UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY AND FOOD TECHNOLOGY

B. TECH. BIOTECHNOLOGY

MODULE PBT1YP4
PLANT BIOTECHNOLOGY

CAMPUS **DFC**

Supplementary Examination 2020

DATE: 8 January 2020 **SESSION: Morning (8:00 – 11:00)**

EXAMINER: **MISS S. M. MOYO**

INTERNAL MODERATOR: **MS S. PELO**

EXTERNAL MODERATOR: **DR M. J. BAPELA**

DURATION: 3 Hours **MARKS 106**

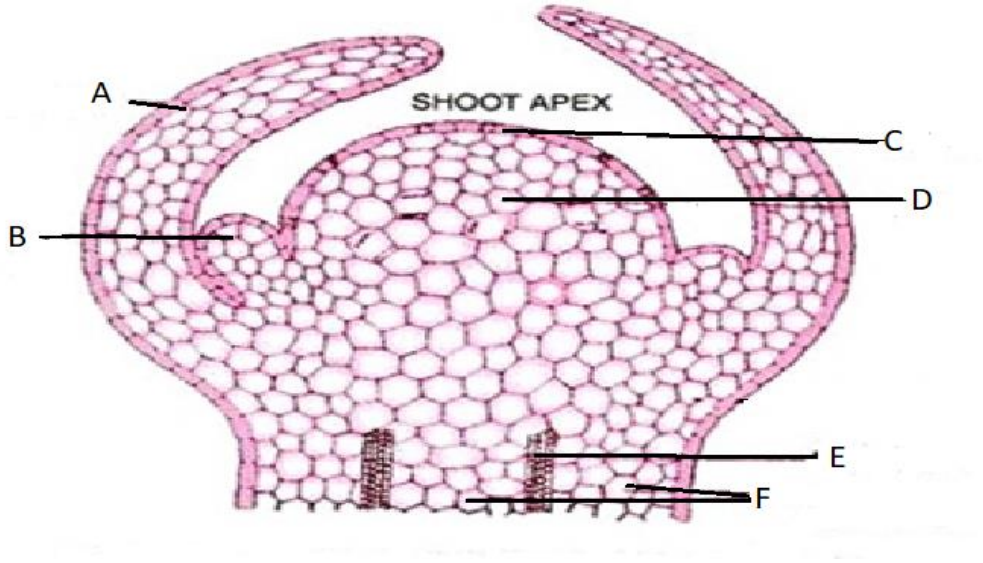
NUMBER OF PAGES: (INCLUDING 1ST PAGE) 4

INSTRUCTIONS TO STUDENTS:

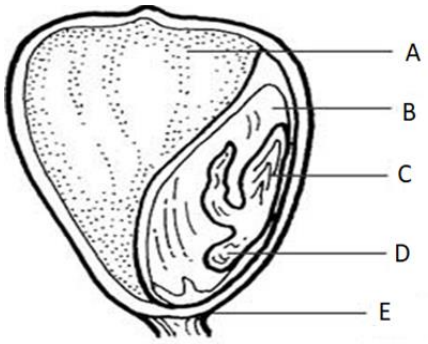
1. Answer all questions in the test answer book provided.
2. Number your answers correctly and clearly, marks will be deducted for untidy and illegible handwriting.
3. Questions may be answered in any order, but sub-sections of questions must be answered together.
4. Good luck!

QUESTION 1:

1.1 From the diagram below label each of the regions of a shoot apex and further describe the regions E and F based on their functions. (10)



1.2 Seeds are essential for the survival and continued existence of many plant species. Label parts of a maize/corn seed shown below and describe different environmental factors that may affect its germination. (15)



1.3 Most seeds produced by mature plants pass through a period of inactivity/dormancy prior to germination.
(i) Describe two ways to break the dormancy. (6)

(31)

QUESTION 2:

2.1 Carbohydrates are defined as polyhydroxy aldehydes or ketones. They are the most abundant organic compounds formed by nature and a play very important role in plants as well as animals in different ways. Describe the role of carbohydrates in plants. (8)

2.2 Describe the function of cytokinin and abscisic acid in plant development.

(I) Cytokinin. (4)

(II) Abscisic acid. (5)

2.3 There are different ways by which micropropagation can be achieved. Multiplication by axillary buds/apical shoots being one of them. Describe Meristem and Shoot Tip Cultures and Bud Cultures. (8)

(25)

QUESTION 3:

3.1 The objective of germplasm conservation is to preserve the genetic diversity of a plant or genetic stock for its use at any time in future. Describe the Mechanism of Cryopreservation and list steps involved in the process of cryopreservation of genetic stock. (10)

3.2 Describe the Limitations of germplasm conservation in the form of seeds. (5)

3.3 List factors that are manipulated during the slow growth method. (4)

(19)

QUESTION 4:

4.1 List the common features of a typical plasmid vector. (7)

4.2 The expression of genes can be controlled through many steps in the pathway leading from DNA to protein. Describe how chemical modifications of chromatin play a key role in chromatin structure and transcription regulation. (8)

4.3 Explain the function of the restriction endonuclease and gel electrophoresis in the isolation of a desired gene. (4)

(19)

QUESTION 5

5.1 Describe Electroporation and Agrobacterium-mediated transformation as a method of plant transformation. (8)

5.2 Advantages of Agrobacterium-mediated transformation. (4)
(12)

THE END