COURSE CODE: SBT 801
COURSE TITLE: EXPERIMENTAL TECHNIQUES AND METHODOLOGIES
EXAM VENUE: STREAM: (MSC)
DATE: EXAM SESSION:
TIME: 2 HOURS

Instructions:
1. Answer ALL questions in Section A and Any two questions in Section B
2. Candidates are advised not to write on question paper
3. Candidates must hand in their answer booklets to the invigilator while in the examination room
QUESTION ONE (Compulsory) (30 MARKS)

a) Distinguish between absolute and differential calibration (2 marks).

b) Explain the need for regular “matching” of IRGAS during measurements (1 mark).

c) Explain the following components of a PCR reaction:
   (i) Denaturation (3 Marks)
   (ii) Annealing (3 Marks)
   (iii) Extension (3 Marks)

a) Which enzyme can make a DNA copy using an RNA template? State its advantage to the microorganisms in which it occurs (3 Marks)

b) Explain the disadvantages of agarose gels in DNA quantification (3 Marks)

c) Outline important considerations when designing a microbiology laboratory (3 Marks)

d) Explain three possible sources of contamination in a microbiology laboratory (3 Marks)

e) What are the advantages of using Class II laboratory safety cabinets in microbiological research? (3 Marks)

f) Distinguish between transmission and scanning electron microscopes (3 marks)

QUESTION TWO (15 MARKS)

a) Discuss five methods of sterilization of media and equipment in a microbiology laboratory (7 Marks)

b) Outline the procedure for using a named differential stain for microscopy (8 Marks)

QUESTION THREE (15 MARKS)

Infra-Red Gas Analysis (IRGA) is a technique used to analyze concentrations of CO₂ and H₂O in a volume of air. Explain the principle behind the success of the technique and how the technique can be applied in soil microbiology research.

QUESTION FOUR (15 MARKS)
a) Discuss the principle behind rt-PCR technique in detecting and measuring DNA concentration (8 marks)
b) Discuss spectrophotometry techniques used in determining the concentration and purity DNA (7 marks)

**QUESTION FIVE (15 MARKS)**

a) Explain key precautions that need to be taken into consideration before deciding on an appropriate location for the installation of a weather station. (7 marks)
b) Discuss key weather variables measured by an automatic climate station and how they apply to the general microbiology research. (8 marks)