

vi. Dried seeds are stored in a temperature of -14°C and in (A. light B. dark C. shade D. dim-light) conditions.

vii. Plants make their own (A. organic B. inorganic C. mineral D. energy) molecules, using the process of photosynthesis.

viii. Female Anopheles mosquitoes feed on human blood to obtain the (A. glucose B. carbohydrate C. lipid D. protein) they need to develop their eggs.

ix. Habitat loss is the most significant cause of (A. biodiversity B. agrobiodiversity C. ecosystem D. forest) loss globally.

x. The largest part of the brain is (A. thalamus B. midbrain C. hypothalamus D. cerebrum).

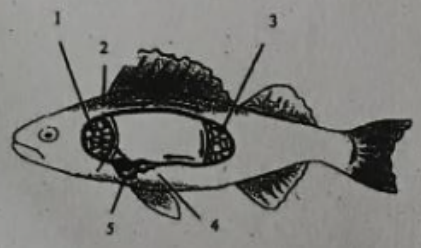
SECTION (B)

4. **Answer All questions.** **(30 marks)**

a. State the nature of molecules to ecosystems, interaction in biological systems.

b. Explain the structure of RNA and tabulate the some different types of RNA molecules. (Illustration is not necessary)

c. Provide labels and caption to the given diagram and explain the single circulatory system. (Do not copy the diagram)



d. Tabulate the some disease of plants caused by fungi.

e. Write a note on gaseous phytohormone and its physiological effects.

f. Enumerate the problems with captive breeding and reintroduction programmes.

5. Answer any FOUR questions. (40 marks)

a. Describe the nature of hydroponic culture.

b. Explain the production of genetically modified animals. (Illustration is not necessary)

c. Define the term translocation and describe the important role of phloem tissue.

d. Give short account on the smoking, inactivity and high blood pressure as modifiable risks factors for cardiovascular disease.

e. Give labeled diagram of the front view of left eye and tabulate the function of cornea, iris and retina in different parts of the eye.

f. Describe some endangered plant species in Myanmar.

Set (1) Answers

SECTION (A)

1.

i. True	ii. True	iii. False	iv. False	v. False
vi. False	vii. True	viii. False	ix. True	x. True

2.

i. pupa	ii. nucleotide	iii. cells	iv. intracellular	v. nervous
vi. carbon	vii. organic	viii. species	ix. voracious	x. osmosis

3.

i. A	ii. C	iii. B	iv. C	v. B
vi. B	vii. A	viii. D	ix. A	x. D

SECTION (B)

4.a. State the nature of molecules to ecosystems, interaction in biological systems.

Organisms interact continuously with physical factors. Plants take up nutrients from the soil and chemicals from the air and use energy from the sun. Interactions among plants, animals, and other organisms affect the participants in varying ways.

In feedback regulation, a process is regulated by its output or product. In negative feedback, accumulation of the product slows its production. In positive feedback, a product speeds up its own production. Feedback is a type of regulation common to life at all levels, from molecules to ecosystems

4.b. Explain the structure of RNA and tabulate the some different types of RNA molecules. (Illustration is not necessary)

Like DNA, RNA is a polymer of nucleotides. RNA contains four nucleotides with the bases adenine (A), uracil (U), cytosine (C), and guanine (G). Unlike DNA, RNA is single-stranded. However, tRNA can fold back on itself, and complementary base pairing within the same molecule stabilizes the looped structure.

There are several types of RNA molecules. Since all are produced from a DNA template, all are synthesized in the nucleus. Only three different RNA molecules that involved in protein synthesis and their functions are listed in table.

Some different types of RNA molecules involved in protein synthesis

Types of RNA	Function
Messenger RNA (mRNA)	Acts as the template for translation
Transfer RNA (tRNA)	Carries specific amino acid to mRNA at ribosome
Ribosomal RNA (rRNA)	Reads the codon on mRNA

4.c. Provide labels and caption to the given diagram and explain the single circulatory system. (Do not copy the diagram)

1. capillaries is gills
2. gill cover
3. capillaries in other parts of body
4. atrium
5. ventricle

Caption – Single circulatory system in fish

Single circulatory system - It is found in fish. The heart pumps deoxygenated blood to the gills, the organs of gas exchange where the blood takes in oxygen (becomes oxygenated) and gives up carbon dioxide at the same time. The blood then travels on around the rest of the body of the fish, giving up oxygen to the body cells before returning to the heart. In this type, blood passes once through the heart.

4.d. Tabulate the some disease of plants caused by fungi.

Some diseases of plants caused by fungi

No.	Genus	Diseases
1.	*Alternaria*	Leaf spots and blight of various plants
2.	*Aspergillus*	Rots of seeds
3.	*Botrytis*	Blights of various plants
4.	*Fusarium*	Root rot of many plants
5.	*Puccinia*	Rust of cereals
6.	*Rhizopus*	Soft rot of fruits
7.	*Sclerotinia*	Soft rot of vegetables

4.e. Write a note on gaseous phytohormone and its physiological effects.

Ethylene

Ethylene is the only gaseous phytohormone. It is produced naturally in plants from amino acid methionine. All parts of seed plants produce ethylene. Maximum synthesis of ethylene occurs during the ripening of fruits.

Physiological effects of ethylene

Some physiological effects of ethylene in plants are as follows:

i. Ethylene stimulates ripening of fruits. It also increases the rate of respiration. Due to this, ethylene is used in post-harvest technology i.e., for commercial ripening of fruits.

ii. Ethylene causes drooping of leaves and flowers.

iii. Ethylene induces rapid growth of internodes and leaf bases.

4.f. Enumerate the problems with captive breeding and reintroduction programmes.

Problems with captive breeding and reintroduction programmes are

i. not enough space or resources in zoos and parks for all the endangered species

ii. difficulty in providing the right conditions for breeding, even if scientists know what those conditions are

iii. continuation of the conditions that pushed the species close to extinction

iv. animals that have been bred in captivity may have problems adjusting to unsupported life in the wild

v. reintroduction programmes can be very expensive and time consuming and they may be fail.

5. Answer any FOUR questions. **(40 marks)**

5.a. Describe the nature of hydroponic culture.

Hydroponics is a method of growing plants without soil. Hydroponics uses less water than traditional soil-based systems. Hydroponic growing allows for faster growth and higher yields than traditional soil-based growing systems. Hydroponics is a type of horticulture and a subset of hydroculture which involves growing plants, usually crops, without soil, by using water-based mineral nutrient solutions in aqueous solvents. Terrestrial or aquatic plants may grow with their roots exposed to the nutritious liquid. In addition, the roots may be physically supported by an inert medium such as perlite, gravel, or other substrates. Despite inert media, roots can cause changes of the rhizosphere pH and root exudates can affect rhizosphere biology and physiological balance of the nutrient solution by secondary metabolites.

The nutrients used in hydroponic systems can come from many different sources, including fish excrement, duck manure, purchased chemical fertilizers, or artificial nutrient solutions. Plants are commonly grown hydroponically in a greenhouse, on inert media, include tomatoes, peppers, cucumbers, strawberries, lettuces, and cannabis, usually for commercial use, and *Arabidopsis*, which serves as a model organism in

plant science and genetics. Hydroponics offers many advantages, notably a decrease in water usage in agriculture. Since hydroponics takes much less water to grow and produce, it could be possible in the future for people in harsh environments with little accessible water to grow their own food.

5.b. Explain the production of genetically modified animals. (Illustration is not necessary)

The production of transgenic animals is a much more complex process than the production of transgenic plants, and not surprisingly, it is also highly controversial. To produce transgenic animals, a foreign gene is inserted into the genome of an animal oocyte (egg) that is then fertilized. The fertilized egg is implanted in a host female and allowed to develop. The resulting offspring are the transgenic form of the animal. The procedure has been used to produce transgenic fish, pigs, cows, rabbits, and sheep.

Transgenic animals can be used to produce pharmaceutical products such as human proteins by using a recombinant plasmid vector. The vector contains the gene for the growth protein as well as the promoter that directs the expression of the genes in mammary cells. The recombinant DNA is then injected into an oocyte. The oocyte is fertilized and implanted into a host female. The transgenic animals are the offspring produced from that implantation. The milk of female transgenic offspring contains human growth protein.

Benefits of GM animals are (i) increased production of a particular product, higher milk yield in cows, greater muscle mass in animals used for meat, (ii) increased resistance to disease, (iii) manufacture of human proteins, such as antibodies, blood clotting factors or important proteins for medicinal purposes and (iv) production of organs for transplantation **(xero transplantation)**

5.c. Define the term translocation and describe the important role of phloem tissue.

Translocation is the movement of dissolved substances through a plant.

When leaves photosynthesize, they produce carbohydrates. These carbohydrates are transported out of the leaf in the form sucrose to the stem. Once in the stem it may travel upwards to actively growing regions or maturing fruits and seeds or downwards to the roots and undergo und storage organs. Both upward and downward movement may take place at the same time in the phloem.

The phloem tissue is a complex tissue. The consisting components are sieve tube, companion cell, phloem parenchyma and phloem fibre. They are living cells except phloem fibre. In the translocation process, sieve tubes or sieve cells which have no nucleus and companion cells possess do work together. They are cylindrical cells with layers of cytoplasm like materials just inside their cell walls. They are so called because of the presence of perforations in the cell septate walls known as sieve plates. These are main components through which translocation take place and permit the plant materials to pass from one cell to another.

Sieve cells can manage translocation without nuclei because they are kept alive by the nucleated companion cells that always situated adjacent to sieve cells. There are profuse cytoplasmic connections between sieve and companion cells. Moreover, phloem tissue is strengthened by fibre cells besides the sieve and companion cells.

5.d. Give short account on the smoking, inactivity and high blood pressure as modifiable risks factors for cardiovascular disease.

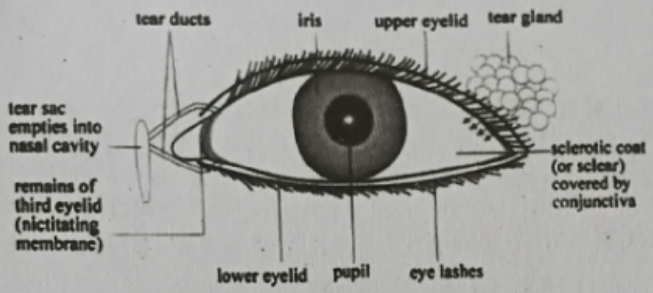
Smoking - Studies have shown that smokers are far more likely to develop atherosclerosis than non-smokers with a similar life style. Studies found that the substances in tobacco smoke: (i)can damage the artery linings, which makes the build-up of plaques more likely, (ii) can cause the arteries to narrow, raise the blood pressure and increase the risk of atherosclerosis, and (iii) smoking also changes the balance of lipoproteins in the blood.

Inactivity – Sedentary life style can lead to heart diseases. It also cause obesity, high blood pressure and diabetes. Regular exercise helps to prevent these adverse health effects. It also lowers blood cholesterol levels, balance lipoproteins and reduce stress. And thus, lower the risk of developing atherosclerosis and CVDs.

High blood pressure - A healthy blood pressure is around 120 mmHg during systole and around 80 mmHg during diastole. If the blood pressure is regularly above 140/90 mmHg. It is a sign of high blood pressure or hypertension and can also be a sign of atherosclerosis. The blood pressure goes up when the walls of the arteries become less flexible due to the build-up of the plaques. This means that raised blood pressure can be the result of atherosclerosis. Measuring blood pressure is used as an indicator of both the heart and blood vessels.

5.e. Give labeled diagram of the front view of left eye and tabulate the function of cornea, iris and retina in different parts of the eye.

Parts	Function
Cornea	- Refracts the light rays that enter the eye
Iris	- Changes the size of the pupil through the antagonistic action of the circular and radial muscles, thereby adjusting the amount of light that enters the eye.
Retina	- Acts as a screen for the formation of images - Rod cells are sensitive under low light and responsible for vision at night - Cone cells care responsible for colour vision under conditions of high light intensity



The front view of the left eye

5.f. Describe some endangered plant species in Myanmar.

(1) Scientific Name: *Dipterocarpus alatus*
Common Name: Gurjum tree
Myanmar Name: Ka nyin
IUCN Status: Endangered

(2) Scientific Name: *Swietenia macrophylla*
Common Name: Mahogany
Myanmar Name: Mahogany
IUCN Status: Endangered

(3) Scientific Name: *Cephalotaxus mannii*
Common Name: Mann's plum yew
Myanmar Name: Kyauk Htinn shuu
IUCN Status: Endangered

(4) Scientific Name: *Paphiopedilum wardii*
Common Name: Black Orchid
Myanmar Name: Thit- khwa net
IUCN Status: Critically Endangered

(5) Scientific Name: *Rhododendron arboreum*
Common Name: Rhododendron
Myanmar Name: Taung Zalat Ni
IUCN Status: Endangered

Set (2)

2025
MATRICULATION EXAMINATION
DEPARTMENT OF MYANMAR EXAMINATIONS

BIOLOGY **Time Allowed : (3) Hours**

WRITE YOUR ANSWERS IN YOUR ANSWERS BOOKLET.

DO NOT COPY THE QUESTIONS.

SECTION (A)

1. Write TRUE or FALSE to the following statements. Do not copy the statements. **(10 marks)**

i. Olericulture is the production of graphs.

ii. Spider silk is referred to by many scientists as bio-fuel.

iii. The two strands of a DNA molecule are antiparallel.

iv. Dissolved mineral ions are transported in the phloem tissue.

v. The walls of the atria are thicker than those of the ventricles.

vi. Study of plant diseases is called plant pathology.

vii. The parasites enter the white blood-cells, where they multiply.

viii. Growth in general is considered as an increase in size of the object.

ix. Habitat loo is the most significant cause of biodiversity loss globally.

x. Ex situ, methods are the ways to conserve animals and plants inside their natural habitats.

2. Complete the following statements with appropriate words. Do not copy the statements. **(10 marks)**

i. The bacterium --------- helps in the formation of curd from milk.

ii. Hydrogen bonds link each --------- base pair.

iii. Genetic engineering crops are increased heat and --------- tolerance.

iv. In hot conditions, transpiration plays an important role in --------- the leaves.

v. In large multicellular organisms, the surface area to volume ratio is ---------.

vi. Platelet inhibitory drugs such as aspirin are also a type of ---------.

vii. Special chemical substances are called plant hormones or ---------.

viii. The forebrain comprises the ---------, thalamus and hypothalamus.

ix. Genetic --------- indicates the loss of identity of the wild plant species.

x. Seed banks have been set up to help conserve --------- plant species.

3. **Choose the correct answer for the following statements. Do not copy the statements.** **(10 marks)**

i. Organisms interact continuously with (A. physiological B. mineral C. chemical D. physical) factors.

ii. Plant fibres are (A. collenchymatous B. arenchyma C. sclerenchymatous D. parenchymatous) cells.

iii. The central dogma of molecular biology stated that genetic information flows from DNA to RNA to (A. Protein B. Amino acid C. Molecule D. Nucleotide)

iv. Vitamin A deficiency can cause (A. night blindness B. heart disease C. blindness D. lung disease)

v. Within any organism, (A. substance B. oxygen C. blood D. water) need to be moved from one place to another.

vi. Plant (A. microbiology B. biology C. pathology D. histology) means a study of plant disease.

vii. Diseases that are always in populations are described as (A. endanger B. endemic C. semi-endemic D. pandemic)

viii. During development, structures and functions of organs or cells are (A. changed B. unchanged C. increased D. decreased)

ix. (A. Interneurones B. Motor C. Sensory D. Bipolar) neurones transmit impulses from the sensory receptors to the central nervous system.

x. Botanical gardens play an important role as valuable sources of plant (A. physiology B. taxonomy C. anatomy D. ecology)

SECTION (B)

4. **Answer All questions.** **(30 marks)**

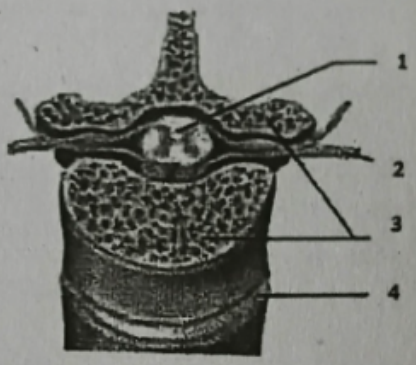
a. Write short note on textile fibre obtained from animal.

b. Classify the three defined stages of the transcription process.

c. Give a flow diagram of blood clotting process.

d. Explain the groups of plant pathogenic bacteria. (Tabulation is not necessary).

e. Provide labels and caption to given diagram and state the spinal cord.



f. Why does GE organism a dangerous global experiment with nature and evolution?

5. Answer any FOUR questions. **(40 marks)**

a. Explain the method of growing plants without soil.

b. Discuss the production of transgenic animals.

c. Describe the active and passive absorption pathways of water movement in plants. (Illustration is not necessary).

d. Clarify the prophylactic drugs used to treat malaria.

e. Mention the physiological effects of auxin, cytokinin and ethylene.

f. Write note on wildlife smuggling directly affects the biodiversity of different ecosystems.

Set (2) Answers

SECTION (A)

1.

i. False	ii. True	iii. True	iv. False	v. False
vi. True	vii. False	viii. True	ix. True	x. False

2.

i. *Lactobacillus*	ii. complementary	iii. drought	iv. cooling	v. low
vi. anticoagulant	vii. phytohomone	viii. cerebrum	ix. population	x. rare

3.

i. D	ii. C	iii. A	iv. C	v. A
vi. C	vii. B	viii. A	ix. C	x. D

SECTION (B)

4. Answer All questions. **(30 marks)**

4.a. Write short note on textile fibre obtained from animal.

Wool is one of the most widely used animal fibres and mainly harvested by shearing. Wool is the textile fibre obtained from sheep and other mammals, especially goats, rabbits, and camelids. As an animal fibre, wool consists of protein together with a small percentage of lipids. This makes it chemically quite distinct from cotton and other plant fibres, which are mainly cellulose. The quality of wool is determined by its fibre diameter, crimp, yield, color, and staple strength. Fibre diameter is the most important wool characteristic determining quality and price.

In addition to clothing, wool has been used for blankets, horse rugs, saddle cloths, carpeting, insulation and upholstery. Wool as well as cotton bas also been traditionally used for cloth diapers. Wool is an essential fibre for winter clothing, suiting, floor coverings and certain industrial applications.

Today, wool is a global industry found in Australia, Argentina, the United States, and New Zealand serving as the major suppliers of raw wool.

4.b. Classify the three defined stages of the transcription process.

Initiation: For each gene, only one strand of the double-stranded DNA molecule is transcribed. This strand is called the antisense strand or template strand. The other strand, which is not transcribed, is called the sense strand or coding strand. It has the same sequence as the product mRNA, with thymine instead of uracil.

Elongation: During the elongation phase shown, the RNA polymerase complex works its way along the DNA molecule, synthesizing a strand of mRNA that is complementary to the template strand of DNA in 5′ to 3′ direction.

Termination: When the RNA polymerase complexes reach the termination signal, they detach from the DNA strand. The new mRNA strand is released from the transcription assembly.

4.c. Give a flow diagram of blood clotting process.

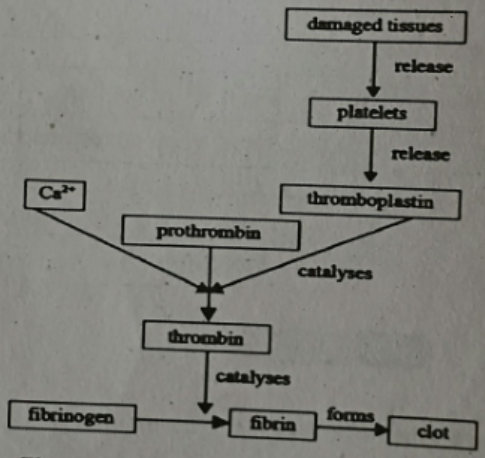


Figure 3.15 Flow diagram of clotting process

4.d. Explain the groups of plant pathogenic bacteria. (Tabulation is not necessary).

Groups of plant pathogens – bacteria

Not all bacteria are bad for plants and soil. In fact, most are beneficial. However, there are approximately 200 types of bacteria that cause diseases in plants. They are most active in warm and humid environments. Bacteria that cause plant diseases are spread in many ways. They can be splashed about by rain or carried by the wind, birds or insects. Most plant pathogenic bacteria belong to the following genera: *Agrobacterium*, *Erwinia*, *Pseudomonas*, *Streptomyces* and *Xanthomonas*.