

# THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

FIRST SEMESTER EXAMINATION – 2021

DEPARTMENT OF AGRICULTURE

AG 111 BIOCHEMISTRY

**FIRST YEAR BSAG**

10<sup>th</sup> Jun, 2021 8.20 AM TIME ALLOWED: 2 ½ HOURS

## INFORMATION FOR CANDIDATES:

1. You have 10 minutes to read the paper. You must not begin writing during this time.
2. Answer **ALL** questions in numerical order.
3. Answers must be written in the book provided. No other written materials will be required.
4. Rules, calculators and correction fluids are required in the examination room. Notes and textbooks are not allowed.
5. Write your name and student number clearly on the front page of your answer book and examination attendance slip. **DO IT NOW.**
6. Marks allotted to each question are indicated against the question number or part number.
7. Total marks = 50

## PART-A

**Define the following terms.**

(10 marks)

1. Cytokinesis
2. Mutation
3. RNA splicing
4. Fermentation
5. Adenosine triphosphate
6. pH
7. Isoenzymes
8. Homopolysaccharide
9. Soap
10. Recommended daily allowance (RDA)

## PART-B

**Short answer questions.**

11. Why is the monosaccharide in nucleic acid called a pentose sugar? (1 mark)
12. How many ATPs are produced from one molecule of glucose passing through metabolic pathways of glycolysis? (1 mark)

**Answer questions 13 and 14 using the amino acid chart:**

		<i>Second Base</i>				
		<b>U</b>	<b>C</b>	<b>A</b>	<b>G</b>	
<i>First Base</i>	<b>U</b>	Phe Phe Leu Leu	Ser Ser Ser Ser	Tyr Tyr Stop Stop	Cys Cys Stop Trp	<b>U C A G</b>
	<b>C</b>	Leu Leu Leu Leu	Pro Pro Pro Pro	His His Gln Gln	Arg Arg Arg Arg	<b>U C A G</b>
	<b>A</b>	Ile Ile Ile Met	Thr Thr Thr Thr	Asn Asn Lys Lys	Ser Ser Arg Arg	<b>U C A G</b>
	<b>G</b>	Val Val Val Val	Ala Ala Ala Ala	Asp Asp Glu Glu	Gly Gly Gly Gly	<b>U C A G</b>

13. What is the correct amino acid sequence for the mRNA code AUGCCAGUAUGA? (1 mark)

14. Which of the following changes would be expected if CAUUUG sequences of bases mutated to CACUUG? (1 mark)
- A. The amino acid sequence would be shorter than expected
  - B. The identity of one amino acid would change
  - C. The identity of more than one amino acid would change
  - D. The amino acid sequence would remain unchanged
15. What is attached to the Transfer RNA (tRNA)? (1 mark)
16. Which organelle in an animal cell determines the position of the nucleus? (1 mark)
17. What are the four levels of structure in a protein? (2 marks)

## PART-C

### Explanatory questions.

18. Discuss the role of restriction enzyme in the process of gel electrophoresis. (4 marks)
19. Describe protein modelling. (4 marks)
20. Discuss what happens in the two stages in photosynthesis. (4 marks)
21. List and explain the factors that influence the enzyme kinetics. (5 marks)
22. Explain the lipid bi-layer structure of the cell membranes with the help of neat diagram. Comment on properties of cell membranes such as asymmetry, fluidity and mosaic nature. (5 marks)

## PART-D

**Choose a correct answer from the multiple choices given.** (10 marks)

23. The vitamin responsible for normal clotting of blood\_\_\_\_\_.
- a. vitamin A                      b. vitamin E                      c. vitamin D                      d. vitamin K
24. \_\_\_\_\_ is the specific qualitative test that distinguishes between reducing sugars and non-reducing sugars.
- a. Molisch test                      b. Benedict's test                      c. Seliwanoff's test                      d. Iodine/KI test
25. Amylopectin is a polymer of \_\_\_\_\_.
- a.  $\alpha$ -D-glucose                      b.  $\beta$ -D-glucose                      c.  $\alpha$ -D-galactose                      d.  $\beta$ -D-galactose

26. \_\_\_\_\_ is the milk sugar.
- a. Maltose                      b. Glucose                      c. Lactose                      d. Galactose
27. A heteropolysaccharide common in microbial cell walls is \_\_\_\_\_.
- a. cellulose                      b. starch                      c. glycogen                      d. peptidoglycan
28. An example of a simple lipid is \_\_\_\_\_.
- a. wax                      b. prostaglandin                      c. animal fat                      d. vegetable oil
29. The lipid-like portion in a glycolipid is bonded to a carbohydrate and will have a \_\_\_\_\_ base attached to a fatty acid.
- a. glycerol                      b. D-galactose                      c. sphingosine                      d. cerebroside
30. A group of related enzymes participating in a given metabolic pathway is called as \_\_\_\_\_.
- a. allosteric enzymes                      b. co-factors                      c. co-enzymes                      d. multienzyme complex
31. Phosphorylation of glucose is carried out by hexokinase enzyme. Hexokinase enzyme belongs to \_\_\_\_\_ group of enzymes.
- a. oxidoreductases                      b. transferases                      c. hydrolases                      d. ligases
32. The pH of a biological fluid with  $[H^+]$  concentration of  $5 \times 10^{-4}$  moles/L is \_\_\_\_\_.
- a. 4.3                      b. 3.7                      c. 3.3                      d. 3.9