

## SRI LANKAN BIOLOGY OLYMPIAD 2008



### Marking scheme **for Part B**

#### Part B (short answer questions)

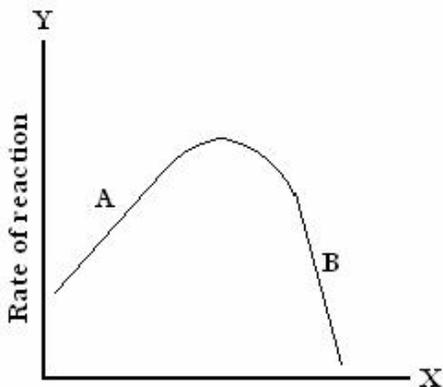
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Write short answers for all questions in the space provided.

Please note that questions in which the answers are to be selected from given choices (A to E) answer can have one or more choices. Write all correct choices.

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- Names of some proteins are given below.  
A. collagen B. hemoglobin C. albumin D. actin E. casein  
Which of these is a ,  
(1) transport protein? B  
(2) storage protein? CE  
(3) fibrous protein? AD  
(4) contractile protein? D
- Five structures found in living cells are given here.  
A. Ribosomes B. Chloroplasts C. Mitochondria D. Lysosomes E. Peroxisomes  
Which of these  
(1) contain DNA within ? BC  
(2) can be found in bacteria? A  
(3) contain a single membrane? DE  
(4) contain catalase enzyme? E
- The diagram given below indicates the change of the rate of an enzyme reaction with a change of one variable factor.



- What is the variable factor that suits the X-axis of the graph ? Temperature
- What happens to the enzyme in the phase B of the graph? Denaturation

- (3) Is the change that happens to enzyme in phase B is reversible? No  
 (4) Name a starch hydrolyzing enzyme that behaves this way Amylase/ Diastase

4. Some geological periods of earth are given below.

(A) Cambrian (B) Permian (C) Devonian (D) Jurassic (E) Quaternary  
 Which of these periods

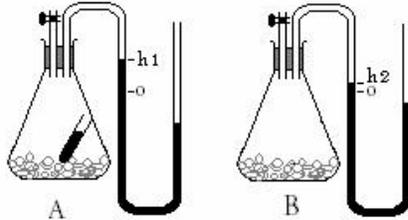
- (1) can be considered as the age of fishes? C  
 (2) marked by the appearance of birds? D  
 (3) marked by the extinction of trilobites? B  
 (4) marked by the appearance of flowering plants? D

5. This question is based on the following.

A. *Ulva* B. Pterophyta C. Reptilia D. Dicotyledoneae E. Lepidoptera  
 Which of the above represents

- (1) a phylum/division? B  
 (2) a class? CD  
 (3) a genus name? A  
 (4) an order? E

6. The diagram given below indicates an experiment on respiration of germinating seeds. The two respirometers A and B have equal samples of seeds. Flask A has a tube containing KOH in addition to seeds. Initial levels of liquid columns in the tubes are indicated as 0. After one hour the liquid column in A was h1 and that of B was h2.



(1) Calculate the Respiratory Quotient.  $RQ = \frac{h1 - h2}{h1}$

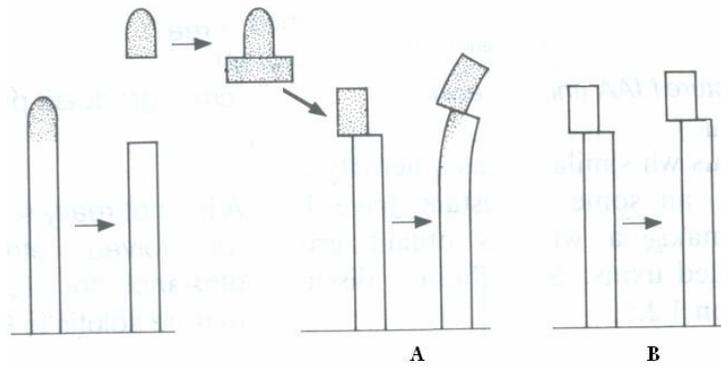
(2) If the flask contained germinating Sesame seeds what will be the approximate value of Respiratory Quotient? 0.7

(3) If the two flasks contained germinating Mung seeds will h2 be 0, -ve or +ve? 0

(4) Why is this experiment done with germinating seeds and not with dry seeds?

Germinating seeds have high rate of respiration/ respiration rate in dry seeds is low

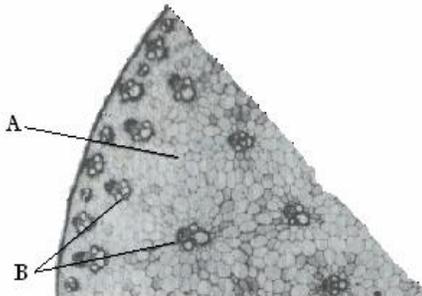
7. The diagram given below indicates some experiments done by Went with coleoptiles of oat seedlings. A coleoptile grown in darkness was decapitated and the tip was kept on a block of agar for a few minutes. A indicates the agar block placed sideways on another decapitated coleoptile. B indicates the control for this experiment.



- (1) If the agar block in B was placed in the center of coleoptile (not sideways) what would have been the result? Grow straight up/ symmetrical growth
- (2) What is the substance that was discovered by these experiments? Auxin
- (3) Why is this experiment carried out in dark?  
To prevent the effect of light on the distribution of auxin
- (4) How is the agar block shown in B different from that shown in A  
B does not contain auxin

8. The diagram given below shows a part of a transverse section of a stem as seen under microscope.

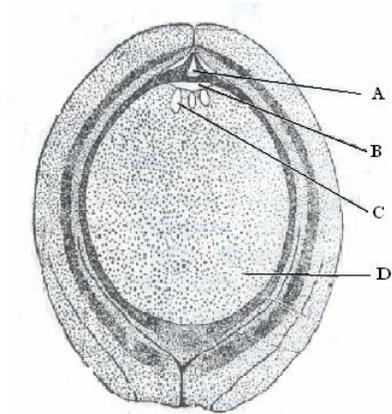
- (1) What is more likely to be the plant from which the section has been taken ; Sunflower or a Grass? Grass
- (2) What is the type of tissue labeled as A? ground tissue/ parenchyma
- (3) What are the structures labeled as B? vascular bundles/ xylem
- (4) Write one function of the tissue A storage/ ground tissue



9. The diagram given below shows the structure of the ovule of *Cycas* .

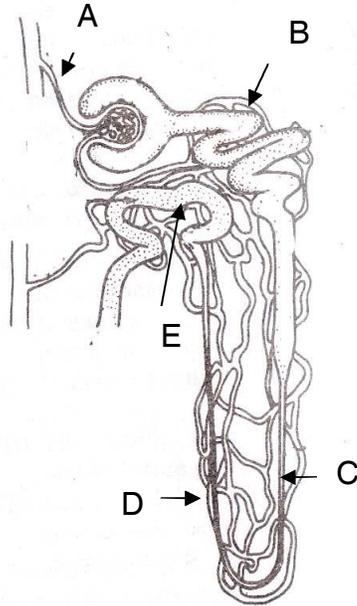
Name the parts labeled A,B,C and D.

- A pollen chamber
- B archegonial chamber
- C archegonia
- D embryo sac/ female gametophyte



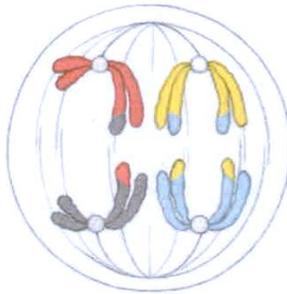
10. This question is based on the transmission of nerve impulses across neurons.
- (1) What is the principle cation inside the cell when a neuron is at resting state?  
K<sup>+</sup>
  - (2) Which side of the membrane has a negative charge?(in or out) in
  - (3) What causes the cell membrane potential from  $-70$  mV to  $+40$  mV, how could this shift occur? Reception of stimulus
  - (4) Which ion is moved across the membrane in this situation? Na<sup>+</sup>
11. State the respiratory surfaces of following animals.
- (1) Fish internal gills
  - (2) Earthworm body surface
  - (3) Grasshopper trachea
  - (4) Garden Snail lung
12. Answer the following questions based on human heart.
- (1) The stimulus for contraction of heart is generated by SA node
  - (2) The finer branches of the cardiac fibers that transmit impulses in the heart are known as perkinje fibers
  - (3) Time taken to complete atrial and ventricular diastole for an adult human at rest is 0.4 seconds
  - (4) Volume of blood pumped per minute into the systemic circuit is known as Cardiac output
13. This question is based on the vitamins listed below
- |                               |                                     |
|-------------------------------|-------------------------------------|
| A – Vitamin A (retinol)       | B – Vitamin B <sub>3</sub> (niacin) |
| C – Vitamin C (ascorbic acid) | D - Folic acid                      |
| E – Vitamin K (phylloquinone) |                                     |
- (1) Deficiency of which leads to impaired immunity? C
  - (2) Which is a component of coenzyme NAD? B
  - (3) Deficiency of which leads to night blindness? A
  - (4) Deficiency of which leads to anemia? D

14. This question is based on following diagram of a mammalian nephron and associated blood vessels



What is the part,

- (1) in which the cells contain numerous mitochondria? BDE  
 (2) with highest concentration of proteins? A  
 (3) which is the target of ADH? E  
 (4) contains increasing osmotic gradient? C
15. The diagram given below shows one stage of meiosis of a cell.



- (1) Name the stage of meiosis shown in the diagram ? anaphase I  
 (2) How many molecules of DNA are represented in the diagram? 8  
 (3) How many chromosomes each daughter cell will have at the end of meiosis according to the diagram? 2  
 (4) Name one structure that is associated with meiosis of animal cells but not seen in plant cells centrioles/ centrosome/ aster
16. In a species of pumpkin fruits can be white, yellow or green because of an interaction between two independently segregating genes. A dominant W allele is necessary to produce white colour. A dominant Y allele is necessary to produce yellow colour. When both of the genes are in double dominant form fruits are white. When both of the genes are in double recessive form the fruits are green.

Genotypes of some plants are given below.

A. WWyy      B. wwYY      C. WwYy      D. WWYY      E. wwyy

- (1) What is the colour of the fruits of A? white
- (2) What is the colour of the fruits of B? yellow
- (3) If a cross is made between D and E what will be the colour of the F1 fruits? White
- (4) If C is subject to a test cross what will be the proportion of white fruits in the progeny? 50% or ½ or 0.5

17. Some characteristics of DNA is given below.

- A. It is has negatively charged molecules.
- B. Two single stranded DNA molecules can reanneal if they are complimentary.
- C. It can stick to nitrocellulose membranes.
- D. It has a universal genetic code.
- E. DNA molecules can be cut into pieces or joined together.

- (1) Which of these features help in Southern blotting? ACE
- (1) Which of these features help in producing genetically modified organisms? ED
- (3) Which of these characters help in agarose gel electrophoresis? AE
- (4) Which of these help in identifying DNA with probes? ABCE

18. Some ecosystems are named below.

(A) Rain forest (B) Open ocean (C) Grassland (D) Coral reef

In which of the above,

- (1) nutrient recycling is the fastest? A
- (2) nutrient recycling is the slowest? B
- (3) total global primary productivity is the highest? B
- (4) biodiversity is the highest? A

19. Stages of some major cultural changes in the history of modern man are given below.

(A) Hunting and gathering (B) Agricultural revolution (C) Urbanization  
(D) Industrial Revolution (E) Globalization

Name the stage in which the following environmental issues were started,

- (1) Habitat destruction and degradation B
- (2) Decrease of cultural diversity C
- (3) Land degradation B
- (4) Wars B

20. Some categories of natural resources are given below.

(A) Perpetual (B) Renewable (C) Non-renewable (D) Can be recycled

Select the category into which each of the following material resources belongs to.

- (1) Coal C
- (2) Iron CD
- (3) Fertile soil B
- (4) Biodiveristy C

21. Names of some important microorganisms are given below.

- A. *Lactobacillus bulgaricus* B. *Salmonella typhi* C. *Xanthomonas* sp. D. *Rhizobium* sp.  
E. *Bacillus polymixa*

Which of the above is/are

- (1) pathogenic? BC  
(2) industrially important? ADE / AE  
(3) important in mineral cycling in nature? D/ all/ ABCDE  
(4) produce antibiotics? E

22. Names of some bacteria are given below.

- (A) *Azotobacter* (B) *Acetobacter* (C) *Sterptococcus* (D) *Staphylococcus*  
(E) *Streptomyces*

Select the bacterium involved in each of the following

- (1) Food poisoning D  
(2) Industrial production of Vitamin B12 E  
(3) Nitrogen fixation A  
(4) Commercial production of curd C

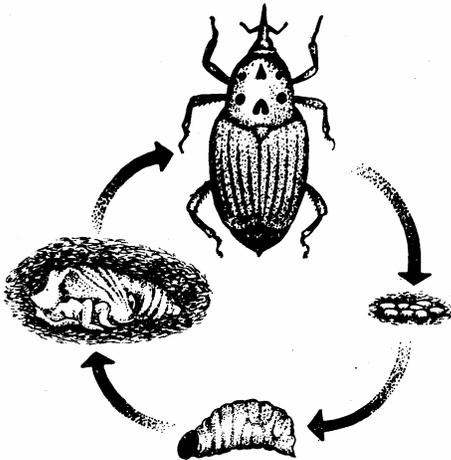
23. Classes of fungi are listed below.

- (A) Zygomycetes (B) Ascomycetes (C) Basidiomycetes (D) Deuteromycetes

Which one of these classes of fungi,

- (1) contains aseptate hyphae? A  
(2) produces asexual spores in sporangia? A  
(3) contains clamp connections? C  
(4) has sexual spores borne externally? C

24. Life cycle of an insect pest is illustrated in the diagram given below.



- (1) Name the insect pest (coconut) red weevil  
(2) Name the four stages of the life cycle given in the diagram.  
Adult ----- > eggs ---- > larva ----- > pupa  
(3) Name key identification feature of this insect.  
6 marks (spots) on the pair of elytra  
(4) What is the major damage caused by this insect.  
Death of sprout

25. Some human parasites are listed below.

(A) *Ascaris lumbricoides* (B) *Plasmodium vivax* (C) *Necator americanus*

(D) *Wuchereria bancrofti* (E) *Entamoeba histolytica*

which one or more of these organisms,

(1) have mosquito as an intermediate host? BD

(2) can be controlled by preventing fecal contamination of food? AE

(3) do not enter human blood circulation? A

(sinhala) enter human blood circulation? BCDE

(4) contains some stages of life cycle outside living host? ACE