

BINDURA UNIVERSITY OF SCIENCE EDUCATION
DEPARTMENT OF BIOLOGICAL SCIENCES
HBScBioTec
INTRODUCTION TO BIOTECHNOLOGY (BTEC 111)

2 HOURS (100 MARKS)

APR 2025

INSTRUCTIONS

Answer **FOUR** questions. You **MUST** answer **QUESTION 1** (Section A) and any **THREE** questions from Section B. Each question carries **25 MARKS**. Where a question contains subdivisions, the mark value of each subdivision is given in brackets. Illustrate your answers where appropriate with large, clearly labelled diagrams. You should not spend more than thirty minutes on each question.

SECTION A (COMPULSORY)

- 1 (a) Outline the steps involved in the construction of a recombinant DNA molecule. (13 marks)
(b) (i) State the importance of *Taq* polymerase in PCR reaction. (5 marks)
(ii) Describe the application of PCR in DNA fingerprinting. (7 marks)

SECTION B

2. (a) Using illustrations describe the formation of sticky ends in DNA fragments. (8 marks)
(b) Outline the steps involved in the creation of a complementary DNA library (cDNA). (10 marks)
(c) Describe the functions of two NAMED enzymes used in recombinant DNA technology (7 marks)
3. (a) Outline the basic steps of a PCR-amplification reaction. (15 marks)
(b) Distinguish between reverse transcriptase PCR and real time PCR. (10 marks)
4. Explain what is meant:
(a) Southern blotting. (15 marks)
(b) DNA sequencing. (10 marks)
5. Write short notes on any FIVE of the following:
(i) *Arabidopsis thaliana*. (5 marks)
(ii) Transformation. (5 marks)
(iii) Agarose gel electrophoresis. (5 marks)
(iv) Selectable marker. (5 marks)

(v) Cloning vector.

(5 marks)

(vi) *EcoR*1.

(5 marks)

6. (a) Describe the role of bioinformatics.

(15 marks)

(b) Outline the importance of Arabidopsis Information Resource (TAIR) in biological studies.

(10 marks)

END OF EXAMINATION QUESTION PAPER