25

(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

MAIN EXAMINATIONS
MAIN CAMPUS

THIRD YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DIPLOMA OF APLLIED BIOLOGY

COURSE CODE: DSB 051

COURSE TITLE: BASIC BIOINFORMATICS

DATE: TUESDAY, 26TH APRIL 2022 **TIME: 8:00 – 10:00 A.M.**

INSTRUCTIONS TO CANDIDATES

Answer ALL questions in section A and ANY TWO selected from section B

TIME: 2 Hours

SECTION A (SHORT ANWSER QUESTIONS, 40 MARKS)

1. Define: (3 marks)
   a. Bioinformatics
   b. Protein Sequence
   c. Global Alignment
2. Distinguish between Pharmacogenomics and Pharmacogenetics. (3 marks)
3. State two commonly used tools in Bioinformatics. (2 marks)
4. State four skills that a Bioinformatician should have. (4 marks)
5. Explain the following components of the Internet; (8 marks)
   a. World Wide Web
   b. E-Mail
   c. TELNET
   d. FTP
6. Distinguish between; (6 marks)
   a. FAQs and RFCs
   b. Global Alignment and Local Alignment
7. Discuss the Importance of Sequence Alignment (5 marks)
8. Using Examples, describe the different types of BLAST searches (5 marks)
9. FASTA is the first widely used program fro Database similarity searches. Discuss the 3 different types of FASTA programmes. (4 marks)

SECTION B (ESSAY QUESTIONS, 30 MARKS)

10. Define Biological database and discuss the various types of biological databases using relevant examples. (15 marks)
11. Apart from analysis of Genome Sequence data, Bioinformatics is now used for vast array of other important tasks. Discuss the various applications of Bioinformatics in research. (15 marks)
12. Briefly explain the main steps involved in Building a Phylogenetic tree. (7 marks)

SECTION A (60 MARKS)

QUESTION 1

The following data on yield in kilograms per acre of two rice varieties was obtained from selected fields:

Fields	1	2	3	4	5	6	7	8	9
Variety A (Yield in Kgs/Acre)	40	80	55	63	75	52	47	60	58
Variety B (Yield in Kgs/Acre)	80	76	65	85	82	53	65	70	80

Use the above data to determine the following statistical outputs:

a. The consistent/stable variety of rice in productivity (8 marks)
b. The best performing variety in productivity between the two (7 marks)

QUESTION 2

The data is from an experiment involving a certain dog species of the same age; that were being reared in cages and being fed on selected diet. Determine the direction of skew of the data and using a suitable procedure normalize the data and determine the mean of the same.

(15 marks)

Dog Number	1	2	3	4	5	6	7	8	9	10
(Weight in Kgs)	20	10	25	80	15	50	20	60	30	85

QUESTION 3

You have been tasked by Kenya Bureau of Standards to test whether bread being sold by United millers company in Kakamega town is within the standard of 400 grams weight. Through random sampling you collected ten loafs of bread with the following weights; 388g, 398g, 401g, 395g, 380g, 379g,400g 410g,387g and 402g. Using a suitable statistical procedure determine whether the bread sampled is within expected standards (15 marks)

QUESTION 4

Six hybrid goats were fed to two mineral supplements types namely; Nguvu and Vitality, and their weights recorded in kgs as indicated in the table below. Use the data to answer the following question:

Goat	FED ON Nguvu	FED ON Vitality
1	80	79
2	78	75
3	81	82
4	84	83
5	80	76
6	77	77

a. List a null hypothesis one can pursue in this analysis (3 marks)
b. Assuming the data is normally distributed, determine which supplement is better in enhancing weight gain (12 marks)

QUESTION 5

The following is the number of influenza cases in Kakamega based on mean monthly temperature for five months recorded in a certain study.

Month	1	2	3	4	5
Influenza cases	1200	220	900	120	1000
Temperature (°C)	10	22	15	28	14

a. Using the data determine whether there is a significant correlation between inlfuenza cases and the temperature levels (8 marks)
b. Determine the linear regression equation for this data and predict the number of cases when the temperature is 30 °C (7 marks)

QUESTION 6

The following data was obtained from Masinde Muliro University's first year student population for academic year 2021/2022 based on courses of choice. Analyse the data descriptively using gender for presentation: (15 marks)

Course	Female	Male
Engineering	240	310
Medicine	10	23
Applied sciences	321	422
Education	1016	902
Social sciences	645	438
Totals	**2232**	**2095**