# THE UNIVERSITY OF NEW ENGLAND

**UNIT NAME:** BIOL 120

**PAPER TITLE:** Biology II

**PAPER NUMBER:** First and Only

**DATE:** **Wednesday 8th November 2006** **TIME:** **9.30 AM TO 11.30 AM**

**TIME ALLOWED:** Two (2) hours and fifteen minutes reading time

**NUMBER OF PAGES IN PAPER:** SIX (6)

**NUMBER OF QUESTIONS ON PAPER:** FIFTEEN (15)

**NUMBER OF QUESTIONS TO BE ANSWERED:** FIFTEEN (15)

**STATIONERY PER CANDIDATE:** [5] X 6 LEAF A4 BOOKS [0] X 12 LEAF A4 BOOKS [0] X ROUGH WORK BOOKS

**GRAPH PAPER:** **NIL** (NUMBER OF SHEETS)

**POCKET CALCULATORS PERMITTED:** **NO**

**OTHER AIDS REQUIRED:** **NIL**

**INSTRUCTIONS FOR CANDIDATES:**

- Candidates may make notes on this paper during the fifteen minutes reading time
- Please use a **separate booklet** for **each section**
- Answer all **FIFTEEN (15)** questions
- There are internal choices in questions FOUR (4), TEN (10) and FOURTEEN (14)
- Please note suggested time allocation for each question
- Use diagrams where appropriate
- Candidates may retain their copy of this examination question paper

**TEXTBOOKS OR NOTES PERMITTED:** **NIL**

# SECTION A

**Use a separate answer book for this section.**

**Answer all FOUR (4) questions in this section but note internal choice in Question Four (4)**

**Suggested time: 30 minutes**

## QUESTION 1 (10 minutes; 10 marks)

**Answer BOTH of the following two parts. Each answer is worth 5 marks.**

(a) Briefly explain, with the aid of diagrams, how the process of mitosis ensures that each daughter cell receives an identical set of chromosomes.

(b) What are the two characteristic processes that occur in a sexual reproductive cycle? How does each of these contribute to genetic variation in the offspring?

## QUESTION 2 (5 minutes; 5 marks)

What do the two parts of a scientific name (binomial) signify? Why is this system used for naming organisms?

## QUESTION 3 (5 minutes; 5 marks)

Describe the structure of a typical bacterium. How do its cells differ from those of eukaryotic organisms?

## QUESTION 4 (10 minutes; 10 marks)

**Answer TWO (2) of the following three parts. Each answer is worth 5 marks.**

(a) What is a protist? Briefly describe an example of a plant-like protist **and** an animal-like protist.

(b) What is a fungus? Discuss an example of an agriculturally or ecologically important role of fungi.

(c) What is a virus? How does a virus reproduce?

## SECTION B

**Use a separate answer book for this section.**

**Answer all FIVE (5) questions in this section.**

**Suggested time: 25 minutes.**

### QUESTION 5 (5 minutes; 5 marks)

List the causes or mechanisms of microevolution. Indicate which mechanisms result in adaptive evolutionary change.

### QUESTION 6 (5 minutes; 5 marks)

Explain the biological species concept.

### QUESTION 7 (5 minutes; 5 marks)

Explain how continental drift has influenced evolution.

### QUESTION 8 (5 minutes; 5 marks)

Distinguish between pollination and double fertilisation in flowering plants.

### QUESTION 9 (5 minutes; 5 marks)

Briefly describe how asexual reproduction can occur in flowering plants.

# SECTION C

**Use a separate answer book for this section.**

**Answer all THREE (3) questions in this section.**

**Suggested time: 30 minutes.**

## QUESTION 10 (10 minutes; 10 marks)

Briefly explain or discuss **FIVE (5)** of the following. Each answer is worth 2 marks.

(a) Ethylene
(b) Primary and secondary cell walls
(c) Specialised underground stems
(d) Control of stomatal opening and closing
(e) Micronutrients
(f) Vascular bundles in stems of dicotyledons
(g) Cohesion and adhesion of water molecules

## QUESTION 11 (10 minutes; 10 marks)

Compare and contrast the three photosynthetic pathways found in plants.

## QUESTION 12 (10 minutes; 10 marks)

**Answer BOTH of the following two parts. Each answer is worth 5 marks.**

(a) Describe the two secondary meristems found in plant stems, their location and the cell types they each produce.

(b) Describe and discuss specialised root adaptations in relation to nutrient supply.

# SECTION D

**Use a separate answer book for this section.**

**Answer ALL questions in this section.**

**Suggested time: 20 minutes.**

## QUESTION 13 (20 minutes; 20 marks)

Answer **ALL** parts of this question in one of the booklets provided.
**Do not answer the questions on the exam paper itself.**

Clearly identify the question and relevant letter: **T** (true) or **F** (false) to denote the correct answer. No marks will be awarded if more than one answer is provided per question.

(a) Plants (= land plants) are more closely related to green algae than they are to other algae.

(b) Possession of cuticle, archegonia and antheridia, and an embryo are all defining features of plants that are also seen as adaptations to a terrestrial environment.

(c) Possession of stomata is a defining feature of bryophytes.

(d) All major lineages of plants (including liverworts and flowering plants) have their origins more than 100 million years ago.

(e) Mosses have a dominant sporophyte generation.

(f) Homospory results in the formation of two kinds of spores – the megaspores (female) and the microspores (male).

(g) All ferns are homosporous.

(h) Ferns have a dominant sporophyte generation.

(i) Ferns are mostly restricted to moist sites by their delicate gametophyte and motile sperm.

(j) All seed plants are vascular plants, but not all vascular plants are seed plants.

(k) All major lineages of plants recognised in classification must contain at least 100 species.

(l) Seed plants as a group are defined by having seeds, pollen grains and secondary wood.

(m) Mature pollen grains are male gametophytes.

(n) All seed plants have non-motile sperm.

(o) Flowering plants are defined by possession of double fertilisation and a carpel

(p) Normal fertilisation in flowering plants results in a triploid zygote.

(q) Pollen grains and spores of plants are protected by the polymer sporopollenin.

(r) Ovules in flowering plants develop into fruit after fertilisation and development.

(s) Female gametophytes in flowering plants are eight-celled, diploids.

(t) Eudicots and dicots are the same lineage of flowering plants.

## SECTION E

**Use a separate answer book for this section.**

**Answer all TWO (2) questions in this section.**

**Suggested time: 15 minutes.**

### QUESTION 14 (10 minutes; 10 marks)

Briefly explain **FIVE (5)** of the following ecological terms:

(a) r-selection
(b) Population growth
(c) Interspecific competition
(d) Mutualism
(e) Parasitism
(f) Secondary productivity
(g) Maximum sustainable yield
(h) Biogeochemical cycles

### QUESTION 15 (5 minutes; 5 marks)

Draw a food web based on your practical work and explain:

(a) Impacts of cutting the trees down
(b) Impacts of removing a top predator
(c) Impacts of adding more parasites