

## Sri Lankan Biology Olympiad 2018



### Answer Sheet for Part A and Part B

Please hand over this part to the Invigilator.

Only Part A is allowed to be taken out of the examination hall.

### Answer Sheet for Part A

Mark the correct answer with a X

- |            |     |     |     |     |     |            |     |     |     |     |     |
|------------|-----|-----|-----|-----|-----|------------|-----|-----|-----|-----|-----|
| <b>01.</b> | (1) | (2) | (3) | (4) | (5) | <b>21.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>02.</b> | (1) | (2) | (3) | (4) | (5) | <b>22.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>03.</b> | (1) | (2) | (3) | (4) | (5) | <b>23.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>04.</b> | (1) | (2) | (3) | (4) | (5) | <b>24.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>05.</b> | (1) | (2) | (3) | (4) | (5) | <b>25.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>06.</b> | (1) | (2) | (3) | (4) | (5) | <b>26.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>07.</b> | (1) | (2) | (3) | (4) | (5) | <b>27.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>08.</b> | (1) | (2) | (3) | (4) | (5) | <b>28.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>09.</b> | (1) | (2) | (3) | (4) | (5) | <b>29.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>10.</b> | (1) | (2) | (3) | (4) | (5) | <b>30.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>11.</b> | (1) | (2) | (3) | (4) | (5) | <b>31.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>12.</b> | (1) | (2) | (3) | (4) | (5) | <b>32.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>13.</b> | (1) | (2) | (3) | (4) | (5) | <b>33.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>14.</b> | (1) | (2) | (3) | (4) | (5) | <b>34.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>15.</b> | (1) | (2) | (3) | (4) | (5) | <b>35.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>16.</b> | (1) | (2) | (3) | (4) | (5) | <b>36.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>17.</b> | (1) | (2) | (3) | (4) | (5) | <b>37.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>18.</b> | (1) | (2) | (3) | (4) | (5) | <b>38.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>19.</b> | (1) | (2) | (3) | (4) | (5) | <b>39.</b> | (1) | (2) | (3) | (4) | (5) |
| <b>20.</b> | (1) | (2) | (3) | (4) | (5) | <b>40.</b> | (1) | (2) | (3) | (4) | (5) |

## Part B – Short Answer Questions

**Answer in the spaces provided. Use only the symbols  $\surd$  or X.**

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



A

B

C

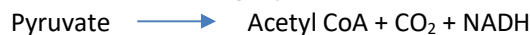
Indicate whether each of the following statements regarding the above figures is correct ( $\surd$ ) or incorrect (X).

- (1) A and B molecules have 1-4 and 1-6 glycosidic bonds respectively.
- (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 ( $\surd$ ) or incorrect (X).

- (1) Some plasma membrane proteins act as enzymes.
- (2) Some enzymes react on different substrates.
- (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.


3. This question is based on the following equation.



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

- (1) This is a carboxylation reaction.
- (2) This is an exergonic reaction.
- (3) This reaction occurs in cytoplasm of living cells.
- (4) In this reaction, pyruvate is reduced to Acetyl Co A.
- (5) This occurs in both photosynthesis and respiration.


4. Indicate whether each of the following statements is correct ( $\surd$ ) 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.
- (3) In Cestoda and Zygomycota, stored food is glycogen.
- (4) Anthophytes and chytridiomycotes are photoautotrophic.
- (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.
- (3) Number of legs per somite can be used to distinguish chilopods from other arthropods.
- (4) Absence of appendages in the abdomen can be used to distinguish insects from other arthropods.
- (5) Diplopods can be distinguished from other arthropods due to the absence of thorax.


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.
- (2) Postganglionic fibers of the sympathetic system are longer than those of the parasympathetic system.
- (3) Sympathetic ganglia are located in effector organs.
- (4) Neurotransmitter produced by sympathetic nerves is acetyl choline.
- (5) Uterus is innervated only by parasympathetic nerves.


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

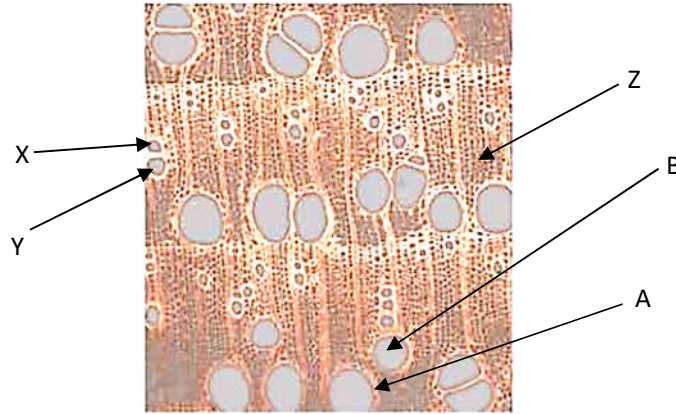
- (1) Large amount of water is required to excrete urea due to its high solubility.
- (2) Creatine is excreted by kidneys.
- (3) Bile pigments are excreted by kidneys.
- (4) Uric acid is the major nitrogenous excretory product of terrestrial amphibians.
- (5) Ammonia is the major nitrogenous excretory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


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.
- (2) Ciliated simple columnar epithelia with goblet cells are found in the small intestine.
- (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 (**v**) 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.
  - (2) When the right atrium is contracted, blood flows through the bicuspid valve.
  - (3) All white blood corpuscles are nucleated.
  - (4) All veins carry deoxygenated blood.
  - (5) When the blood group of both parents is AB, the blood group of their children is also AB.
10. Indicate whether each of the following statements is correct (**v**) or incorrect (**X**).
- (1) Basic plan of the nervous systems of arthropods, annelids and platyhelminthes is similar.
  - (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 (**v**) 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.
  - (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 (**v**) or incorrect (**X**).
- (1) Corpus luteum is developed during the follicular phase.
  - (2) Progesterone level is higher than the estrogen level during the follicular phase.
  - (3) Ovulation occurs due to rapid increase in FSH level.
  - (4) Luteal phase of ovary coincides with the proliferative phase of endometrium.
  - (5) Fertilization can occur only during the middle period of the luteal phase.
13. Indicate whether each of the following statements regarding phloem translocation is correct (**v**) 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.
  - (3) Bulk flow along the xylem vessels from sink to source occurs due to positive pressure.
  - (4) Growing roots, buds, stem, and fruits are sinks.
  - (5) Phloem loading and unloading takes place between sieve tube elements and transfer cells.

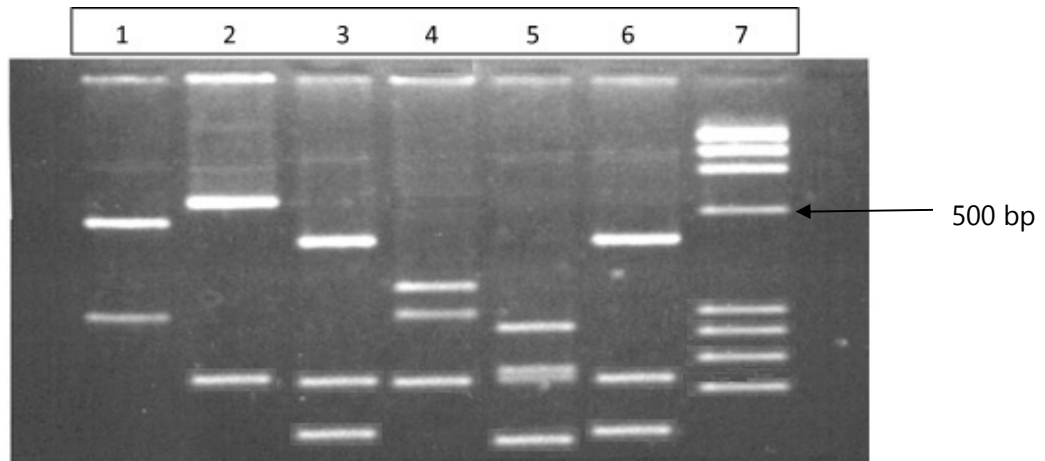
14. The Figure given below shows a part of a cross section of dicot stem.



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.
- (4) X and Y are xylem parts.
- (5) Z is parenchyma cells in pith.


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.
  - (4) Y chromosome of male is longer than X chromosome.
  - (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.
  - (3) In cell membrane, branched lipids appeared before unbranched lipids.
  - (4) Terrestrial plants are older than terrestrial animals.
  - (5) First land plants were mosses.
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.
  - (2) Hydrosphere extends to about 20 km deep from the earth surface.
  - (3) Only 3% of all water found on earth is useful for existence of life.
  - (4) Crust is the innermost layer of the hydrosphere.
  - (5) Mutagenic radiation of sunlight is absorbed within troposphere.
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.
  - (3) Denitrification occurs under aerobic conditions.
  - (4) *Azotobacter* is a chemoautotrophic, aerobic, N<sub>2</sub> fixing bacterium in soil.
  - (5) *Thiobacillus ferrooxidans* is a chemoautotrophic, aerobic bacterium in soil.
20. Indicate whether each of the following statements regarding food spoilage microorganisms is correct (✓) or incorrect (X).
- (1) *Staphylococcus aureus* causes food borne infections.
  - (2) *Salmonella typhi* produces exotoxins which cause food intoxication.
  - (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.