Sri Lankan Biology Olympiad-2018

Answer sheet Part A

No	Answer
1	2
2	3
3	4
4	3
5	5
6	4
7	1
8	2
9	2
10	3
11	1
12	2
13	2
14	1
15	2
16	3
17	5
18	3
19	1
20	1

No	Answer
21	4
22	5
23	4
24	2
25	2
26	2
27	4
28	2
29	1
30	3
31	1
32	2
33	3
34	1
35	1
36	3
37	5
38	4
39	2
40	5

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Part B – Short Answer Questions

Answer in the spaces provided. Use only the symbols √ or X.

1. Three polysaccharide molecules are depicted in the figures given below. A circle indicates one monosaccharide.

A B C

Indicate whether each of the following statements regarding the above figures is correct (√) or incorrect (X).

(1)	A and B molecules have 1-4 and 1-6 glycosidic bonds respectively.	X
(2)	C molecule has 1-4 glycosidic bonds only.	√
(3)	B and C molecules are linear molecules.	√
(4)	A and B molecules can be storage molecules.	√
(5)	Monomers of these three polysaccharides can be glucose.	√

2. Indicate whether each of the following statements regarding enzymes is correct (√) or incorrect (X).

(1)	Some plasma membrane proteins act as enzymes.	√
(2)	Some enzymes react on different substrates.	XX X
(3)	Some metal ions inactivate enzymes.	√
(4)	Enzymes generally have different optimum pH values and the same optimum temperature.	√
(5)	Competitive inhibitors alter the shape of the active sites of enzyme.	X

3. This question is based on the following equation.

$$\text{Pyruvate} \longrightarrow \text{Acetyl CoA} + CO_2 + \text{NADH}$$

Indicate whether each of the following statements regarding the above equation is correct (√) or incorrect (X).

(1)	This is a carboxylation reaction.	X
(2)	This is an exergonic reaction.	√
(3)	This reaction occurs in cytoplasm of living cells.	X
(4)	In this reaction, pyruvate is reduced to Acetyl Co A.	X

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(5)	This occurs in both photosynthesis and respiration.	X

4. Indicate whether each of the following statements is correct (√) or incorrect (X).

(1)	Phaeophytes and anthophytes have cell walls made up of cellulose.	√
(2)	In Rhodophyta and Ascomycota, cell walls are made up of chitin.	X
(3)	In Cestoda and Zygomycota, stored food is glycogen.	√
(4)	Anthophytes and chytridiomycotes are photoautotrophic.	X
(5)	*Halobacterium* and *Rhizopus* are not sensitive to antibiotics.	√

5 Indicate whether each of the following statements regarding arthropods is correct (√) or incorrect (X).

(1)	Crustaceans can be distinguished from other arthropods by the number of antennae.	√
(2)	Presence of cephalothorax can be used to distinguish arachnids from other arthropods.	X
(3)	Number of legs per somite can be used to distinguish chilopods from other arthropods.	X
(4)	Absence of appendages in the abdomen can be used to distinguish insects from other arthropods.	X
(5)	Diplopods can be distinguished from other arthropods due to the absence of thorax.	X

6. Indicate whether each of the following statements regarding the autonomous nervous system of man is correct (√) or incorrect (X).

(1)	Preganglionic fibers of the sympathetic system run along cranial and spinal nerves.	X
(2)	Postganglionic fibers of the sympathetic system are longer than those of the parasympathetic system.	√
(3)	Sympathetic ganglia are located in effector organs.	X
(4)	Neurotransmitter produced by sympathetic nerves is acetyl choline.	X
(5)	Uterus is innervated only by parasympathetic nerves.	X

7. Indicate whether each of the following statements regarding excretion in animals is correct (√) or incorrect (X).

(1)	Large amount of water is required to excrete urea due to its high solubility.	X
(2)	Creatine is excreted by kidneys.	X
(3)	Bile pigments are excreted by kidneys.	√
(4)	Uric acid is the major nitrogenous excretory product of terrestrial amphibians.	X
(5)	Ammonia is the major nitrogenous excretory product of all fishes.	X

8. Indicate whether each of the following statements regarding human tissues is correct (√) or incorrect (X).

(1)	Lining of the alimentary canal is composed of stratified, pseudo stratified and simple columnar epithelia.	X
(2)	Ciliated simple columnar epithelia with goblet cells are found in the small intestine.	X
(3)	Cells that do not grow to the surface of the epithelium are found in the urinary bladder and bronchioles.	√
(4)	Stratified columnar epithelia can be observed in a cross section of a human skin most of the time.	√
(5)	Large amount of collagen fibers and elastin fibers are found in tendons and ligaments respectively.	√

9. Indicate whether each of the following statements is correct (√) or incorrect (X).

(1)	Events of a cardiac cycle in correct sequence are contraction of atria, relaxation of atria, contraction of ventricles, relaxation of ventricles.	X
(2)	When the right atrium is contracted, blood flows through the bicuspid valve.	X
(3)	All white blood corpuscles are nucleated.	√
(4)	All veins carry deoxygenated blood.	X
(5)	When the blood group of both parents is AB, the blood group of their children is also AB.	X

10. Indicate whether each of the following statements is correct (√) or incorrect (X).

(1)	Basic plan of the nervous systems of arthropods, annelids and platyhelminthes is similar.	X
(2)	In the human eye, light rays are refracted both by the lens and cornea.	√
(3)	Acetyl cholinesterase inhibitors enhance the transmission of nerve impulses at synapses.	√
(4)	Eyes similar to those of vertebrates are found in cephalopods.	√
(5)	Tip of the human tongue is highly sensitive to sweet taste.	√

11. Indicate whether each of the following statements regarding endocrine regulation in man is correct (√) or incorrect (X).

(1)	Reduction in TSH secretion increases blood calcium level.	√
(2)	Reduction in PIH secretion increases milk production.	√
(3)	Cortisol reduces blood glucose level.	X
(4)	Parathyroid hormone increases excretion of PO_4^{-3}.	√
(5)	Adrenalin increases blood glucose level.	√

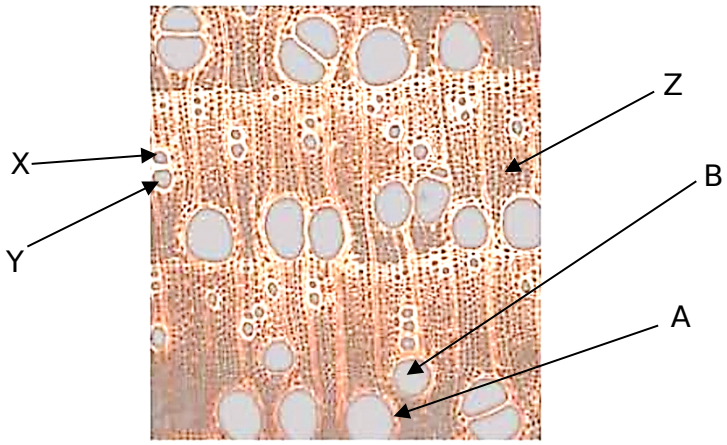
12. Indicate whether each of the following statements regarding female reproductive system of humans is correct (√) or incorrect (X).

(1)	Corpus luteum is developed during the follicular phase.	X
(2)	Progesterone level is higher than the estrogen level during the follicular phase.	X
(3)	Ovulation occurs due to rapid increase in FSH level.	X
(4)	Luteal phase of ovary coincides with the proliferative phase of endometrium.	X
(5)	Fertilization can occur only during the middle period of the luteal phase.	X

13. Indicate whether each of the following statements regarding phloem translocation is correct (√) or incorrect (X).

(1)	Concentration of free sugar in the sink is always lower than that in the sieve tube.	√
(2)	Bulk flow along the sieve tubes from source to sink occurs due to negative pressure.	X
(3)	Bulk flow along the xylem vessels from sink to source occurs due to positive pressure.	X
(4)	Growing roots, buds, stem, and fruits are sinks.	√
(5)	Phloem loading and unloading takes place between sieve tube elements and transfer cells.	√

14. The Figure given below shows a part of a cross section of dicot stem.



Indicate whether each of the following statements regarding the above figure is correct (√) or incorrect (X).

(1)	This is a cross section of secondary xylem.	√
(2)	This is a cross section of annual rings.	√
(3)	A and B are xylem and phloem parts respectively.	X
(4)	X and Y are xylem parts.	√
(5)	Z is parenchyma cells in pith.	X

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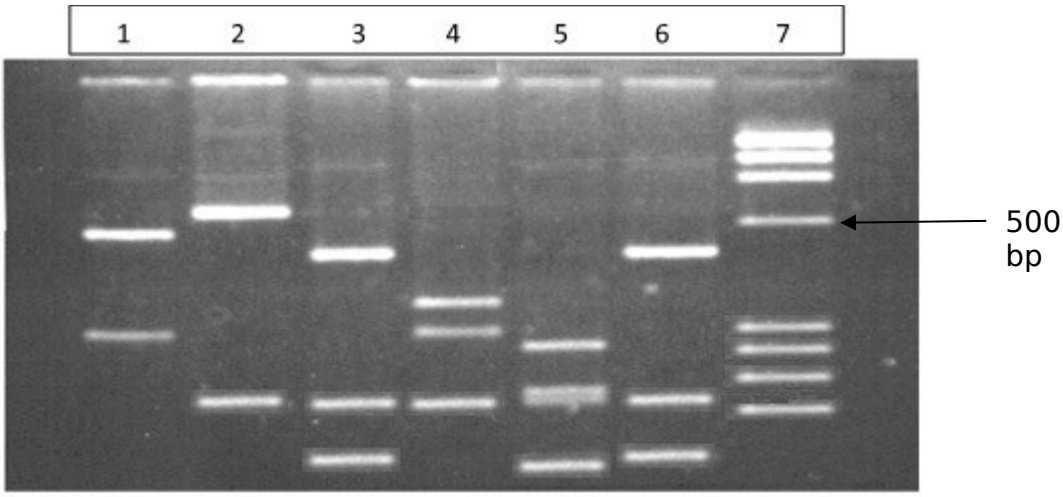
15. The figure below shows DNA fingerprinting pattern of six persons of a family. Samples in Lanes 1 and 2 belong to the mother and the father respectively. Lanes 3-6 belong to their children including the adopted ones. Lane 7 denotes 100 base pair ladder.



Indicate whether each of the following statements regarding DNA fingerprinting pattern is correct (√) or incorrect (X).

(1)	There are nine alleles in it.	√
(2)	There are three adopted sons in this family.	√
(3)	There is a male specific allele in the pattern.	√
(4)	The largest fragment indicates 500 bp.	√
(5)	The smallest fragment indicates less than 100 bp.	√

16. Indicate whether each of the following statements regarding sex chromosomes of humans is correct (√) or incorrect (X).

(1)	Male genome has 24 different chromosomes.	√
(2)	Sex linked genetic disorders are more common in males than in females.	√
(3)	Two alleles of red-green colour-blind gene are present in males.	X
(4)	Y chromosome of male is longer than X chromosome.	X
(5)	Mutant allele in the X chromosome of a father is passed to his daughter but not to his son.	√

17 Indicate whether each of the following statements regarding evolution of organisms is correct (√) or incorrect (X).

(1)	Closed circulatory systems appeared before the open circulatory systems.	√
(2)	Photosynthetic organisms appeared before heterotrophic organisms.	X
(3)	In cell membrane, branched lipids appeared before unbranched lipids.	X
(4)	Terrestrial plants are older than terrestrial animals.	√
(5)	First land plants were mosses.	X

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18. Indicate whether each of the following statements regarding earth is correct (√) or incorrect (X).

(1)	Mantle extends to about 100 km deep from the earth surface.	X
(2)	Hydrosphere extends to about 20 km deep from the earth surface.	X
(3)	Only 3% of all water found on earth is useful for existence of life.	X
(4)	Crust is the innermost layer of the hydrosphere.	X
(5)	Mutagenic radiation of sunlight is absorbed within troposphere.	X

19. Indicate whether each of the following statements regarding soil microorganisms is correct (√) or incorrect (X).

(1)	The second abundant microorganisms in soil are Actinomycetes.	√
(2)	*Rhizobium* secretes plant growth substances.	X
(3)	Denitrification occurs under aerobic conditions.	X
(4)	*Azotobacter* is a chemoautotrophic, aerobic, N_2 fixing bacterium in soil.	X
(5)	*Thiobacillus ferrooxidans* is a chemoautotrophic, aerobic bacterium in soil.	X

20. Indicate whether each of the following statements regarding food spoilage microorganisms is correct (√) or incorrect (X).

(1)	*Staphylococcus aureus* causes food borne infections.	X
(2)	*Salmonella typhi* produces exotoxins which cause food intoxication.	X
(3)	Microorganisms growing in food are heterotrophic bacteria.	√
(4)	Food borne infections are caused by some viruses and protozoans.	√
(5)	Salt containing foods are spoiled by halophilic bacteria.	√