

UNIVERSITY OF SWAZILAND  
FACULTY OF SCIENCE AND ENGINEERING  
DEPARTMENT OF BIOLOGICAL SCIENCES

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MAIN EXAMINATION PAPER 2017/2018

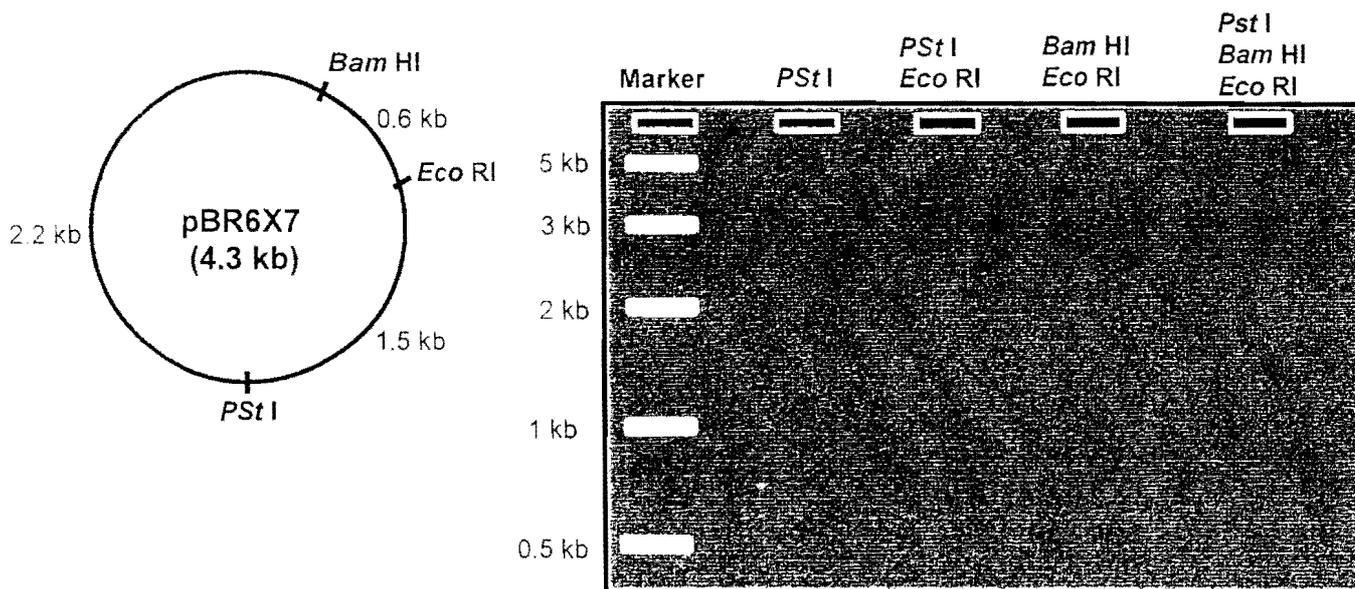
- PROGRAMMES:            B.Sc. III  
                              B. Ed Secondary III
- COURSE CODE:            BIO341
- TITLE OF PAPER:        ADVANCED MOLECULAR BIOLOGY
- TIME ALLOWED:         THREE (3) HOURS
- INSTRUCTIONS:         1. ANSWER QUESTION ONE (COMPULSORY) IN  
                                 SECTION A AND ANY OTHER TWO QUESTIONS IN  
                                 SECTION B.
2. QUESTION 1 CARRIES 50 MARKS AND EACH  
                                 QUESTION IN SECTION B CARRIES 25 MARKS.
3. ILLUSTRATE YOUR ANSWERS WITH LARGE  
                                 CLEARLY LABELLED DIAGRAMS WHERE  
                                 APPROPRIATE

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SECTION A [Compulsory]

Question 1

- (a) (i) Briefly explain the principle of the polymerase chain reaction (PCR), highlighting the factors that may cause a PCR to fail. (6 marks)
- (b) The restriction map for plasmid pBR6X7 is shown below. Indicate and label the locations of the expected bands on the schematic gel below after restriction digestion with the enzymes indicated. (6 marks)



- (c) Explain how a specific DNA fragment can be identified and isolated after genomic DNA has been treated with a restriction endonuclease producing many different fragments of different sizes. (10 marks)
- (d) Discuss the molecular biology and pathogenesis of the human immunodeficiency virus (HIV). (12 marks)
- (e) Discuss how cDNA and gDNA libraries are constructed. (16 marks)
- [Total = 50 marks]

**SECTION B (Answer any two questions in this section)**

**Question 2**

Discuss the mechanism of RNAi in eukaryotic gene control, highlighting the possibilities and challenges of RNAi application in cancer therapy. (25 marks)

**Question 3**

List any five (5) types of molecular markers and indicate their applications in agriculture, medicine and/or forensics. (25 marks)

**Question 4**

Discuss DNA repair mechanisms and indicate the specific disorders that may result when repair mechanisms fail. (25 marks)

**END OF EXAMINATION PAPER**