



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2018/2019**

COURSE NAME : ECOLOGICAL DYNAMICS  
COURSE CODE : BWJ 30603  
PROGRAMME CODE : BWW  
EXAMINATION DATE : DECEMBER 2018/ JANUARY 2019  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

- Q1** (a) Define 'Methodology'. (2 marks)
- (b) You are the manager of one top oil palm plantation in Pagoh. Recently, the production of your oil palm is reducing because of the increasing population of oil palm's predator, the rat. As a manager, you are responsible to find out the solution for this problem and you come out with the idea to use the Barn owl (*Tyto alba*) as a biological control for rat population. Before you implement the idea, you need to conduct an experiment first to prove your theory. Using your knowledge in the scientific method of ecological processes, plan your experimental design which include an appropriate explanation about the five stages of the ecological processes. (10 marks)
- (c) There are four classifications of river and stream which are the first-order stream, second-order stream, third-order stream and fourth order stream. Illustrate and label the formation of these **FOUR (4)** river and stream classifications. (8 marks)
- Q2** (a) Identify whether bird is endothermic or ectothermic animal? Justify your answer. (2 marks)
- (b) Explain in details how 'supercooling' prevent animals in cold environment from freezing. (8 marks)
- (c) In photosynthesis, there are two processes involved which are the light reaction and carbon fixation. The carbon fixation process involved three photosynthetic pathways depending on the type of plants such as Calvin Cycle for C3 plants, Hatch and Slack Cycle for C4 plants and CAM photosynthetic pathways for CAM plants. Analyze the full process of Carbon fixation for C3 plants. (10 marks)
- Q3** (a) Differentiate between 'food chain' and 'food web'. (2 marks)
- (b) By using an illustration, compare between food chain and food web. (6 marks)
- (c) State and explain **THREE (3)** properties of soil that affect litter accumulation and decomposition. (6 marks)
- (d) Explain why plants that contain high lignin have slow decomposition rates. (2 marks)

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- (e) **Figure Q3 (e)** shows the decomposition rate of pine branch, pine needle and deciduous leaf of pin-cherry in Canadian temperate forest. Compare the decomposition rate and discuss why the decomposition rate is different between the pine branch, pine needle and deciduous leaf of pin-cherry.

(4 marks)

- Q4** (a) Who is the founder of the modern evolutionary theory?

(1 mark)

- (b) Gregor Johann Mendel introduced the Law of segregation which stated that two copies of gene segregated from each other during transmission from parent to offspring. Predict what will happen to F1 and F2 generation when Mendel crossed true breeding purple and white flowered plants.

(4 marks)

- (c) Static life table is used by ecologist to gather a data on the age structure of a given population at one point in time. Based on **Table Q4 (c)**:

- (i) calculate the number of death in the age class (9-10) years.

(3 marks)

- (ii) calculate the survivorship rate in the age class (7-8) years.

(3 marks)

- (iii) explain about the survivorship rate obtained in **Q4 (c)(ii)**.

(2 marks)

- (d) Using graph illustration, compare and give example of survivorship curve of Type I, Type II and Type III.

(7 marks)

- Q5** (a) There are four hypotheses suggested as causes of spatial and temporal patterns of biodiversity. Name all **FOUR (4)** hypotheses.

(4 marks)

- (b) Compare the hypotheses stated in **Q5 (a)**.

(4 marks)

- (c) Explain **TWO (2)** reasons why the rate of extinction is low at time of first colonization.

(4 marks)

- (d) Illustrate the differences between metapopulations, Core-satellite/Island-mainland metapopulations, patchy populations and non-equilibrium metapopulations.

(8 marks)

– END OF QUESTIONS –

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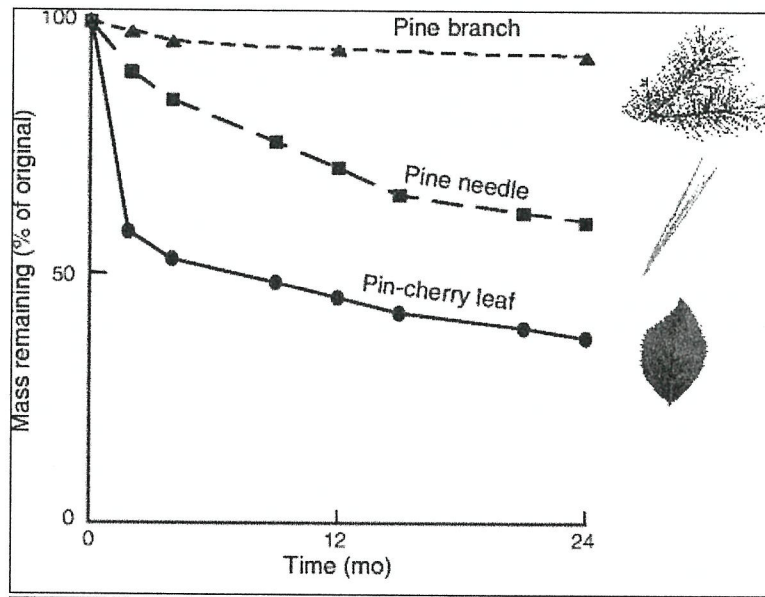


Figure Q3(e)

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Table Q4(c)

Age class	No. alive	No. dying	Proportion surviving	Mortality rate	Average no. alive in age class	Total years alive	Life expectancy
0-1	1000	199	1.000	0.199	900.5	7053	7.0
1-2	801	12	0.801	0.015	795	6152.5	7.7
2-3	789	13	0.789	0.016	776.5	5357.5	6.8
3-4	776	12	0.776	0.015	770	4581	5.9
4-5	764	30	0.764	0.039	749	3811	5.0
5-6	734	46	0.734	0.063	711	3062	4.2
6-7	688	48	0.688	0.070	664	2351	3.4
7-8	640	69	*	0.108	605.5	1687	2.6
8-9	571	132	0.571	0.231	505	1081.5	1.9
9-10	439	*	0.439	0.426	345.5	576.5	1.3
10-11	252	156	0.252	0.619	174	231	0.9
11-12	96	90	0.096	0.937	51	57	0.6

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