



UNIVERSITY OF RUHUNA  
BACHELOR OF SCIENCE IN FISHERIES AND MARINE SCIENCES DEGREE

Level II Semester I Examination

July 2015

LIM 2112 – Applications of Basic Ecological Principles to Aquatic Ecosystems

Time: 01 ½ hours

Answer **all** questions

1. Across a stream, velocity and depth were measured at 1m interval from one bank to the other and readings are given in below Table 1.

Table 1:

Water velocity ( $\text{cms}^{-1}$ )	Water depth (cm)
1	17
3	33
7	58
4	49
2	22

- (i) Using above data calculate the total discharge of the stream

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(07 marks)

(ii) From the above <sup>stream</sup> 500g of dried sediment sample was used to study the characteristics of stream bottom. Automatic sieve set was used to separate substrate particles and results obtained are given in the below Table 2.

Using information given in Table 2 describe characteristics of stream bottom.

(use attached graph paper for this question).

Table 2:

Seive size	Weight of the empty sieve (g)	Weight of the sieve after sieving the bottom substrate (g)
2 mm	536.26	564.57
1.4 mm	501.69	521.52
900 $\mu\text{m}$	502.35	548.97
400 $\mu\text{m}$	469.23	694.65
250 $\mu\text{m}$	455.7	573.05
100 $\mu\text{m}$	419.73	479.26
63 $\mu\text{m}$	427.32	429.56
Pan	411.26	411.88

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Table 3

Order	Family	Replicate 1	Replicate 2	Replicate 3	Mean AFDW (g)
Odonata	Euphaedae	46	43	40	1.29
	Cordulidae	0	2	3	0
Tricoptera	Helicopsychidae	87	82	85	1.78
	Hydropsychidae	329	359	338	2.73
	Odontoceridae	9	8	7	0.23
Ephemeroptera	Leptophlebiidae	52	54	52	1.44
	Ephemeridae	46	44	45	1.42
	Caenidae	4	3	4	0
	Baetidae	4	4	4	0
Plecoptera	Nemouridae	54	51	53	1.87
	Perlidae	3	4	3	0
Coleoptera	Scirtidae	23	20	21	2.34
	Hydrophilidae	12	11	11	1.72
	Haliplidae	17	19	18	2.27
	Psephenidae	20	20	21	1.89
	Elmidae	54	58	57	2.74

(iii) Macroinvertebrate samples were collected at three sub sites of the same stream habitat using a Surber sampler (25cm×25cm). The number of individuals for each family at the three subsites and the mean value of Ash Free Dry Weight (AFDW g) for the relevant family are given in Table 3.

Using information give in Table 3 calculate suitable indices to explain the quality of the stream habitat

Note: To answer this question you may use information given in Annex 1











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(30 marks)

3) Copepod reproduction rate was studied at several life cycle stages and the collected data from the experiment are given in Table 5.

Using the data given in Table 5 calculate the production rate of copepod

Table 5:

Size category	Number of individuals	Development time (days)	Minimum weight (µg dry wt)	Maximum weight (µg dry wt)
Eggs	220	2	0.00	0.05
Nauplii	199	6	0.04	0.16
Copepodite 1	180	11	0.16	0.95
Copepodite 2	170	8	0.24	1.53

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(35 marks)

Annex 1:

Following informations given in below table may be useful for question 1 (iii)

Taxonomic order	Taxonomic family	Tolerance value
Odonata	Euphaedae	2
	Cordulidae	2
Tricoptera	Helicopsychidae	3
	Hydropsychidae	4
	Odontoceridae	0
Ephemeroptera	Leptophlebiidae	3
	Ephemeridae	3
	Caenidae	6
	Baetidae	5
Plecoptera	Nemouridae	2
	Perlidae	2
Coleoptera	Scirtidae	5
	Hydrophilidae	5
	Helophoridae	5
	Psephenidae	4
	Elmidae	4

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