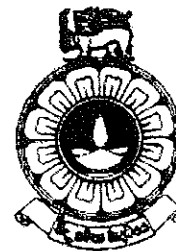


**The Open University of Sri Lanka**  
**Faculty of Natural Sciences**  
**Advanced certificate in Science Programme**



|                                |                                    |
|--------------------------------|------------------------------------|
| <b>Department</b>              | <b>: Foundation Academic Unit</b>  |
| <b>Level</b>                   | <b>: Level 2</b>                   |
| <b>Name of the Examination</b> | <b>: Final Examination 2020/21</b> |
| <b>Course Title and - Code</b> | <b>: Biology 1 BYF 2511</b>        |
| <b>Academic Year</b>           | <b>: 2020/21</b>                   |
| <b>Date</b>                    | <b>: 08.12.2021</b>                |
| <b>Time</b>                    | <b>: 9.30am-12.30pm</b>            |
| <b>Duration</b>                | <b>: 03 Hours</b>                  |

**General Instructions**

1. Read all instructions carefully before answering the questions.
  2. This question paper consists of 07 questions in 09 pages.
  3. All questions carry equal marks.
  4. Answer for each question should commence from a new page.
  5. Draw fully labelled diagrams where necessary
  6. Involvement in any activity that is considered as an exam offense will lead to punishment
  7. Use blue or black ink to answer the questions.
  8. Clearly state your index number in your answer script
-

Index No.....

Answers to questions in Part I should be given in the question paper itself. Answers to questions in Part II should be given in the answer book provided.

**PART I (1 ½ Hours)**

**Multiple Choice and Structured Essay Questions**

Answer ALL Questions

**Part A – Multiple Choice Questions**

Indicate the most appropriate answer with a cross (X) in the cage provided.

1.1 Which of the following statements is **true** regarding gene therapy?

|    |                          |                                               |
|----|--------------------------|-----------------------------------------------|
| a. | <input type="checkbox"/> | a.) Gene therapy is used to prevent diseases. |
| b. | <input type="checkbox"/> | b.) Gene therapy is used to treat diseases.   |
| c. | <input type="checkbox"/> | c.) In gene therapy no drugs are used.        |
| d. | <input type="checkbox"/> | d.) All the above is done in gene therapy     |

1.2 Use of herbicide tolerant plants,

|    |                          |                                                                                    |
|----|--------------------------|------------------------------------------------------------------------------------|
| a. | <input type="checkbox"/> | a.) will be destroyed by herbicides                                                |
| b. | <input type="checkbox"/> | b.) are harmful to the environment.                                                |
| c. | <input type="checkbox"/> | c.) is a technological advancement which protects the environment and crop plants. |
| d. | <input type="checkbox"/> | d.) not tolerant to the herbicides.                                                |

1.3 If in a family, the mother has the blood group A and the father has the blood group B. If their four children have all four blood groups, the probability of having a child with blood group A is

|    |                          |          |
|----|--------------------------|----------|
| a. | <input type="checkbox"/> | a.) 50%  |
| b. | <input type="checkbox"/> | b.) 25%  |
| c. | <input type="checkbox"/> | c.) 100% |
| d. | <input type="checkbox"/> | d.) 0%   |

1.4 In a heterozygous condition, the organism will have

|    |                          |                                    |
|----|--------------------------|------------------------------------|
| a. | <input type="checkbox"/> | a.) two or more identical alleles. |
| b. | <input type="checkbox"/> | b.) only two identical alleles.    |
| c. | <input type="checkbox"/> | c.) non-identical alleles.         |
| d. | <input type="checkbox"/> | d.) two non-identical alleles.     |

1.5 In biochemical thermodynamics we study,

|    |  |                                                          |
|----|--|----------------------------------------------------------|
| a. |  | a.) the biological activities with energy absorption.    |
| b. |  | b.) biological reactions taking place.                   |
| c. |  | c.) energy liberated in reactions.                       |
| d. |  | d.) energy changes taking place in biological reactions. |

1.6 An example of a high energy compound is

|    |  |                        |
|----|--|------------------------|
| a. |  | a.) ATP.               |
| b. |  | b.) Acetyl CoA         |
| c. |  | c.) active methionine. |
| d. |  | d.) all of the above.  |

1.7 A co-factor of an enzyme can be

|    |  |                            |
|----|--|----------------------------|
| a. |  | a.) a coenzyme             |
| b. |  | b.) a metal ion activator. |
| c. |  | c.) a prosthetic group.    |
| d. |  | d.) all of the above.      |

1.8 Enzymes that carry out addition or removal of water are called,

|    |  |                 |
|----|--|-----------------|
| a. |  | a.) hydrolases. |
| b. |  | b.) oxidases    |
| c. |  | c.) isomerases. |
| d. |  | d.) ligases.    |

1.9 Miller and Urey apparatus explained,

|    |  |                                             |
|----|--|---------------------------------------------|
| a. |  | a.) the theory of special creation.         |
| b. |  | b.) the theory of extra-terrestrial origin. |
| c. |  | c.) the theory of spontaneous origin.       |
| d. |  | d.) bubble theory.                          |

1.10 Which of the following microscope is the best suited to observe a suspension of bacteria?

|    |  |                                |
|----|--|--------------------------------|
| a. |  | a.) Compound microscope.       |
| b. |  | b.) Phase contrast microscope. |
| c. |  | c.) Oil immersion microscope.  |
| d. |  | d.) Dark field microscope.     |

1.11 Red blood cells do **not** agree with the cell theory because,

|    |                             |
|----|-----------------------------|
| a. | a.) they lack a cell wall.  |
| b. | b.) they lack a nucleus.    |
| c. | c.) they lack a protoplasm. |
| d. | d.) of all the above.       |

1.12 Out of the features given below, which ones are absent in prokaryotes?

|    |                                 |
|----|---------------------------------|
| a. | a.) nucleus and a cytoskeleton. |
| b. | b.) cell wall and flagella.     |
| c. | c.) ribosomes and DNA.          |
| d. | d.) cell division and motility. |

1.13 Extrinsic or peripheral proteins in the plasma membrane

|    |                                                 |
|----|-------------------------------------------------|
| a. | a.) are attached tightly to the membrane.       |
| b. | b.) cannot be easily removed.                   |
| c. | c.) are superficially attached to the membrane. |
| d. | d.) penetrate the membrane.                     |

1.14 Endocytosis and exocytosis

|    |                                                 |
|----|-------------------------------------------------|
| a. | a.) are active processes.                       |
| b. | b.) are involved in bulk transport of material. |
| c. | c.) can be found in all the organisms.          |
| d. | d.) show all the above features.                |

1.15 Diffusion

|    |                                                                 |
|----|-----------------------------------------------------------------|
| a. | a.) is an active process.                                       |
| b. | b.) is a process which needs no energy input.                   |
| c. | c.) takes place only in gases                                   |
| d. | d.) is inversely proportional to the temperature of the medium. |

1.16 Which of the following is **not** a function of RNA?

|    |                                                                            |
|----|----------------------------------------------------------------------------|
| a. | a.) enzymatic activity.                                                    |
| b. | b.) serving as a genetic material in some organisms.                       |
| c. | c.) carrying genetic information from DNA to the site of protein synthesis |
| d. | d.) all of the above are functions of RNA.                                 |

1.17 If human body cell has 23 pairs of chromosomes, how many a red blood cell would contain?

|    |  |
|----|--|
| a. |  |
| b. |  |
| c. |  |
| d. |  |

- a.) 0 pairs of chromosomes  
 b.) 23 pairs of chromosomes.  
 c.) 46 pairs of chromosomes.  
 d.) 92 pairs of chromosomes.

1.18 An example of a monosaccharide ketose having six Carbons is

|    |  |
|----|--|
| a. |  |
| b. |  |
| c. |  |
| d. |  |

- a.) glucose.  
 b.) fructose.  
 c.) galactose.  
 d.) mannose.

1.19 The autotrophs are defined as the organisms

|    |  |
|----|--|
| a. |  |
| b. |  |
| c. |  |
| d. |  |

- a.) obtaining their organic food from other sources.  
 b.) which are able to synthesize their organic food.  
 c.) which synthesize their organic food using energy of a chemical reaction.  
 d.) which synthesize their organic food using energy of sunlight.

1.20 If a student needs to check the rate of photosynthesis of *Hydrilla* in an experiment, which of the following methods can be used to obtain accurate results?

|    |  |
|----|--|
| a. |  |
| b. |  |
| c. |  |
| d. |  |

- a.) harvest method.  
 b.) gas exchange method.  
 c.) both of the above mentioned in a and b.  
 d.) none of the above mentioned in a and b.

1.21 Which of the following statements is **incorrect** regarding intra-cellular signaling?

|    |  |
|----|--|
| a. |  |
| b. |  |
| c. |  |
| d. |  |

- a.) Cells change their behavior in response to internal and external stimuli.  
 b.) One of the most important intracellular messengers is  $Mg^{2+}$   
 c.) Water stress in plants induces uptake of  $K^+$  into guard cells  
 d.) Cell stimulation can change the concentration of intracellular solution.

1.22 Which of the following would yield the highest amount of ATP in respiration?

|    |  |
|----|--|
| a. |  |
| b. |  |
| c. |  |
| d. |  |

- a.) Sucrose  
 b.) Citric acid.  
 c.) Pyruvic acid.  
 d.) Acetyl CoA.

1.23  $C_4$  plants can be differentiated from  $C_3$  plants by having,

|    |                                                  |
|----|--------------------------------------------------|
| a. | a.) large bundle sheath cells with chloroplasts. |
| b. | b.) palisade parenchyma.                         |
| c. | c.) spongy parenchyma                            |
| d. | d.) large mesophyll cells.                       |

1.24 If a plant has two pairs of heterozygous genes, the number of different types of gametes formed by this plant is

|    |        |
|----|--------|
| a. | a.) 2. |
| b. | b.) 4. |
| c. | c.) 6. |
| d. | d.) 8. |

1.25 Meiosis is important for organisms because

|    |                                                           |
|----|-----------------------------------------------------------|
| a. | a.) it reduces the number of chromosomes into half.       |
| b. | b.) during meiosis mixing of traits takes place.          |
| c. | c.) it produces four daughter cells from one mother cell. |
| d. | d.) of all the above reasons.                             |

(100 marks)

**Part B - Structured Essay Question**

2a) How do plants obtain the following elements?

- i) C.....
- ii) H.....
- iii) O.....
- iv) N.....

b) In what way does water help in absorbing the minerals into plants?

.....

.....

.....

c) What is the special feature of water which makes it suitable for mineral absorption?

.....

d) What is water potential?

.....

.....

e) If there are pure water and a solution of NaCl, what can you say about the water potential value of these at standard temperature and pressure?

Pure water.....

NaCl solution.....

f) If a plant cell having an osmotic potential of -12 bars and pressure potential of +3 bars is kept in an external solution having osmotic potential of -5 bars, which way will the water move?

Explain the above process using a suitable equation.

.....

.....

.....

.....  
.....  
.....

g) Differentiate between plasmolysis and incipient plasmolysis

.....  
.....  
.....  
.....  
.....

(100 marks)



**Part II – Essay Type Questions (1 ½ hours)**

**Answer any three (3) questions using the answer book provided.**

- 1a) What are the four major biomolecules found in human body?
- b) Out of the above mentioned biomolecules, which type of biomolecule would form enzymes?
- c) Define enzymes.
- d) Briefly explain how enzymes would increase the rate of a reaction. You may use diagrams where necessary.
- e) Using suitable diagrams, describe the effect of temperature on the enzyme activity of a human body.

2 a) State Mendel's second law.

b) What are the phenomena that deviate from the Mendel's laws?

When two mice with yellow fur were crossed, the F<sub>1</sub> generation resulted in two mice with yellow fur and one mouse with non-yellow fur.

c) What is this phenomenon?

d) Using suitable symbols explain the above cross.

3a) What are the main substrate and the end products of cellular respiration?

b) What are the other additional compounds which enter into this reaction?

c) How do these compounds you mentioned in a) and b) above enter the cellular respiration?

d) Briefly describe how a marathon runner obtains energy to run the race.

e) Explain how yeast cells produce energy in an environment where oxygen is absent.

4a) Draw a suitable diagram to show all the organelles of a plant cell.

b) Give functions of each of the organelles you mentioned in a).

c) Give differences between a plant cell and an animal cell.

5) Write short notes on any three (03) of the following.

- a) Incomplete dominance
- b) Importance of meiosis
- c) Heterotrophs
- d) Types of light microscopes.
- e) Nucleic acids

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