



**FACULTY OF SCIENCE**

**DEPARTMENT OF BOTANY and PLANT BIOTECHNOLOGY**

<b>MODULE</b>	<b>ADVANCED PLANT TAXONOMY AND ECONOMIC BOTANY BOT8X05</b>
<b>CAMPUS</b>	<b>APK</b>
<b>EXAMINATION</b>	<b>NOVEMBER 2018</b>

**DATE**  
12/November/2018

**SESSION**  
08:30 – 11:30

**EXAMINER**

**PROF. A. MOTEETEE**

**INTERNAL MODERATOR**

**PROF. M. VAN DER BANK**

**EXTERNAL EXAMINER**

**DR L. JOUBERT**

**DURATION: 3 HOURS**

**MARKS: 150**

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**NUMBER OF PAGES: 6 PAGES**

**INSTRUCTIONS: ANSWER ALL THE QUESTIONS**

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**QUESTION 1**

**[28]**

1.1 Scan the attached article and answer the following questions:

- Provide a suitable title for the article (1)
- Summarise the results of this study in tabular form according to the following trichome characters in all the species (where provided): unicellular or multicellular, conical or elongated, smooth or ridges, with or without flattened disc, cytolithic appendages, thin or thick walled, acute (pointed) or blunt at the apices

(54 x ½ =27)

**QUESTION 2**

**[6]**

- 2.1 What is the difference between an isopolar and heteropolar pollen grain? (1)
- 2.2 What is pollen polarity? (1)
- 2.3 Discuss the different types of units in which pollen grains are released. (3)
- 2.4 What is a tricolporate pollen grain? (1)

**QUESTION 3**

**[6]**

- 3.1 Name and distinguish between the three types of megasporogenesis. (3)
- 3.2 What is the difference between:
- a) axile and parietal placentation
  - b) basal and apical placentation
- 3.3 Which are the two major integument types? (1)

**QUESTION 4**

**[9]**

- 4.1 Define the following terms: (3)
- a) heterostyly
  - b) distyly
  - c) enantiostyly
- 4.2 Briefly describe the biological species concept and explain why it is a better definition of a 'species'. (3)
- 4.3 What is self-incompatibility and what is its significance in plant reproductive biology? (3)

**QUESTION 5**

**[5]**

Discuss the following sources of chemical data that can be used for taxonomic purposes:

- a) Glycosides (3)
- b) Betacyanins (2)

**QUESTION 6**

**[6]**

- 6.1 Elaborate on polyploidy in plants. (4)
- 6.2 How can chromosome behaviour during meiosis affect chromosome number? (2)

**QUESTION 7**

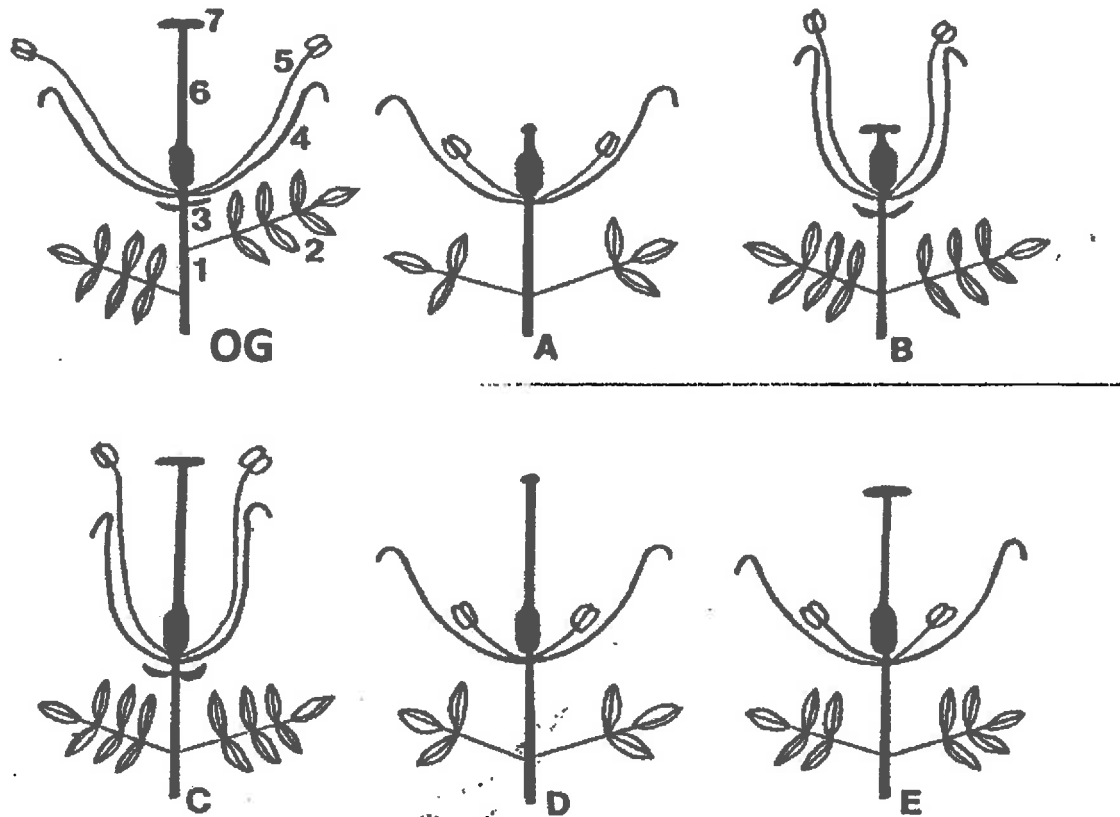
**[10]**

- 7.1 Mention the different categories of plants according to their habitats. (5)
- 7.2 Which phenomenon explains the distribution patterns of plants in southern Africa, Australia, and South America? (2)
- 7.3 Distinguish between centres of diversity and centres of endemism. (2)
- 7.4 Why is the Cape Floristic Region classified as a biodiversity hotspot? (1)

**QUESTION 8**

**[30]**

- 8.1 Name any two botanists regarded as the first taxonomists? In which plant names are they commemorated? (4)
- 8.2 Why was Linnaeus's sexual system criticised? In which publication was this system published? (3)
- 8.3 Explain what Adanson, de Jussieu, de Lamarck, de Candolle, Bentham, and Hooker have in common. (2)
- 8.4 Which American botanist made important contributions to plant classification? In what way were his 'dicta' classified? (2)
- 8.5 Briefly describe the basis for Charles Darwin's theory of natural selection. (3)
- 8.6 Carefully study the figure in the next page showing five species (A-E) as well as the outgroup (OG). (16)
  - a) Identify the characters (1-7) shown in OG and logically polarise the character states
  - b) Construct a "Taxon x Character" data matrix.
  - c) Draw a possible cladogram for the hypothetical species.
  - d) Indicate the following as applicable: sister taxa, apomorphies, and synapomorphies.



### QUESTION 9

[40]

- 9.1 Name the work that provides the rules and recommendations for plant nomenclature? (1)
- 9.2 Provide the taxonomic rank of the following taxa: (5)
- a) Conostylidoideae
  - b) Flacourtiaceae
  - c) *Linnaea borealis*
  - d) Rosales
  - e) *Tribonanthes*
- 9.3 Define the following terms: (4)

- a) holotype
  - b) isotype
  - c) lectotype
  - d) neotype
- 9.4 What is the meaning of an x in a scientific name, as in *Quercus x morehus*? (1)
- 9.5 List the main criteria of a validly published name. (4)
- 9.6 Discuss the following principles of the ICN: (4)
- a) Priority principle
  - b) Uniqueness principle
- 9.7 What is the additional, validly published name for the following plant families? (6)
- a) Apiaceae
  - b) Arecaceae
  - c) Asteraceae
  - d) Brassicaceae
  - e) Fabaceae
  - f) Poaceae
- 9.8 Provide the gender of the following generic names. Also propose artificial specific epithets to accompany these names: (6)
- a) *Podocarpus*
  - b) *Olinia*
  - c) *Homalium*
- 9.9 Using the correct format, indicate specific epithets commemorating the following people: (3)
- a) Fischer
  - a) Burke
  - b) Jutta
- 9.10 If you were to transfer the species *Cassine maurocenia* L. to the genus *Maurocenia*, what would the new name be? Explain your answer. (3)
- 9.11 Explain the author citations in the following situations:
- a) *Buxus natalensis* (Oliv.) Hutch. (1)
  - b) *Olea europaea* L. subsp. *africana* (Mill.) P.S. Green (2)

**QUESTION 10**

**[10]**

- 10.1 Describe the botanical exploration of Carl Pehr Thunberg to South Africa and his contribution to South African botany. (5)
- 10.2 Name three South African herbaria under the auspices of the South African National Biodiversity Institute (3)
- 10.3 Name two broad functions of national herbaria. (2)