ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்

අ.පො.ස. (උ.පෙළ) විභාගය / க.பொ.த. (உயர் தர)ப் பரீட்சை - 2023 (2024)

විෂය අංකය
பாட இலக்கம் **09**

විෂයය
பாடம் **Biology**

ලකුණු දීමේ පටිපාටිය / புள்ளி வழங்கும் திட்டம்

I පත්‍රය / பத்திரம் I

ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.
01.	1	11.	1	21.	5	31.	4	41.	2
02.	4	12.	3	22.	4	32.	4	42.	1/5
03.	3	13.	1	23.	5	33.	5	43.	3
04.	2	14.	2	24.	3	34.	2	44.	1
05.	2	15.	1	25.	5	35.	5	45.	2
06.	5	16.	3	26.	3	36.	1	46.	2
07.	4	17.	4	27.	3	37.	3	47.	4
08.	5	18.	3	28.	1	38.	1	48.	4
09.	2	19.	5	29.	4	39.	5	49.	4
10.	3	20.	2	30.	Any	40.	5	50.	5

✪ විශේෂ උපදෙස් / விசேட அறிவுறுத்தல் :

එක් පිළිතුරකට / ஒரு சரியான விடைக்கு ලකුණු 01 බැගින් / புள்ளி வீதம்

මුළු ලකුණු / மொத்தப் புள்ளிகள் 1 × 50 = 50

Part A

Structured Essay

Answer all questions on this paper itself

(Each question carries 100 Marks)

1. (A) (i) What is the structural difference between a nucleotide and a nucleoside?

Nucleoside does not have a phosphate group whereas a nucleotide has. **01 pt**

(ii) Name two ions present in the plant cell sap.

Potassium ion / K^+ , Chloride ion / Cl^- **02 pts**

(iii) At which phase of mitosis would the nuclear envelop be fragmented?

Prometaphase **01 pt**

(iv) State the specific site of occurrence of each of the following in a mitochondrion.

(a) Oxidative phosphorylation : Cristae / inner membrane

(b) Conversion of pyruvate to acetyl group : Matrix **02 pts**

(v) What is known as the respiratory quotient of a substrate?

Ratio of volumes of CO_2 evolved and O_2 consumed in a given time (for the substrate) **01 pt**

(B) (i) State the major events that took place in the evolution of organisms during the following time periods.

(a) About 700 million years ago : Origin/ formation / evolving of sponges / Porifera **01 pt**

(b) About 365 million years ago : Origin / formation / evolving tetrapods (of earliest) **01 pt**

(c) 6–7 million years ago : Divergence of human lineage from other primates. **01 pt**

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(ii) State two main differences between artificial classification and natural classification.

- In artificial classification a few characteristics are used/ based on a few characteristics and in natural classification many characteristics are used / based on many characteristics. 01 pt
- In artificial classification evolutionary / true relationships are ignored and in natural classification these are used / based on true/ evolutionary relationships. 01 pt

should write both conditions to get marks

(iii) State **two** nutritional modes seen in bacteria.

- Heterotrophs / Chemoheterotrophs / Photoheterotrophs
- Autotrophs / Photoautotrophs / Chemoautotrophs

02 pts

(iv) State the common structural features that can be seen in both *Euglena* and *Paramecium*, and the structural features that can be seen only in each of them.

(a) In both : Pellicle, contractile vacuole 02 pts

(b) In *Euglena* only : Flagella, chloroplast, eye spot, pocket, one nucleus (Any 04) 04 pts

(c) In *Paramecium* only : Cilia, oral groove, food vacuole, two types of nuclei / mega and micro nuclei 04 pts

(v) (a) Name a phylum with animals having a mantle. : Mollusca

(b) Name the first animal group that showed cephalization. : Annelida

02 pts

(C) (i) What are the common features shown by Cycadophyta and Pterophyta?

- Dominant sporophyte/ reduced gametophyte
- Compound leaves
- Fiddleheaded young leaves
- Vascular tissue / system / phloem and xylem both (Any 3) 03 pts

(ii) State the specific location and functions of companion cells.

Specific location : Alongside seive tube elements 01 pt

Functions :
- In leaves source / help phloem loading and
- Phloem unloading in other organs/ tissues. / sink
- Controling the function of / serves adjoing seive tube element

any 02 pts

(iii) What is known as heart wood?

- Older layers of secondary xylem that
- do not transport water and minerals,
- located close to centre of stem and root. 04 pts

(iv) What is the role of abscisic acid in plants during drought conditions?

- Removes K^+ from guard cells.
- Closing stomata (thereby)
- reducing transpiration and
- preventing wilting. not need in order

04 pts

40 pts X 2.5 = 100 marks

2. (A) (i) Indicate the relationship between the water potential (Ψ) and solute potential (Ψ_s of a fully flaccid cell.

$\Psi = \Psi_s$ water potential = Solute potential 01 pt

(ii) State the main characteristics of bulk flow that takes place within plants.

- Liquid and materials/ solutes/ entire solution moved/ transported
- in response to pressure gradient / from higher pressure to lower pressure region.
- Long distance transport.
- Does not occur through membranes.
- Occurs at greater speed than diffusion.
- Independent of solute concentration gradient.
- Passive transport mechanism . / method / Does not use ATP / energy (Any 6) 06 pts

(iii) Name two substances other than sucrose that can be found in phloem sap but not in xylem sap.

- Amino acids
- Hormones / plant growth substances / regulators. 02 pts

(iv) Name two essential elements each needed by plants for the following:

(a) Activation of enzymes : Mg/ Mn/ Cu / Zn (Any two)

(b) Nitrogen metabolism : Mo, Ni 04 pts

(v) Name the structure that develops from each of the following in flowering plants after fertilization.

(a) Ovary : Fruit

(b) Ovule : Seed

(c) Zygote : Embryo

(d) Triploid nucleus : Endosperm 04 pts

(B) (i) State what is meant by parthenogenesis and parthenocarpy in plants and give one example of plants that show each of them.

(a) Parthenogenesis : Seeds develop without fertilization.

Example: (Some) grasses 02 pts

(b) Parthenocarpy : Fruits develop without fertilization.

Example: Banana / Grapes / Orange 02 pts

only example no marks.

(ii) How do halophytes respond to salt stress?

Secreting excess salts out of plant across leaf surface, by salt glands. 02 pts

(iii) (a) Name the two classes of photoreceptors in plants.

- Blue light receptors / Cryptochromes
- Phytochromes / Red light receptors

02 pts

(b) Which of the above classes provides information on quality of light?

Phytochromes / Red light receptors 01 pt

(C) (i) State three main functions of glial cells of man.

- Nourishment of neurons/ nerve cells
- Modulating neuron/ nerve cell functions
- Insulating neurons/nerve cells
- Replenishing neurons / nerve cells (Any 03) 03 pts

(ii) (a) What are the structural features of the human small intestine that contribute to effective absorption?

- (Permanent) folds / foldings
- Villi
- Microvilli

03 pts

(b) State two reasons for excessive secretion of HCl in the human stomach other than prolonged starvation.

- Mental stress
- Use of some drugs / aspirin.

02 pts

(iii) Why do animals need a circulatory system?

When the body size is increased / complex, to transport molecules/ materials within the body and to exchange molecules/ materials with the environment.

02 pts

(iv) (a) State two characteristics that effective respiratory surfaces of animals should have other than a large surface area.

Must be permeable, wet, thin, possess a good blood supply (Any two) 02 pts

(b) What is known as a respiratory pigment?

Organic compounds/ materials that can combine with oxygen when its partial pressure is high and release oxygen when its partial pressure is low 01 pt

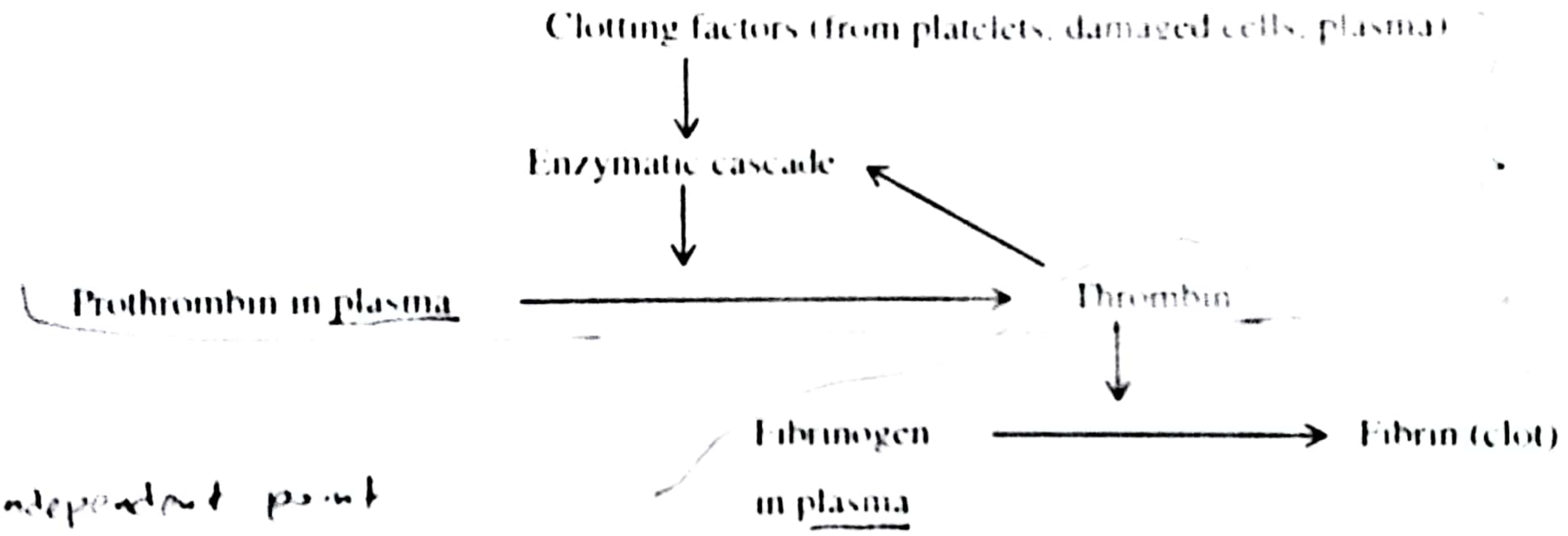
(v) Indicate the correct pathway of conduction of electrical impulses in the human heart.

Sino atrial node / SA node → Atrio ventricular node / AV node → Bundle of His / Atrioventricular bundle → Bundle branches → Purkinje fibres 01 pt

should be in order anything missing no marks

40 pts X 2.5 = 100 marks

3. (A) (i) (a) Show the sequence of blood clotting process in man using a flow chart.



independent point

(Thrombin formation - 01 pt

Fibrin formation - 01 pt) 02 pts

(b) Other than the specificity for foreign molecules, state two main characteristics that distinguish acquired immunity from innate immunity. memory T cells B cells not accepted

- Recognition of animal's own molecules / self molecules from non-self molecules.
- Immunological memory/ memory for previously encountered pathogens that give stronger and more rapid response for subsequent encounters. 02 pt

(ii) (a) State the location of the human kidneys.

- On the posterior abdominal wall on either side of vertebral column,
- behind the peritoneum.
- below the diaphragm. / inferior to the diaphragm 03 pt

(b) What are kidney stones?

Precipitated urinary constituents / oxalates and phophates (normally present in urine) 01 pt

(c) Name the enzyme secreted by the human kidney.

Renin Rennin X 01 pt

(iii) (a) Name a phylum that includes animals with a nerve net.

Cnidaria 01 pt

(b) Name the meninges starting from the innermost layer.

Pia mater, Arachnoid mater, Dura mater should be order and should write three layers 03 pts

(iv) (a) State two functions of the cerebellum of man.

- Maintains posture and balance
- Helps in learning/ remembering motor skills
- Coordinates voluntary/skeletal muscular movements (Any 2) 02 pts

(b) What is a synapse?

A junction/place where a neuron, communicates with another cell/ neuron/ muscle cell/ secretory cell, across a narrow gap. 01 pt

(v) (a) What is meant by sensory adaptation?

Decrease in responsiveness of the sensory receptors due to continuous stimulation. 01 pt

(b) State the structures located in the human ear which contribute to maintaining posture and balance.

- Semicircular canals
- Vestibule / utricle and saccule 02 pts

(B) (i) (a) Why do only target cells respond to a specific hormone although all hormones can reach all body cells through blood?

Because target cells have matching receptors to the hormone. 01 pt

(b) State the functions of thymosin.

- Regulates development of T lymphocytes
- Regulates maturation of T lymphocytes 02 pts

(ii) State the disadvantage of asexual reproduction to a particular species of animals.

Any harmful mutation in parents can affect the survival of offspring in changing environments. 01 pt

(iii) (a) What is the specific site of sperm production in man?

Seminiferous tubules (of testes.) **01 pt**

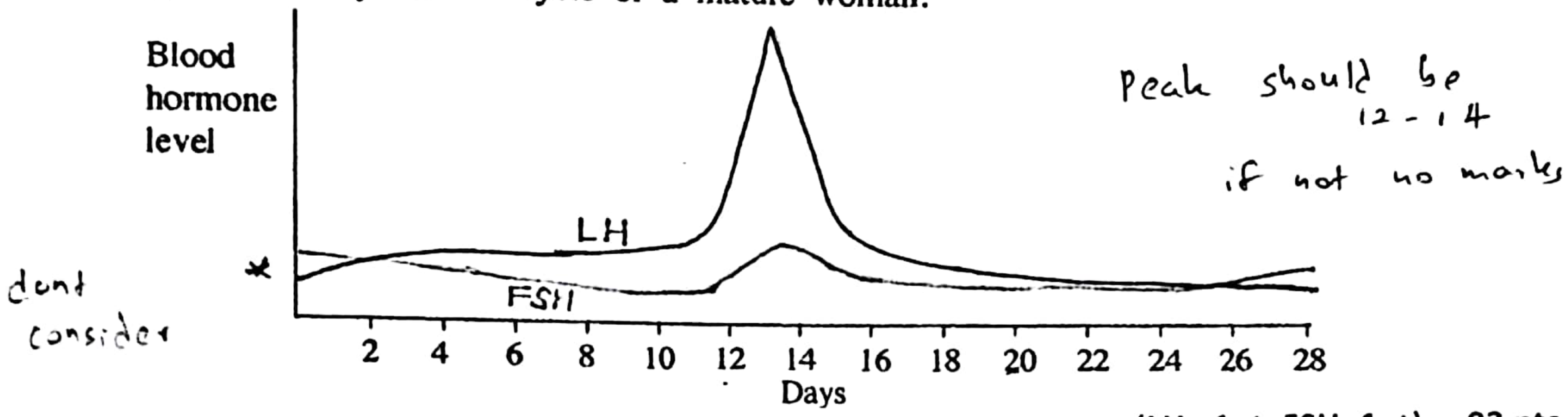
(b) What is the normal life expectancy range of a human sperm after ejaculation?

48 – 72 hours. **01 pt**

(iv) (a) How are the polar bodies formed during the process of cell division in oogenesis?

Due to unequal cytokinesis. **01 pt**

(b) Indicate below how the levels of LH and FSH in the blood change during the typical 28 day ovarian cycle of a mature woman.



(LH - 1pt, FSH- 1pt) 02 pts

(v) (a) State the site where cleavage of zygote occurs during human development.

Oviducts /Fallopian tube / Uterine tube **01 pt**

(b) State **two** surgical sterilization methods of birth control.

- Vasectomy (for males)
- Tubal ligation (for females) / LRT

02 pt

(C) (i) (a) Name a phylum that contains animals with exoskeletons formed mainly by calcium carbonate.

Mollusca **01 pt**

(b) What structures in the human cranium facilitate parturition?

Fontanelles **01 pt**

(ii) (a) State the main function of the vertebral foramens in man.

Provide passage for the spinal cord. **01 pt**

(b) What is the structural arrangement which allows pronation and supination of the upper limb of man?

Presence of the (wrist) joint between the distal end of radius and three proximal carpel bones. **01 pt**

(iii) Name the human disorder associated with reduction of bone density.

Osteoporosis **01 pt**

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(iv) What is the number of ATP utilized by a myosin head in one cross bridge cycle of skeletal muscle contraction?

One. 01 pt

(v) (a) State Mendel's second law of inheritance.

Alleles ~~separate and~~ pair up independently during the formation of gametes. 01 pt

(b) If A and B are dominant alleles for two particular traits, and if their respective recessive alleles are a and b, name the cross given below and state its purpose.

AaBb × aabb

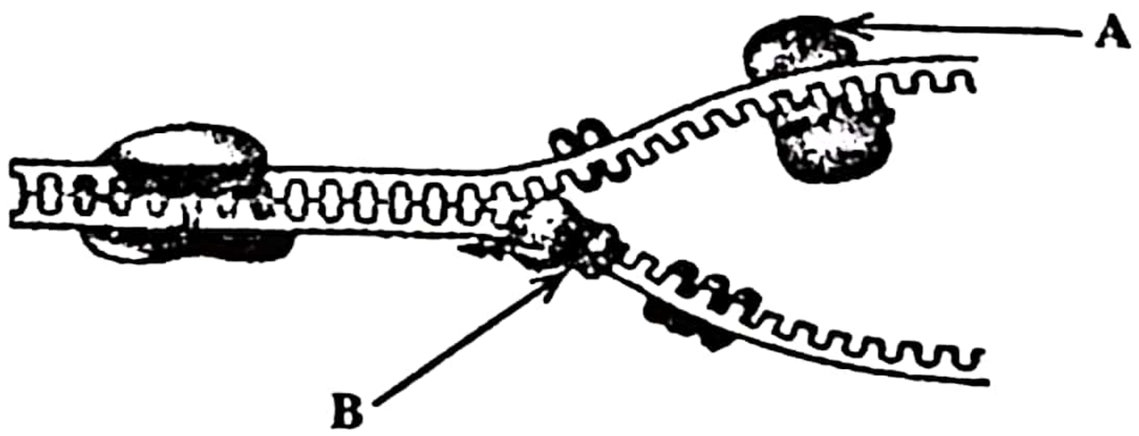
Cross : Dihybrid test cross

Purpose : To determine the unknown genotype of an individual for two (dominant) traits.

02 pts

40 pts X 2.5 = 100 marks

4. (A) (i) Given below is a diagram illustrating the origin of replication of DNA.



Name the enzymes **A** and **B** and state the main function of each of them.

Enzyme	Main function
A: RNA Polymerase/ Primase	Initiates synthesis of RNA (Primer) on DNA template.
B: Helicase	Unwinds the double helix

(If function is written without the enzyme - no marks) (2 x 2 pts) 04 pts

(ii) What is recombinant DNA technology?

DNA from two / more different species/ sources are joined together and inserted into a host.

01 pt

(iii) What is the technique used to separate DNA fragments according to their size in recombinant DNA technology?

Agarose gel electrophoresis 01 pt

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(iv) Which types of interactions that occur in an ecosystem are depicted by the following examples?

(a) Conversion of Fe^{2+} into Fe^{3+} in soil : Abiotic -Abiotic **01 pt**

(b) Absorption of mineral ions into root hairs from soil : Biotic -Abiotic **01 pt**

(B) (i) How do inland freshwater marshlands in Sri Lanka receive water?

Through surface runoff, Ground water seepage, Flood water from rivers/ from rivers **03 pts**

(ii) (a) State **three** abiotic characteristics of mangrove ecosystems. **03 pts**

- Saline / brakish water
- loose soil
- anoxic condition
- Intense sunlight

(b) Name **two** true mangrove plants that are common in Sri Lanka. **02 pts**

- Kadol/Kandal
- Mas athu gas/ Mas athu trees/ Kannaamaram

scientific names are accepted with rules.

(iii) State **four** types of values of biodiversity.

- Environmental service value
- Recreational value
- Ethical value
- Educational/Scientific value
- Social/ Cultural/ Religious value

(Any 04) **04 pts**

(iv) State **two** impacts of acid rain on soil.

Destroy (soil) organisms, loss of (soil) fertility, leaching heavy metals. (Any 02) **02 pts**

(v) What are the objectives of Ramsar convention?

Conservation and wise use of wetlands and their resources. **02 pts**

(C) (i) State the stages of the lytic cycle of a bacteriophage.

- Attachment
- Penetration
- Biosynthesis
- Maturation and assembly
- Release

not need write in order

05 pts

(ii) Name one virus each that causes diseases in the following:

(a) Nervous system : Rabies virus / Polio virus

(b) Digestive system : Hepatitis A virus

02 pts

(iii) (a) Name **two** gases produced due to acetogenic bacterial activity on organic waste.

CO_2 and H_2 **02 pts**

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(b) Name a bacterial genus that carries out the following conversion in soil.

$NO_3^- \rightarrow NO_2^- \rightarrow N_2O \rightarrow N_2$

Pseudomonas sp. ignore and give marks. 01 pt

(iv) State how Bt toxin affects mosquito larvae.

When ingested, it dissolves and lyses tissues of the gut of larvae. 02 pts

(v) (a) Why is the use of ozone preferred over chlorination for disinfection of drinking water?

- It leaves no taste / odor.
- Has little residual effect.
- Highly reactive. (Any 02) 02 pts

(b) Name one enzyme each that causes rancidity and putrefaction during food spoilage by microorganisms.

Rancidity : Lipase

Putrefaction : Protease

02 pts

40 pts X 2.5 = 100 marks

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Q5. (a) Describe the linear electron flow that takes place in the chloroplast during the light reaction of photosynthesis.

(b) Briefly discuss the reasons for high efficiency of photosynthesis in C_4 plants.

(a)

1. Electrons flow through Photosystem I/(PS I) and Photosystem II/PS II)
2. A and other molecular components(embedded)in thylakoid membrane(of chloroplasts)
4. 3. Each photosystem has a reaction center complex and light harvesting complexes.
6. The reaction center complex contains a primary electron acceptor.
- In PS I, chlorophyll molecule / P700
- ~~which~~ absorbs light of 700 nm wavelength.
- In PS II, chlorophyll molecule / P680
- ~~which~~ absorbs light of 680 nm wavelength.

~~In linear electron flow~~

- striking of photons (of light) on the photosynthetic pigments results in the excitation of electrons from PS II to a higher energy state.
10. These electrons are accepted by the primary electron acceptor in PS II.
11. Splitting of water occurs due to
12. an enzyme catalyzed reaction
13. 14. 15 which yields O_2, H^+ and electrons.
17. These electrons (released as a result of hydrolysis) neutralize excited PS II/P680$^+$/ P680.
17. Striking of photons (of light) on pigments results in excitation of electrons from PS I to a higher energy state.
- These electrons will be accepted by the primary electron acceptor in PS I.
- Excited electrons at PS II (at primary electron acceptor of PS II) pass through an electron transport chain
20. 21. to PS I and neutralize the excited PS I/ P700/ P700$^+$ while
22. energy released due to the passage of electrons from higher energy state to lower energy state
23. results in synthesis of ATP/ Photophosphorylation.
24. Excited electrons at PS I (at primary electron accepter of PS I) pass through an electron transport chain and
25. reduce $NADP^+$
26. to form NADPH
27. which is catalyzed by $NADP^+$ reductase.

(In C_4 plants), mesophyll cells and bundle sheath cells are tightly interconnected.
CO_2 fixation occurs twice,
initially in mesophyll cells,
secondly, in bundle sheath cells.
In mesophyll cells CO_2 is fixed by PEP Carboxylase

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6. using Phophoenolpyruvate/ PEP as the CO_2 accepter.
7. In bundle sheath cells, CO_2 is concentrated/ released by decarboxylating enzymes
8. and refixed by Rubisco.
9. Due to high concentration of CO_2 at the site of Rubisco/ bundle sheath cells
10. and by spatial separation of Rubisco,
11. photorespiration/ oxygenase reaction (which is a wasteful process) is repressed.

27 38
29 + 11= 40 points

Any 37 points X 4 =148 marks

If more than 37 points written add 2 marks

Maximum 150 marks

06. (a) Briefly describe how the two groups of flowering plants could be distinguished from each other.

(b) Explain the radial transport process that takes place in plants through apoplastic route.

(a)

1. Two groups of flowering plants are monocots and dicots.
2. Monocot embryos have only one cotyledon while dicot embryos have two cotyledons.
3. Monocots have a fibrous root system and dicots have a tap root system.
4. Monocot leaves have parallel veins while dicot leaves have reticulate veins.
5. Monocot flowers are trimerous while dicot flowers are pentamerous or tetramerous.
6. Monocot perianth is not differentiated into calyx and corolla, while dicot perianth is usually differentiated into calyx and corolla.
7. Monocot pollen grains have one opening/aperture, while dicot pollen grains have three openings/apertures.
8. Vascular bundles in the monocot stem do not have cambia, while vascular bundles in the dicot stem have cambia in a ring.
9. Vascular bundles in monocot stems are scattered while vascular bundles in dicot stems are arranged as a ring.

Two para no marks
for charts - 10%

(b)

1. The apoplastic route consists of everything external to the plasma membrane and
2. includes cell walls,
3. extracellular spaces and / matrix
4. the interior of dead cells such as,

5, 6. vessel elements and tracheids.

7, 8. water and solutes move along continuum of the cell walls and

9. extracellular spaces.

10. Uptake of soil solution by the hydrophilic walls of root hairs provide access to the apoplast.

11,12. water and minerals can then diffuse into cortex

13,14. along the matrix of walls and extra cellular spaces.

15. Endodermis blocks apoplastic route

16,17. by a barrier located in the transverse and radial walls of endodermal cells

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18. called the casparian strip.
19. It is (a belt) madeup of suberin.
20, 21.which is impervious to water and mineral salts.
22, 23.Thus water and minerals cannot cross the endodermis and
24, 25.enter the vascular cylinder via apoplast
26. and therefore cross selectively permeable plasma membrane
27. before entering the vascular tissue and
28, 29.keep unneeded and toxic materials out.

9 + 29= 38 points

Any 37 points X 4 =148 marks

If more than 37 points written add 2 marks

Maximum 150 marks

07. (a) Briefly describe the structure of the wall of the heart.

(b) Explain the coronary circulation and the consequences of the blockage of coronary arteries in man.

(a)

1, 2, 3. Heart wall is composed of
pericardium, myocardium and endocardium.
4. Pericardium is the outermost layer which is
5, 6. made up of (two sacs) (outer) fibrous pericardium , and (inner) serous pericardium.
7. Myocardium is the middle layer which is
8. composed of cardiac muscle.
9. Network of (specialized) conducting fibers run through the myocardium.
10. Endocardium is the inner layer which is
11. a smooth membrane
12. consisting of flattened epithelial cells.

(b)

Coronary circulation

1, 2. Right and left coronary arteries
3, 4. branch/originate from aorta immediately distal to aortic valve and
5. supply oxygen rich blood/arterial blood to the heart.
6. Coronary arteries travel/located in the heart wall
7. forming a network of capillaries.
8. (Most of) oxygen deficient blood/ venous blood (from the heart) is collected into cardiac veins which
9. 10. (joins to) form coronary sinus that opens to the right atrium.
11. Remaining oxygen deficient blood/ venous blood passes directly into heart chambers
12 through (small) venous channels.

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Consequences of the blockage of coronary arteries

13. (One or more branches of) coronary arteries can be blocked due to atherosclerosis which is
14, 15. the thickening and hardening of inner lining of arteries
16, 17. due to fatty deposits especially cholesterol particles.
18. Blood clots/thrombus within these arteries can complicate the blockage.
19, 20. Depending on the place of the block and degree of blockage (in coronary arteries)
21, 22. (related) parts of the heart muscle will be deprived of oxygen, and nutrients.
23. Narrowing of coronary arteries (due to partial blockage) causes chest pain/angina.
24. Complete blockage of (one or more branches of) coronary arteries lead to heart attacks/myocardial infarction.
25. In heart attacks, damage/ death of cardiac muscle tissue occurs
26. due to lack of adequate oxygen (and nutrients). / adequate O_2 is not provided
27. Hence heartbeat rhythm may be abnormal and
28. heart may cease to be an effective pump.
29. Therefore, other vital organs/brain may be deprived of adequate supply of oxygen rich blood.
30. If not treated on time heart attacks can be fatal.

12 + 30= 42 points

Any 37 points X 4 =148 marks

If more than 37 points written add 2 marks

Maximum 150 marks

08. (a) Explain how blood glucose level is regulated in man.

(b) Briefly discuss the reason for type I diabetes and its controlling measures.

(a)

1. Normal blood glucose level is 70-110 mg/100 mL while fasting.
2, 3, Opposing action of insulin and glucagon
4. secreted by islets of Langerhans (of pancreas)
5. homeostatically control blood glucose level.
6. Above normal blood glucose level stimulate secretion of insulin
7. by beta cells (of islets of Langerhans).
8. Insulin promotes lowering of blood glucose level by
9,10,11. stimulating transport of glucose into body cells, and use of glucose (by body cells), to produce ATP,
12,13,14,15. stimulating conversion of glucose into glycogen in the liver and skeletal muscles for storage,
16, 17. stimulating conversion of glucose into fatty acids and storage of fat (in adipose tissues).
18. When blood glucose level decreases to reach the normal range/level (due to action of insulin),
19, 20. blood glucose level directly controls insulin secretion by negative feedback system/ mechanism
21. Blood glucose level below normal range, stimulate secretion of glucagon
22. by alpha cells (of islets of Langerhans).
23. Glucagon promotes increasing blood glucose level by

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24. 25. 26. 27. stimulating glycogen breakdown in the liver and skeletal muscles and release of glucose into blood.

28. When blood glucose level increases to reach the normal range/ level (due to action of glucagon),

29,30. blood glucose level directly controls glucagon secretion by negative feedback system/ mechanism.

(b)

1. Autoimmune disorder in children / young adults
2. caused due to destruction of beta cells of islets of Langerhans/ pancreas
3. by immune system
4. resulting in severe deficiency / absence of insulin secretion which
5. increases blood glucose level above limits
6. leading to excretion of glucose with urine.
7,8. Controlled by taking meals with less carbohydrate and less fat,
9. regular monitoring of blood glucose level and
10. periodic insulin injections.

30 + 10 = 40 points

Any 37 points X 4 =148 marks

If more than 37 points written add 2 marks

Maximum 150 marks

09 (a) Explain the process of packing of chromatin inside the nuclei of eukaryotic cells.

(b) Describe the role of microbes in vinegar production and dairy industry.

(a)

1, 2. DNA may be lightly packed as euchromatin or
3, 4. tightly packed as heterochromatin.
5. DNA packaging occurs in 4 levels.

Level 1

6. Double helix DNA molecule winds around a complex of 8 histone molecules and
7. forms nucleosomes (with the appearance of beads of a necklace)
8. Adjoining beads of nucleosomes are linked together
9. by a stretch of DNA/linker DNA.

Level 2

10 Nucleosomes twist and
11. pack in a spiral fashion
12, 13. forming a chromatin fiber of 30 nm diameter.

Level 3

14.Loop domains are formed and
15. they attach to a protein scaffold and
16. thickness of fiber increases to 300 nm.

Level 4

17, 18, 19. Loop domains coil, fold, and further compact
20, 21. and form chromatid of thickness of 700 nm

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(b)

1, 2. Vinegar is produced by alcoholic fermentation and acetic acid fermentation.
3. Sugars in malt grain/ sap of palms/ sugar cane / fruit juices fermented by (any 02 be written)
4. *Saccharomyces cerevisiae*
5. producing ethanol.
6. Ethanol (derived from alcoholic fermentation) undergoes incomplete oxidation
7. and is converted to acetic acid
8. under highly aerobic conditions by
9,10. *Acetobacter sp.* and *Gluconobacter sp.*

In dairy industry

11. products are made by fermentation of milk.
12. Lactose sugar (in milk) is fermented into lactic acid
13. by lactic acid producing bacteria.
14. As these bacteria are killed during pasteurization, they should be to be added externally (when making dairy products)

Examples

15. Curd/yoghurt produced by a mixed populations of bacteria
16. namely: *Lactobacillus bulgaricus, Lactococcus lactis* and *Streptococcus thermophilus/ S.thermophilus*
17. *Lactobacillus bulgaricus* adds flavor
18,19. *Streptococcus* sp. add creamy texture and flavour
20. Cheese is produced by *Streptococcus* sp.
21. and *Penicillium.*

21 + 21 = 42 points
Any 37 points X 4 =148 marks
If more than 37 points written add 2 marks
Maximum 150 marks

10. Write short notes on the following

(a) Polygenic inheritance
(b) Desertification
(c) Control of Filariasis

(a) Polygenic inheritance

1. Inheritance of phenotypes with quantitative characters
2. which results due to cumulative expression of two or more genes/more than one gene.
3, 4, 5. Examples: Height, Intelligence, Skin colour
6. If each of the genes A, B and C have a dark skin allele (contributing to one unit of darkness) are incompletely dominant to genes a, b, and c then,
7. if all alleles are dominant/AABBCC- skin colour is very dark,
8. if all alleles are recessive/aabbcc – skin colour is very light,
9. if alleles are heterozygous/AaBbCc – skin colour is intermediate.
10. The phenotypic and genotypic combinations in the progeny may vary

11. based on number of genes involved in determining a polygenic character.
12. Data for a polygenic character may result in a normal distribution in the population/phenotypes showing polygenic inheritance show a normal distribution in the population,
13. majority of offspring (in the population) are intermediate phenotypes/ majority of offspring have skin colour/ height/ intelligence in the middle range.

(b) Desertification

1. Process of land degradation in arid/ semiarid/ dry sub-humid areas.
2. Occurs due to climate change and
3. human activities such as
4. deforestation,
5, 6. overexploitation of water and soil,
7. uncontrolled mining,
8 excessive use of agrochemicals and
9. poor land management.

Desertification results in

10. decrease in ecosystem services/water scarcity,
11 reduction in biodiversity/loss of habitats ~~and~~ / distruction of habitats
12 reduces / affects food security,
13. affects human well being/health and
14. reduces carbon storage capacity of plants/soil.

(c) Control of Filariasis

1. Personal protection from *Culex* /mosquitoes /preventing *Culex*/ mosquito bites
2. using mosquito nets/repellents/wearing long sleeve shirts and trousers ;
3. Elimination of breeding sites
4. by repairing broken tanks/cleaning drainages/preventing dumping of garbage into drains;
5. Chemical control of aquatic plants in water reservoirs;
6. Preventing creation of breeding sites;
7. Use of larvivorous fish
8. such as guppy/ nalahandaya in waterbodies.
9. ~~10.~~ screening healthy population, by night blood films
10. to detect people who harbour the infection but do not show any symptoms
11. and treating them;
12. Monitoring vector mosquito population for infectivity.

13 +14 +~~13~~ 12 =~~40~~ 39 points

Any 37 points X 4 =148 marks

If more than 37 points written add 2 marks

Maximum 150 marks