UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2021/2022

COURSE NAME	:	ECOLOGICAL DYNAMICS
COURSE CODE	:	BWJ 30603
PROGRAMME CODE	:	BWW
EXAMINATION DATE	:	JANUARY / FEBRUARY 2022
DURATION	:	3 HOURS 30 MINUTES
INSTRUCTION	:	1. ANSWER **ALL** QUESTIONS.
		2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **OPEN BOOK**

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1   (a)   You have been appointed as a leader for a research project entitled 'Monitoring of biotic and abiotic factors in Sungai Muar, Johor'.

         (i)   Name **ONE (1)** biotic factor and **ONE (1)** abiotic factor that your research can focus on.

(2 marks)

         (ii)   Give **ONE (1)** reason for each of your choice mentioned in **Q1(a)(i)**.

(2 marks)

   (b)   Briefly explain why coral reefs belong to the shallow water ecosystem.

(1 mark)

   (c)   Elaborate the process of energy flow and trophic dynamics occurring in **Figure Q1(c)**.

(20 marks)

Q2   (a)   During the hot weather, animals tend to soak themselves in water. What kind of process is involved? Explain in detail how this action helps to cool down an animal's body temperature.

(5 marks)

   (b)   Different plants undergo different photosynthetic pathways in terms of carbon fixation process.

         (i)   Plants that live in tropics and warm temperate zones are classified under which type of plants?

(1 mark)

         (ii)   Explain **TWO (2)** characteristics of plants in **Q2(b)(i)**.

(4 marks)

         (iii)   Enumerate the complete process of photosynthesis for the type of plant mentioned in **Q2(b)(i)**.

(15 marks)

Q3   (a)   Determine **TWO (2)** types of aquatic ecosystem that have high Net Primary Production (NPP). Explain why these ecosystems are productive.

(6 marks)

   (b)   Given that decomposition constant, K is 2 years in tropical rainforest and 4 years in temperate deciduous forest, both forests have an equal amount of forest floor litter pool which is 6000 gC/m^2.

(i)   Calculate aboveground litterfall for both forests.

(7 marks)

(ii)   Calculate the mean residence time for both forests.

(7 marks)

(c)   Lizard that has large body size is prone to be eaten by predator as it is easily visible to its predator. In contrast, a lizard that has a smaller body size can hardly escape from predator as it cannot run fast to escape its predator.

(i)   From the above statement, what can you conclude?

(2 marks)

(ii)   Identify the best natural selection pathway to elucidate the above problem.

(1 mark)

(iii)   Draw the graph of the natural selection pathway mentioned in **Q3(c)(ii)**.

(2 marks)

Q4   (a)   **Table Q4(a)** shows the life table for the American robin, *Turdus migratorius*.

(i)   Calculate the mortality rate for individuals in age class (3 – 4) years.

(3 marks)

(ii)   Calculate the survival rate for individuals in age class (4 – 5) years.

(3 marks)

(iii)   Construct survivorship curve for the American robin, *Turdus migratorius*.

(3 marks)

(iv)   Interpret the graph produced in **Q4(a)(iii)**.

(4 marks)

(b)   The equilibrium theory of island biogeography supported two out of four hypotheses suggested by the previous scientists which determine the spatial and temporal patterns of biodiversity. Determine these **TWO (2)** hypotheses theories and briefly explain each of them.

(4 marks)

(c)   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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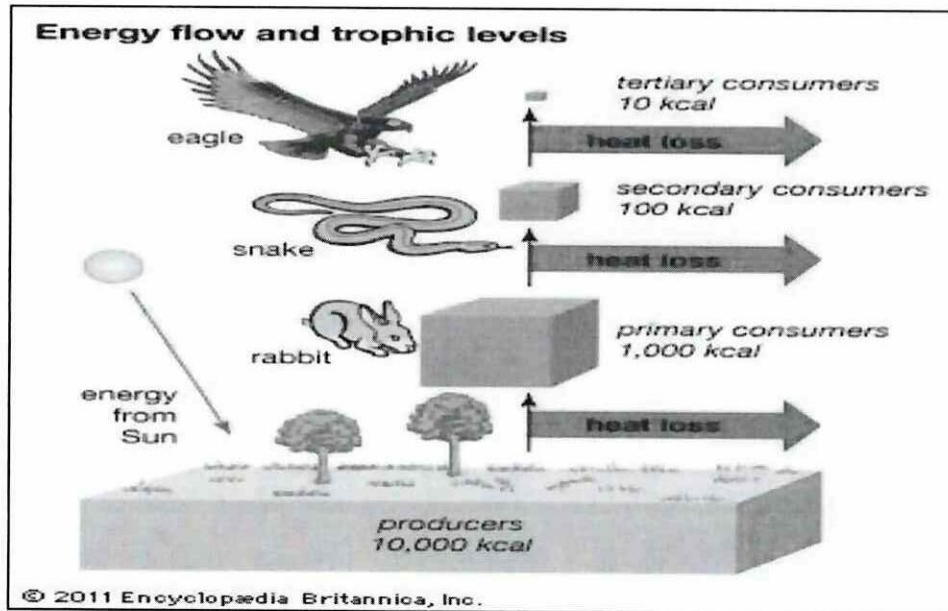PROGRAMME CODE : BWW
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Figure Q1(c)

Age class	n_x	d_x	l_x	q_x	$\log n_x$
0 - 1	568	286	1.00	0.503	2.75
1 - 2	282	152	0.497	0.539	2.45
2 - 3	130	79	0.229	0.608	2.11
3 - 4	51	34	0.090	*	1.71
4 - 5	17	11	0.030	0.647	1.23
5 - 6	6	4	* 0.010	0.667	0.79
6 - 7	2	0	0.004	0	0.30

Table Q4(a)