Charles Darwin University

Final Examination

Family Name						
Given Name/s						
Student Number						
Teaching Period	Semester 2, 2018					

ENV204 – Ecosystems and Biodiversity	DURATION	
	Reading Time:	10 minutes
	Writing Time:	180 minutes

INSTRUCTIONS TO CANDIDATES

The examination has TWO sections.

Section A: Short Essay Questions
Flora 90 marks (Note that the values of marks vary between questions.)
Answer ALL (5) questions
Suggested Time: 90 mins

Section B: Short Essay Questions
Fauna 90 marks (Note that the values of marks vary between questions.)
Answer ALL (5) questions
Suggested Time: 90 mins

Total marks for this examination: 180

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a CLOSED BOOK examination

No calculators are permitted

No handwritten notes are permitted

No dictionaries are permitted

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
No additional printed material is permitted	2 x 16 Page Book 1 x Scrap Paper

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

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SECTION A

Short Answer Questions
Total Number of Marks for this section: 90

Answer all 5 questions

All questions NOT of equal marks

This section should be answered in the Answer Booklet provided.
Suggested Time allocation for Section A: 90 mins

Question 1

On a sketch of Australia, draw the locations of tropical rainforests, tall *Eucalyptus* forests, *Eucalyptus* forests/woodlands, *Acacia* woodlands/shrublands, hummock grasslands and Australian Mediterranean-type shrublands.

Explain how climate influences the distribution of these communities.

Globally, what geographical and climatic features cause the climatic conditions experienced by deserts and Mediterranean-type shrublands?

(20 marks)

Question 2

Describe in detail all the factors leading to mixing of parental genetic material during meiosis and fertilisation.

What are the advantages and disadvantages in clonal reproduction for desert plants such as *Triodia*?

(15 marks)

Question 3

How have climatic changes, tectonic movement, flooding of the Nullarbor Plain, environmental factors and aboriginal occupation affected the evolution and dominance of sclerophyll Proteaceae in southeastern and southwestern Australia?

Many successful Proteaceae and Myrtaceae are sclerophyllous. What does this mean and what two major advantages do sclerophyllous leaves have that have led to this success?

(20 marks)

Question 4

Discuss the relationships between biogeography and rarity in plant species.

Compare the factors causing rarity in the rare desert *Eucalyptus rameliana* with those factors causing rarity in the conifers, such as:

- *Prumnopitys ladei* (Atherton)

- *Microstrobos fitzgeraldii* (Blue Mountains)

- *Wollemia nobilis*

Why do so many species have restricted ranges in the Northern Territory Arnhem escarpment, such as

- *Boronia quadrilata* and *B. viridiflora*.

(15 marks)

Question 5

a) What is required for the scientific name of a plant species to be valid?

b) The scientific name of the Darwin stringy bark is *Eucalyptus tetrodonta* F. Muell. This was published in F. Mueller (1859) Monograph of the Eucalypti of tropical Australia. *Journal of the Proceedings of the Linnean Society, Botany* 3: 97.
What is the authority and why is it important to include it when referring to a species?

c) Discuss the difference between a valid name of a species and an accepted name. Can valid names or accepted names vary between herbaria in different states and territories of Australia?

d) When carrying out a taxonomic revision of a species why is it important to seek out and look at the type specimen in particular, rather than the just the range of specimens held in Australian herbaria?

(20 marks)

SECTION B

Short Answer Questions
Total Number of Marks for this section: 90

Answer all 5 questions

All questions NOT of equal marks

This section should be answered in the Answer Booklet provided.
Suggested Time allocation for Section B: 90 mins

Question 6

The Australian Government's key piece of environmental legislation is the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). International agreements for the protection of species are legally binding for countries that have formally ratified them. The Australian Government has ratified several international environmental agreements.

a) A developer is planning a new resort close to a Ramsar wetland. What are Ramsar wetlands? (4 marks)

b) This developer would need to find out if the action of building and running that resort might have a significant impact on any matter of national environmental significance. In this instance, describe two matters of national environmental significance that this developer would need to assess (5 marks).

c) Among the international conservation agreements, CITES is one of the oldest and it has the largest membership, with 183 parties (countries or regional economic integration organizations) signing it. What is the main aim of CITES? (4 marks)

d) The Australian Government and all states and territories in Australia have agreed to establish a common assessment method for the assessment and listing of threatened species. It is based on the best practice standard developed by the International Union for Conservation of Nature (IUCN), as used to create the Red List of Threatened Species, with some amendments to suit the Australian context. There are five criteria used to evaluate if a taxon belongs in an IUCN red list threatened category of Vulnerable, Endangered or Critically Endangered. Provide a brief description for two of these five criteria (5 marks).

(Total: 18 marks)

Question 7

Numerous megafauna species became extinct during the transition from the Pleistocene to the Holocene epoch. In Australasia, two thirds of the 27 genera of mammalian megafauna were driven to extinction. Three main hypotheses have been suggested to explain the late Pleistocene mass extinction.

a) Provide a brief description of these three hypotheses. (6 marks)

b) Provide the common name or the scientific name of two large mammals which were present in Australia until the late Pleistocene. (4 marks)

c) Although the Thylacine was extinct on the mainland of Australia when Europeans arrived, it survived into the 1930s in Tasmania. What was the most probable cause for the extinction of the Thylacine (Tasmanian Tiger) on the mainland? Approximately how many years ago did it happen? (5 marks)

(Total: 15 marks)

Question 8

Biologists have not been able to agree on exactly what a species is, or how species should be abstractly defined. There are currently over 60 species concepts and their variants. Ernst Mayr in 1942 defined the well-known "Biological Species Concept".

a) Describe the "Biological Species Concept". (5 marks)

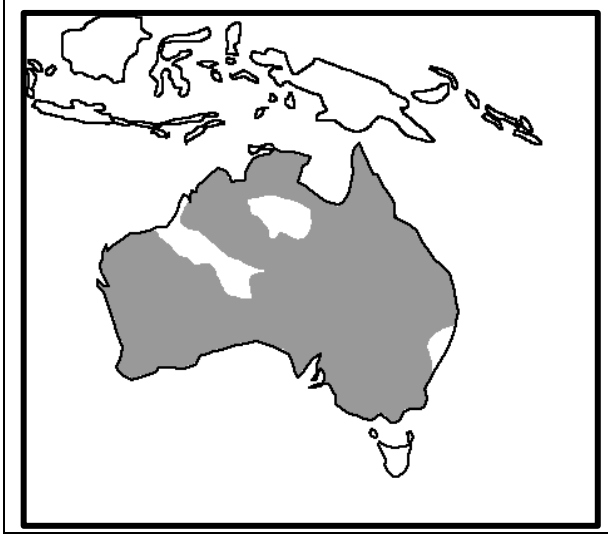
b) What are the weaknesses of the biological species concept that have led to the suggestion of alternative species concepts? Provide at least two weaknesses in your answer. (10 marks)

(Total: 15 marks)

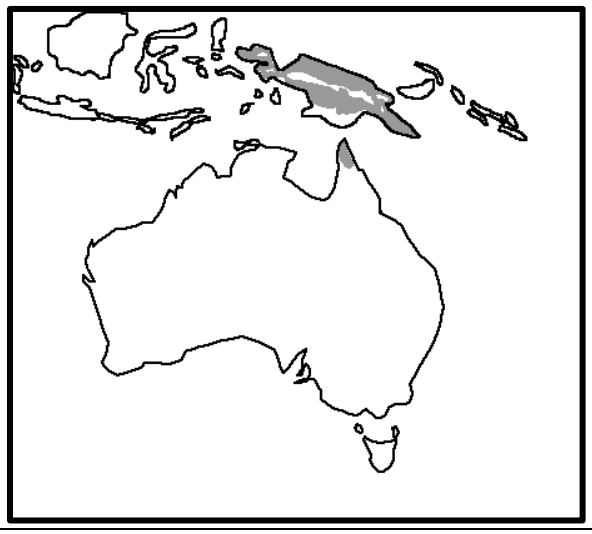
Question 9

The following bird species distributions were retrieved from the IUCN red list website on the 19th of August, 2017 (http://maps.iucnredlist.or).

Common Emu (*Dromaius novaehollandiae*)



Magnificent Riflebird (*Lophorina magnifica*)



Based on the distribution of these two birds and your knowledge of biogeography of Australian birds, answer the following questions:

a) Which species is endemic to Australia? (2 marks)

b) What does it mean for a species to be endemic to Australia? (3 marks)

c) In 1969, Kikkawa and Pearce divided the Australian continent into six Zoogeographic zones: (Timorian, Torresian, Eyrean, Southwestern, Kosciuskan and Tasmanian). According to the zoogeographic zones, how would you define the Australian distribution of the Magnificent Riflebird? (3 marks)

d) Why does the Riflebird have such a restricted distribution in Australia, in comparison to its New Guinea distribution? (5 marks)

e) Australian faunal elements have different origins. Fill out the table below with a brief description for each of the zoogeographic origins of the Australian fauna and provide one example. Include both the Common Emu and the Magnificent Riflebird as examples in the table. (8 marks)

Origin	Description	Example
Pangaean	Taxa in Australia since Pangaean times; fossils represented in both southern and southern continents.	Cockroaches
Gondwanan		
Asian Tertiary		
Modern		
Introduced		

(Total: 21 marks)

Question 10

Different components in the herpetofauna differ in species richness along environmental gradients.

a) Provide an explanation as to why, in the Northern Territory, frog species richness increases from south to north, whereas lizard species richness increases from north to south. (8 marks)

b) Provide one example of another vertebrate group which also has the same species richness gradient as frogs in the Northern Territory. (5 marks)

c) The lizard family Scincidae has many genera with cryptic species (for example: *Cryptoblepharus* skinks). What are cryptic species? What are the common characteristics of vertebrate groups with many cryptic species? (8 marks).

(Total: 21 marks)