BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT: BIOLOGICAL SCIENCES

PROGRAMME: MASTERS IN MICROBIOLOGY AND PLANT PATHOLOGY (MPP)

COURSE CODE: MPP517 (3) NARRATION: METHODS AND TECHNIQUES IN APPLIED PLANT PATHOLOGY

DURATION: 2 HOURS JUN 2025 TOTAL MARKS: 100

INSTRUCTIONS TO CANDIDATES

Answer TWO questions. You MUST answer ONE question from Section A and ONE question from Section B. Each question carries 50 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

1. a. Explain Koch's postulates and their role in confirming pathogen causality. (6 Marks)
   b. Discuss their limitations when applied to obligate pathogens such as viruses and phytoplasmas. (20 Marks)
   c. Describe three commonly used pathogenicity tests and their applications in plant pathology. (24 Marks)

2. A farmer reports widespread leaf yellowing, wilting and reduced yield in a tomato crop.
   a. As a plant pathologist, outline your diagnostic approach (field survey, sample collection, lab testing) to identify the cause of the problem. (25 Marks)
   b. Propose an effective disease management strategy based on your findings. (25 Marks)

SECTION B

3. a. Discuss the causes and consequences of fungicide and bactericide resistance in plant pathogens. (10 Marks)
   b. i) Explain mechanisms of resistance development. (10 Marks)
   ii) Outline best practices for resistance management in plant disease control. (10 Marks)
   c. Provide case studies of diseases where pesticide resistance has become a major challenge. (20 Marks)

4. a. Analyze the role of remote sensing, drones and Internet of Things (IoT)-based sensors in plant disease detection. (15 Marks)
   b. Explain revolutionising precision agriculture through hyperspectral imaging, thermal cameras and machine learning algorithms. (15 Marks)
   c. Provide case studies where these technologies have been successfully applied. (20 Marks)

END OF PAPER