

Part A - Structured Essay

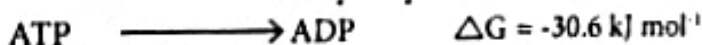
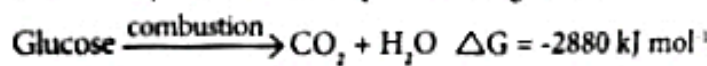
Answer all questions on this paper itself.

01.

- (A) (i) In the table given below write in column A the three major stages of aerobic respiration in correct sequence and indicate in column B the end products of each of the three major stages you mentioned, when glucose is the respiratory substrate. Indicate in columns C and D respectively the sites in a prokaryotic cell and a eukaryotic cell where the above three stages take place.

A	B	C	D
Major stages of aerobic respiration	End products	Site in prokaryotic cell	Site in eukaryotic cell
1. Glycolysis	Pyruvate NADH	Cytoplasm	Cytoplasm
2. Krebs cycle	CO ₂ ATP	Cell membrane	matrix of mitochondria
3. electron transport chain	H ₂ O	Cell membrane	Cristae

- (ii) Using your knowledge of respiration and the following data calculate the energy conversion efficiency of aerobic respiration of glucose.



- (B) (i) What are the four major groups of organic compounds found in living matter?

Carbohydrate, Proteins, Lipids, nucleic acids

- (ii) Give one example of a macromolecule each for three groups of organic compounds mentioned in B (i).

C - starch, L - oil
P - collagen
n - DNA, RNA

- (iii) Why are the molecules mentioned in B (ii) called macromolecules?

needed in larger amount in diet

- (iv) Which of the major groups of organic compounds stated in B (i) are found in the following in this organelles?

Organelle

Major groups of organic compounds

protein

nucleic acids

Ribosomes

Chloroplast

Carbohydrate
Protein

- (C) (i) What is an enzyme?

biological catalyst which
↑ rate of reaction

- (ii) For each simple of the enzyme listed below name the appropriate substrate and the end products of the enzyme reaction.

Enzyme	Substrate	End products
Amylase complex	Starch	Maltose
Catalase	H ₂ O ₂	Water
Trypsin	Protein	

- (D) Describe a simple experiment to demonstrate inactivation of amylase enzyme complex by heat.

02.

- (A) (i) Explain why sexual reproduction is considered to be more advantageous than asexual reproduction for the survival of a species.

- (ii) State the major asexual method of reproduction seen in of the following organisms.

- (a) Planaria
(b) Saccharomyces
(c) Penicillium
(d) Spirogyra
(e) Paramecium
(f) Hydra

- (B) (i) What is alternation of generations?

- (ii) In the space given below draw a labelled outline diagram of the life cycle of Selaginella consisting of all major stages to illustrate alternation of generations.

- (C) (i) Explain what is meant by plant tissue culture
.....
.....
- (ii) State the major advantages of plant tissue culture
.....
.....
- (D) (i) Name four different types of tissue / parts of plants used in plant tissue culture.
.....
.....
- (ii) State the major methods used at present for large scale propagation of the following plants in Sri Lanka.
sugar cane
Rubber
Mango
Potato

03.

- (A) (i) What is a cytoskeleton?
.....
.....
- (ii) State the functions of the cytoskeleton other than providing support.
.....
.....
- (iii) Name the supporting tissues of plants.
.....
.....
- (iv) State the major chemical constituents which determine the rigidity of each of the supporting tissues stated in A (iii).
.....
.....
- (B) (i) State the major types of skeletons found among animals
.....
.....
- (ii) What are the major function of skeletal systems of animals other than providing support?
.....
.....
- (iii) Name the major non-cellular substance found in the skeleton of arthropods
.....
.....
- (C) (i) In man state how the atlas vertebra differs from a typical cervical vertebra
.....
.....
- (ii) Give reasons for the differences stated in C (i).
.....
.....

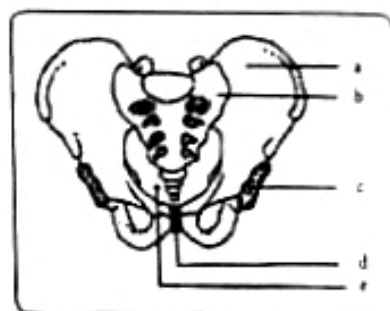
- (iii) What are the secondary curves of the vertebral column of man?
.....
.....

- (iv) State the function of each of the secondary curves of the vertebral column of man
.....
.....

- (v) What are the functions of the intervertebral discs?
.....
.....

- (vi) How should a heavy object be lifted by man to minimize the risk of slip disc?
.....
.....

- (D) Questions D (i) - D (iii) are based on the following diagram



- (i) Identify the structure given in the diagram
.....

- (ii) Name the parts labelled a, b, c, d and e.
a
b
c
d
e

- (iii) How does the structure shown in the above diagram contribute to the upright posture of man?
.....
.....

04.

- (A) (i) What is a biome?
.....
.....
.....
- (ii) Name three biomes found in the tropics and state two major vegetation characteristics of each of them.

Biome	Major vegetation characteristics
a	
b	
c	

Part B - Essay

Answer four questions only.

Give clearly labelled diagrams where necessary.
(Each question carries 15 marks)

(B) How does the structure shown in the above diagram contribute to the upright posture of man?

1. Explain briefly the processes and relevant mechanisms involved in the absorption, lateral transport and vertical transport of water in higher plants.

2. (i) Explain with appropriate examples the use of microorganisms in biotechnology.

(ii) What are the advantages of using microorganisms and microbiological processes in such technologies?

3. Describe the structures of the human spermatozoon and the ovum in relation to the functions they perform.

4. (a) List the major insect pests and diseases which cause damages to paddy cultivation in Sri Lanka.

(b) Name the causative organisms of the diseases you mentioned.

(c) Briefly describe the methods used to control such insect pests and diseases.

5. (a) Explain the following.

(i) Dominant and recessive alleles

(ii) Independent assortment

(b) The colour of feathers in chicken is governed by a pair of co-dominant alleles F^+ and F^- . The genotypes F^+F^+ are white feathered, F^+F^- are black feathered and F^-F^- are yellow feathered. An independently segregating locus governs the nature of the legs. The LL genotype has legs of normal length while LL^b has bent legs. The genotype LL^b is lethal. If yellow feathered, bent legged animals are crossed determine the likely

(i) genotypes and

(ii) phenotypic ratio of the resulting progeny

6. Write short notes on the following

(i) Endosymbiotic theory

(ii) Functions of liver

(iii) Binomial nomenclature

(A) (i) What is a biome?

(ii) Name three biomes found in the tropics and state two major vegetation characteristics of each of them

Biome	Major vegetation characteristics
a	
b	
c	

a

b

c

(B) In the space given below draw an outline diagram of the nitrogen cycle in a terrestrial ecosystem to indicate its major features. Label its major stages and processes

(C) (i) Indicate two processes/stages of the nitrogen cycle which may be affected by human interference

(ii) Describe briefly the consequences of effects of human interference you have indicated in C (i)

(D) (i) What is the major group of synthetic chemical substances responsible for ozone depletion in the atmosphere?

(ii) Name two major sources generating these chemical substances

(iii) State one environmental effect and a consequent health hazard of ozone depletion.

Environmental effect	Health hazard

Health hazard

(iv) What is the international convention that deals with the use of substances that affect the ozone layer?