PAPER 1

TECHNICAL UNIVERSITY OF MOMBASA

School of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN INDUSTRIAL MICROBIOLOGY & BIOTECHNOLOGY

ABT 4301: GENETIC ENGINEERING 1

END OF SEMESTER EXAMINATION

ORDINARY EXAMINATION PAPER 1

SERIES: DECEMBER, 2024 SERIES

TIME: 2 HOURS

DATE: DECEMBER, 2024

Instructions to Candidates

You should have the following for this examination
Answer Booklet, examination pass and student ID
This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.
Do not write on the question paper.

QUESTION ONE (30 MARKS)

a) Define the following terminologies as used in Genetic Engineering.

i. Chaotropic agent 1 Mark

ii. Operon 1 Mark

iii. Exons 1 Mark

iv. Taq polymerase 1 Mark

b) Distinguish between the following terms as used in Genetic Engineering.

(i) A clone and a vector 2 Marks

(ii) Type I and type II restriction enzymes 2 Marks

c) One of the Polymerase Chain Reaction (PCR) components is $MgCl_2$. Outline FOUR effects of $MgCl_2$ in PCR. 4 Marks

d) State the disadvantages of the Guanidinium Thiocyanate-Phenol-Chloroform DNA extraction method. 7 Marks

e) Explain the importance of measuring absorbance of DNA solution at wavelengths 260 nm and 280 nm. 4 Marks

f) Describe the application of recombinant DNA technology in forensic analysis. 7 Marks

QUESTION TWO (20 MARKS)

a) Explain the principle of blue-white screening method in determining a successful ligation. 10 Marks

b) Outline FIVE factors affecting gel electrophoresis. 10 Marks

QUESTION THREE (20 MARKS)

Discuss the nucleic hybridization method you would use to screen a target gene in a DNA library. 20 Marks

QUESTION FOUR

a) Explain the principle of silica matrices in nucleic acid purification. 5 Marks

b) Discuss the salting-out method of nucleic acid extraction. 7 Marks

c) A student programmed his PCR conditions as follows: 95°C for 3 minutes, 94° C for 45 seconds, 72° C for 1 minute, 72° C for 5 minutes. Explain what happened in the PCR. 8 Marks

QUESTION FIVE (20 MARKS)

Explain THREE factors to consider when selecting DNA polymerases for PCR. 20 Marks