

THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

FIRST SEMESTER FINAL EXAMINATION – 2020

DEPARTMENT OF AGRICULTURE

AG 111 BIOCHEMISTRY

1st YEAR B.Sc.(Ag.)

TIME ALLOWED: 2 HOURS

Thursday, 25th June 2020

AG1-32/AG1-25

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. The answers to different **PARTS** should be written discretely.
3. Answers must be written in the book provided. No other written materials will be required.
4. Rulers, 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.
7. Total marks = **50**

PART-A

Define the following terms.

(1 mark each)

1. Catabolism
2. Halophiles
3. Cytokinesis
4. Bioinformatics
5. Restriction enzymes
6. Isoenzymes
7. Enantiomers
8. Saturated fatty acids
9. Buffer solution
10. K_m

PART-B

Short answer and multiple choice questions.

(1 mark each)

1. At which stage of protein formation are helix and sheet structures of proteins initiated and formed?
2. How many ATPs are produced from one molecule of glucose passing through metabolic pathways of glycolysis, Krebs cycle and electron transfer system?

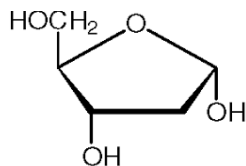
Answer questions 3, 4 and 5 using the following DNA segment and amino acid chart:

DNA segment: 5'-ATGAGGCATGAGACG-3' (coding strand)

3'-TACTCCGTA CTCTGC-5' (template strand)

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

3. What products would be formed from the segment's replication?
4. Write the mRNA sequence that would be obtained from the segment's transcription.
5. What is the amino acid sequence of the peptide produced from the mRNA in question 4?
6. The interactions occurring between neutral atoms are called_____.
- a. ionic bonds b. hydrogen bonds c. Hydrophobic interactions d. van der Waals forces
7. The $[H^+]$ concentration in milk is 4.5×10^{-7} moles/L. What is the $[OH^-]$ concentration?
- a. 2.2×10^{-8} moles/L b. 4.5×10^{-7} moles/L c. 22×10^{-9} moles/L d. 45×10^{-9} moles/L
8. Some structures of fatty acids are given below.
- i. $CH_3(CH_2)_{10}COOH$
- ii. $CH_3(CH_2)_{14}COOH$
- iii. $CH_3(CH_2)_4CH=CHCH_2CH=CH(CH_2)COOH$
- iv. $CH_3CH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_7COOH$
- Which of the fatty acids has the highest melting point?
- a. i b. ii c. iii d. iv
9. _____ is required as a co-factor for the enzyme prolyl hydrolase in the production of collagen protein.
- a. ascorbate b. Fe^{2+} c. ascorbic acid d. α - keto glutarate
10. _____ is a precursor of retinol.
- a. dehydrocholesterol b. α -tocopherol c. β -carotene d. 11-cis-retinal
11. Lactose is a disaccharide made up of one molecule of β -D-glucose and a _____ molecule.
- a. β -D-galactose b. β -D-glucose c. α -D-fructose d. α -D-glucose
12. Structure of β -D-2 deoxyribose is given below.



Certain statements are made on the structure of deoxyribose sugar.

- i. Deoxyribose is a ketose sugar
- ii. It is a pentose
- iii. Its chiral molecule is α -D-2 deoxyribose

iv. One oxygen atom is missing at second C atom

Now, which statement/s is/are true regarding the given deoxyribose structure?

- a. i and iii b. i and iv c. ii and iii d. ii and iv
13. The inhibitor that binds to enzyme- substrate complex only and not to the free enzyme is called _____.
- a. a non-competitive inhibitor b. an uncompetitive inhibitor c. a competitive inhibitor d. negative feedback inhibitor
14. To remove contaminant proteins from a crude protein extract which biochemical technique would you use?
- a. electrophoresis b. dialysis c. mass spectrometry d. ammonium sulphate precipitation
15. You were given four amino acid solutions (proline, tyrosine, glycine and cysteine) in the test tubes without labels. You are asked to identify the test tube with amino acid cysteine which has a –SH group in its structure. Which test will you perform?
- a. ninhydrin test b. biuret test c. nitroprusside test d. xanthoproteic test

PART-C

Explanatory questions.

1. Discuss the process of gel electrophoresis. (2 marks)
2. What are the factors that are involved in the different processes of metabolic pathways? (5 marks)
3. Discuss the two stages in photosynthesis. (4 marks)
4. Describe what happens during RNA splicing. (4 marks)
5. Enlist and explain the factors that affect the activity of enzymes. (5 marks)
6. Explain the principle and purpose of UV spectrophotometry and size exclusion chromatographic techniques. (5 marks)

!!! GOOD LUCK !!!