

CHUKA UNIVERSITY

RESIT/SUPPLEMENTARY EXAM MAY,2025

ZOOL 412; POPULATION BIOLOGY: YEAR OF STUDY: Y4S2

PROGRAM: BSC (BIOLOGY, GENERAL); BED (Science)

INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO FROM SECTION B

SECTION A (30MARKS)

Q1. a) Explain how age structure affects the growth rate of animal populations. (3mks)

b) Illustrate with examples three types of survivorship curves (3mks)

Q2. a) Identify and explain the model represented by the following equation (3mks)

$$H_a = H_t (1 - e^{-apt})$$

b) Elaborate on three assumptions of Lotka-Volterra predator - prey model (3mks)

Q3. a) The growth of a laboratory culture of bacteria is growing according to logistic equation. If the density is 500 individuals and r is 0.6 per day. Predict the density after 10 days in an initial culture of 8 individuals (4mks)

b) State the assumptions of exponential model of population growth (2mks)

Q4. Write short notes on the following antipredator adaptations

a. Flushing colorations (2mks)

b. Distractive displays (2mks)

c. Escape in time (2mks)

Q5. a) Briefly describe symbiotic interactions found in animals (3mks)

b) Explain at least three ways in which density independent factors limit population growth (3mks)

SECTION B (40 MARKS)

Q6. Discuss antipredator adaptations that enable prey to survive predation (20marks)

Q7. Illustrate using examples and discuss the effects of interspecific competition (20marks)

Q8. A team of fisheries biologists set out to estimate the density of Tana River. At randomly selected point they electro-fished a 1000-m section of the river (with a mean width of 5m). The captured fish were measured, recorded, fin-clipped, then released. Two days later, the sampled the same reach and recorded the number of marked and unmarked fish in each of the 4 size classes. Here is the data.

Size (cm)	Number individuals Day 1	Number of individuals Day 2
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		Unmarked	Marked
<10	73	64	22
10-20	35	28	13
20-30	20	22	18
>30	6	4	2
Total	134	118	55

- a) Using the data, estimate the density (number/hectare) of each size class and the overall density.

Note: 1 hectare = 10,000m²

15mks

- b) Give an account of iteroparous reproductive strategies associated with organisms' success and persistence

(5mks)