09 E II

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கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2010 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2010

ජීව විද්‍යාව II
உயிரியல் II
Biology II

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

Index No. : ....

Important :

* *This question paper consists of 12 pages.*
* *This question paper comprises Part A and Part B. The time allotted for both parts is three hours.*

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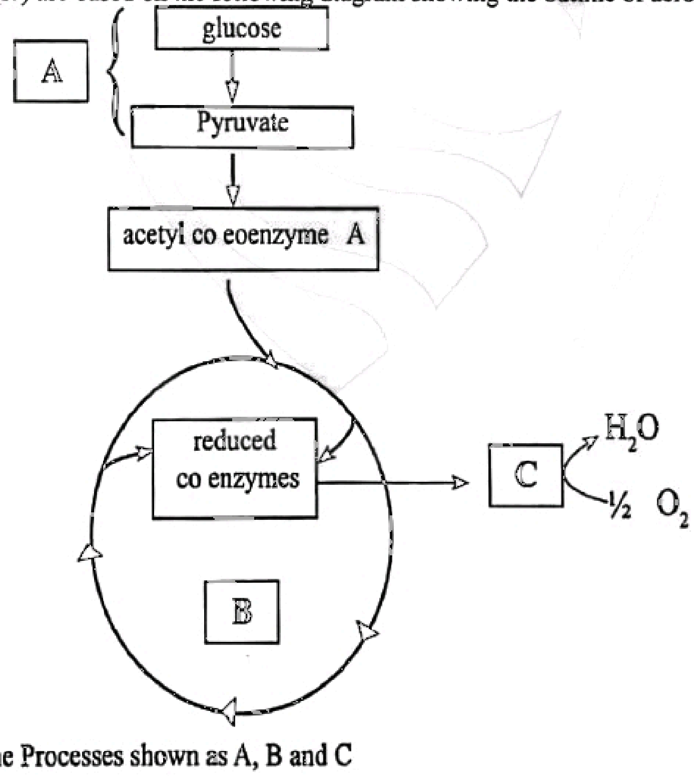
1. A Questions (i)- (iv) are based on the following diagram showing the outline of aerobic respiration.



(i) Name the Processes shown as A, B and C

A .... B .... C ....

(ii) Where do processes A, B and C occur in the living cell?

A ....

B ....

C ....

(iii) How many ATP molecules are formed in stages A and C in the respiration of one glucose molecule.

A .....

C .....

(iv) Name three electron carriers taking part in biochemical reactions of process C.

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.....

.....

(v) Name the two products that may be formed from pyruate in the absence of O_2

.....

(vi) Using the following data, and the number of the ATP molecules formed in a living cell during aerobic respiration of glucose, calculate the energy conversion efficiency of aerobic respiration

Glucose $\longrightarrow$ $CO_2 + H_2O$ $\quad \Delta G = -2880\ kJ\ mol^{-1}$

ATP $\longrightarrow$ $ADP + P_i$ $\quad \Delta G = -30.6\ kJ\ mol^{-1}$

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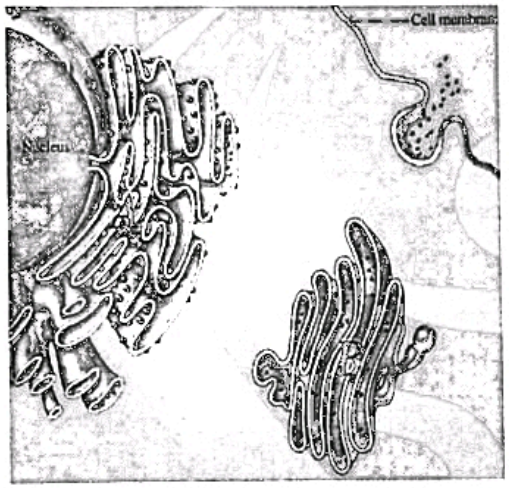
B. (i) Name A and B in the electron micrographic diagram given here



A ..... B .....

(ii) State two functions of each:- A and B

A ..... B .....

(iii) What is a cytoskeleton?

.....

(iv) State three functions of a cytoskeleton

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.....

.....

(v) State three biochemical / physiological changes that cause aeging of cells.

.....

.....

.....

(vi) Endosymbiotic theory states that mitochondria and chloroplasts have originated from bacteria. Give **two** common features of chloroplasts and mitochondria that support this theory.

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.....

C (i) What is the biodiversity?

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.....

(ii) In recent years, scientists are concerned about the rapid loss of biodiversity. Give **three** reasons for loss of biodiversity.

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(iii) What is IUCN red data book?

.....

.....

(iv) Name the IUCN red list categories.

.....

.....

.....

(v) What is a biodiversity hotspot?

.....

.....

D (i) State **three** major sources of pollutants of aquatic environments in Sri lanka, other than industrial wastes.

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(ii) State the subject areas that are considered by the following international conventions and protocol?

Basel convention .....

Montreal protocol .....

Remsar convention .....

CITES .....

(iii) What are the consequences of discharging untreated waste water into an aquatic system?

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(iv) What is the national institution in Sri Lanka that formulates regulations regarding industrial pollution of water?

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2 A (i) State two ways by which growth of plants differs from growth of animals.

.....

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(ii) State three ways by which an annual plant differs from a perennial plant.

.....

.....

.....

(iii) Name the tissues seen in the apical region of a stem as seen in a cross section through the zone of the cell differentiation

.....

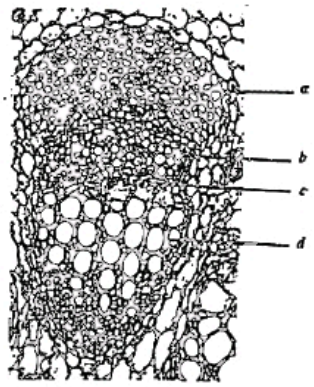
.....

.....

(iv) State three differences seen in the meristamatic region of stem and root apices

Stem apices	Root apices
.....	.....
.....	.....
.....	.....

(B)



(i) Identify the structure shown in the given photo micrograph.

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(ii) Name the tissues labelled a, b, c, and d

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.....

.....

(iii) State four differences seen between a xylem vessel element and a seive tube element.

Xylem vessel element	Sieve tube element
.....	.....
.....	.....
.....	.....
.....	.....

C (i) What is the theory which is used to explain the mechanism of conduction of solutions in trees?

.....

(ii) What is the hypothesis that is used to explain the mechanism of xylem conduction of solutes in phloem?

.....

.....

(iii) What are the differences between the mechanism of conduction and phloem conduction

Xylem conduction	Phloem conduction
.....	.....
.....	.....
.....	.....
.....	.....

(iv) Name the types of cells in a plant in the correct sequence,through which a molecule of water passes from the site of absorption from soil, to moving out into the atmosphere through a stoma.

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.....

(v) Name the cells in the correct sequence through which a carbon atom from a molecule of CO_2 found in the atmosphere passes until it gets stored in starch in a root of a C_4 photosynthetic plant.

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.....

(vi) Indicate which of the plants A- E, exhibit the characteristics given below from 1- 10

A. *Poganatum*
B. *Nephrolepis*
C. *Selaginella*
D. *Cycas*
E. An angiosperm

1. Autotrophic gametophyte .....
2. Spores dispersed by wind .....
3. Dioecious gametophyte .....
4. Thick walled megaspores .....
5. Bi flagellate male gametes .....
6. Embryo with cotyledons .....
7. Sporangia in sori .....
8. Rhizoids in gametophytes .....
9. Heterospory .....
10. Endosperm .....

3 A (i) What is a sensory receptor?

.....

(ii) State three locations of the human body where pacinian corpuscles are found.

.....

.....

.....

(iii) State the photoreceptors found in animals belonging to the following phyla

Phylum	Photoreceptors
Coelentrata	.....
Annelida	.....
Arthropoda	.....

(iv) Name an invertebrate phylum which has photoreceptors similar to that of vertebrates.

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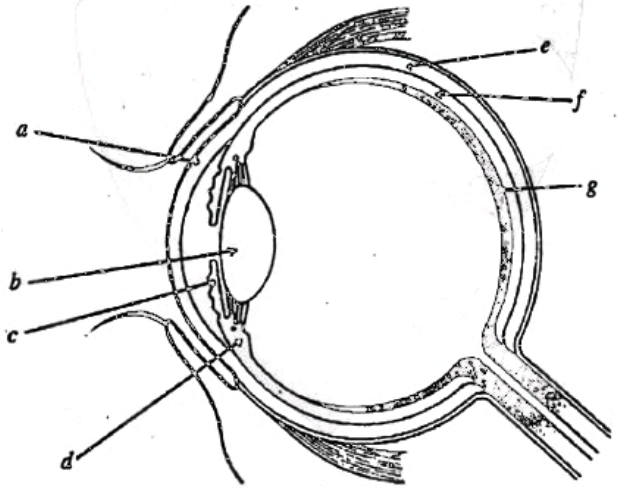
B ◦ Questions in parts B and C are based on the given diagram of a human eye.



(i) Name the parts labelled *a* - *g* in the diagram.

a ..... *e* .....

b ..... *f* .....

c ..... *g* ..... *d* .....

.....

(ii) State the function of *a*, *c*, *e* and f

a .....

c .....

e .....

f .....

(iii) Name the substance present between *a* and *b*

.....

C (i) Name the two types of photosensitive cells found in 'g', and state their approximate numbers, the pigments found in them and the functions of these cells.

Cells	Approximate numbers	Pigments	Functions
.....	.....	.....	.....
.....	.....	.....	.....

(ii) What is the place on 'g' where there are no photosensitive cells.

.....

(iii) What is the place on 'g' where the light rays focus?

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D (i) State the reasons for short sightedness.

.....

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(ii) How can short sightedness be rectified?

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(iii) State the reasons for far sightedness.

.....

.....

(iv) How can far sightedness be rectified?

.....

4 A (i) Name the layers of atmosphere in correct sequence from surface of earth, towards space.

.....

.....

(ii) Which one of the layers of atmosphere

a) is responsible for green house effect? . .....

b) protects earth organisms from harmful UV rays of solar radiation?.....

c) is responsible for weather conditions? .....

d) contains air with the lowest temperature? .....

(iii) What percentage of earth's surface is covered with oceans?

.....

(iv) Of the total amount of water available in the hydrosphere

a) What percentage constitutes fresh water?

.....

b) What percentage is present in glaciers and polar ice-caps?

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B (i) a) State four main biotic components of an ecosystem.

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b) State four main abiotic components of a terrestrial ecosystem/

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(ii) State two main functional features of an ecosystem

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(iii) a) Snakes, grasshoppers, toads and eagles are the animals found in a grassland eco system. If the amount of energy fixed at the primary producer level of this eco system is approximately 800×10^6 $kJha^{-1}yr^{-1}$ what is the approximate amount of energy available at the trophic level to which snakes belong?

.....

.....

b) If eagles are removed from this ecosystem, indicate what can happen to the population size of grasshoppers? Place a tick ✓ in appropriate cage.

Increases	
Does not change	
Decreases	

C (i) What is Polyallelism ?

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(ii) Give an example for polyallelic inheritance stating suitable genotypes and phenotypes.

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(iii) Name three characters in humans which show polygenic inhertance?

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(iv) a) If height of a plant is inherited by four pairs of alleles all of which show dominance, how many height classes are expected in the population?

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b) What proportion of plant in the population are expected to be in the shortest class?

.....

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D (i) What is Hardy - Weinberg equilibrium?

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(ii) Assume that a recessive character occurs in human population at a frequency of one in 2500. What is the percentage of individuals in the population who are heterozygous with regard to this character?

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(iii) Name four factors which lead to change in frequencies of alleles in natural populations.

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(iv) Following are the views put forward by famous scientists regarding evolution of life. In each case, name the scientist who proposed it first.

a) Organic molecules were produced by the action of electrical discharges and UV radiation on inorganic gases which were present in the primitive earth.

.....

b) Diversity of individuals in natural populations lead to differences in their abilities to survive and reproduce.

.....

c) Stratification seen in rocks represents events in the geological history of the earth.

.....

d) Adaptatians aquired by individuals of a population within their lifetime, are transmitted to their progeny.

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Biology II- Part B - Essay

1. a) What are the different nutritional types found among soil micro organisms?
   b) Explain how soil micro organisms contribute to the fertility of soil

2. Explain how body temperature of man is regulated.

3. Giving suitable examples, write an account of the basic chemical features and biological functions of carbohydrates.

4. a) What are plant growth substances?
   b) Give examples of major plant growth substances and state their sites of production.
   c) Give a brief account of the function of plant growth substances.

5. a) Describe how insect pests could be controlled without using chemical pesticides.
   b) What are the adverse impacts of using chemical pesticides for insect pest control.

6. Writer short notes on the following.
   a) Saliva
   b) Bioremediation
   c) Gene cloning and its application in medicine and agriculture.