UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER: MAY 2013

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) 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]

Question 2

(a) Discuss the life cycles of a typical leptosporangiate fern. Illustrate:
(i) the gametophyte with gametangia, (8 marks)
(ii) sporangia on a sporophyll. (7 marks)

(b) Briefly define the following asexual processes and explain their consequences
(i) apogamy, (6 marks)
(ii) apospory. (4 marks)

[TOTAL MARKS = 25]

SECTION B (GYMNOSPERMS)

Answer **one** question from this section.

Question 3

Explain seed formation in *Pinus* to support its classification as a gymnosperm using the following key steps to illustrate your answer:

(a) Megasporophyte maturation, (9 marks)

(b) Microsporophyte maturation, (10 marks)

(c) Embryo differentiation and seed formation. (5 marks)

[TOTAL MARKS = 25]

Question 4

(a) How do you characterise a gymnosperm? (3 marks)

(b) Prepare a table of criteria that can be used to separate cycads from pines. (9 marks)

(c) List the cells of the xylem and phloem of gymnosperms. (3 marks)

(d) Explain the differentiation of the secondary body in the stem of gymnosperms. Illustrate the following:
- primary body,
- differentiation of the stem,
- differentiation in the outer cortex. (10 marks)

[TOTAL MARKS = 25]

SECTION C (PLANT CLASSIFICATION)

Answer **one** question from this section.

Question 5

Discuss family Fabaceae (old Leguminosae) and compare its sub-classes Ceasalpinioidae, Mimosoidae and Papilionoidae. (25 marks)

[TOTAL MARKS = 25]

Question 6

You are given a flower with the following data:

-Floral formula: ♂5, C(5), A ∞, G(3)
♀
-Calyx is valvate
-Corolla is contorted
-Anthers are bicelled
-Gynaecium is unilocular.

(a) Draw the floral diagram. (10 marks)

(b) Separate the characteristics of this flower into primitive and advanced according to Bessey. (5 marks)

(c) Draw the relevant line of evolution on Bessey's tree and insert this 'family X'. Explain why you inserted it here. (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) Collenhyma. (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-corpus Theory. (5 marks)

[TOTAL MARKS = 25]

Question 8

(a) Cells differentiate in order to be efficient in their function. Illustrate this statement using vessel members. (10 marks)

(b) Discuss seed formation in *Lillium*, an angiosperm with a 5n endosperm. Illustrate key steps. (15 marks)

[TOTAL MARKS = 25]

END OF QUESTION PAPER