

UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER: DECEMBER 2015

TITLE OF PAPER: SPERMATOPHYTA

COURSE CODE: B301

TIME ALLOWED: THREE HOURS

- INSTRUCTIONS:
1. THIS PAPER IS DIVIDED INTO FOUR SECTIONS
  2. ANSWER A TOTAL OF FOUR (4) QUESTIONS, CHOOSING ONE (1) QUESTION FROM EACH SECTION
  3. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS
  4. ILLUSTRATE YOUR ANSWER WITH LARGE AND CLEARLY LABELLED DIAGRAMS WHERE APPROPRIATE

SPECIAL REQUIREMENTS: NONE

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATORS

**SECTION A (PTERIDOPHYTES)**  
Answer one question from this section.

**Question 1**

- a) List the general characteristics of members of the order Equisetales (Horsetails).  
(5 marks)
- b) Draw and label the spore bearing structure of *Equisetum* and explain sporangium dehiscence, spore release and dissemination.  
(10 marks)
- c) Prepare a table to compare primitive and advanced features in the evolution of pteridophytes.  
(10 marks)

**[TOTAL MARKS = 25]**

**Question 2**

- a) Prepare a table to suggest possible evolutionary trends among ferns.  
(10 marks)
- b) Discuss the evolution of the sporophyte of pteridophytes under the following subtitles:
- (i). Evolution of macrophyllous leaves – Telome Theory, (5 marks)  
(ii). Evolution of microphyllous leaves – Enation Theory, (5 marks)  
(iii). Evolution of the pith – Intrusion and Intracyclic theories (5 marks)

**NB:** Illustrate your answers

**[TOTAL MARKS = 25]**

**SECTION B (GYMNOSPERMS)**

Answer one question from this section

**Question 3**

a) Prepare a table to differentiate between coniferales and cycadales. (10 marks)

b) (i) Draw and label transversal sections of a pine needle and a dicotyledonous leaf. (10 marks)

(ii) List the differences between the two leaves you drew in 3(b)(i). (5 marks)

**[TOTAL MARKS = 25]**

**Question 4**

Describe and illustrate the life cycle of a pine. Note that the following stages should be clearly explained:

(i). Megaspore development, (8 marks)

(ii). Microspore development, (9 marks)

(iii). Embryo development. (8 marks)

**[TOTAL MARKS = 25]**

**SECTION C (TAXONOMY)**

Answer one question from this section

**Question 5**

- a) Plant taxonomists heavily rely on floral characteristics in their work. How do they believe the flower evolved? (5 marks)
- b) Draw Bessey's chart on how angiosperm families could have evolved. (8 marks)
- c) Explain the evolutionary changes that could have occurred to the flower along each line. (12 marks)

**TOTAL MARKS = 25]**

**Question 6**

- a) Discuss family Fabaceae and differentiate the component sub-families. (15 marks)
- b) What other characteristics besides floral ones are also considered in taxonomy? (10 marks)

**[TOTAL MARKS = 25]**

**SECTION D (ANATOMY)**  
Answer one question from this section

**Question 7**

- a) Write brief notes on the following cells:
- i) Parenchyma, (4 marks)
  - ii) Collenchyma. (6 marks)
- b) Explain the following theories of structural development and differentiation:
- i) Histogen Theory, (5 marks)
  - ii) Apical Cell Theory, (5 marks)
  - iii) Tunica-carpus Theory. (5 marks)
- [TOTAL MARKS = 25]

**Question 8**

- a) Discuss sclereids under the following subtitles:
- i) Cell structure and composition, (3 marks)
  - ii) Cell morphology and function, (5 marks)
  - iii) Distribution. (2 marks)
- b) Discuss seed formation & embryo development in *Lilium*, (a monocotyledon) with a 5n endosperm. Illustrate key steps. (15 marks)
- [TOTAL MARKS = 25]

**END OF EXAM PAPER**