



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

**FOURTH YEAR SECOND SEMESTER MAIN PRACTICAL
EXAMINATION**

FOR THE DEGREE

OF

BACHELOR OF SCIENCE IN MEDICAL BIOTECHNOLOGY

COURSE CODE: MLB 400

COURSE TITLE: PRACTICUM II

DATE: 12TH APRIL 2023

TIME: 9.00 – 11.00 AM

INSTRUCTIONS TO CANDIDATES

You are provided with the following link. <https://www.ncbi.nlm.nih.gov/>

Use it to answer the questions that follow.

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

1. Access Insulin gene on NCBI database using the above link: Select the IRS1 (Insulin receptor substrate 1) on your search output.
 - a) Write down the accession number of the gene sequence (5 Marks)
 - b) In what format is the sequence presented? (5 Marks)
 - c) What characterizes the file you have named above? (5 Marks)
 - d) Explain the type of nucleic acid represented by the sequence you have identified above? (5 Marks)
 - e) Write down the first 10 and last 10 nucleotides of the sequence above (8 Marks)
2. Search for the first 100 most similar sequences to the above sequence using BLAST N tool. Open “PREDICTED Homo sapiens insulin receptor substrate 1 (IRS1), mRNA in your alignment output
 - a) What is the accession number and maximum score of the alignment? (5 Marks)
 - b) The alignment has a query cover of 100%, what does this imply? (5 Marks)
 - c) In the alignment section for PREDICTED: Marmota marmota marmota insulin receptor substrate 1 (Irs1), mRNA, (Sequence ID: XM 015481462.2), in your search output in (2) identify and name the nucleotide against which the gap was introduced. (5 Mark)
3. Perform protein BLAST search of the above sequence in (1). Access the GenBank file information of “Insulin (Octodon degus)” in your search output.
 - a) Write down the accession number of the protein (4 Marks)
 - b) Explain the information recorded on the locus line of the file (8 Marks)
 - c) What is the name of the file in which the information on this protein is presented? (2 Marks)
 - d) The protein was published in an article titled “Cloning of complementary DNAs encoding islet amyloid polypeptide, insulin and glucagon precursors from a New World rodent, the degu, octodon degus”, who are the authors? (4 Marks)
4. Design one forward and one reverse primer for glyceraldehyde 3-phosphate dehydrogenase (GAPDH).
 - a) Write down the accession number of the target sequence. (4 Marks)
 - b) Identify and write down the first 10 and last 10 nucleotides of the target sequence. (5 Marks)
 - c) Name the primer design tool you will use to design the primer. (2 Marks)
 - d) Write down the first 4 sets of primers generated in your output. (8 Marks)