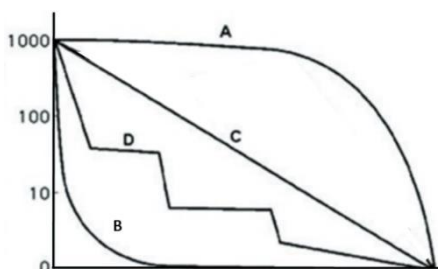


Note: Do not jumble answers for Part A and Part B.

**Part A**

**A 1.1.** Study and label the graph axes and curves. (3)



**A1.2.** State which graph would best represent the life history of butterfly. Justify. (2)

**A2.** As per the foraging strategy model “Balancing the use of food resources”, how can one find out the optimum number of food items the species would feed on? Explain using a diagram. (2)

**A3.** Choose the correct option and justify why you selected a given option and rejected others.

1. Correctly rephrase the following famous quote from J. B. S. Haldane. "I would lay down my life in order to save at least two brothers or \_\_\_\_\_."

- A. one son or daughter (3)
- B. four cousins
- C. three uncles
- D. two nephews and one offspring
- E. two grandsons or granddaughters

2. An early age of first reproduction and short maturation time and life span are features of \_\_\_\_\_ populations. (3)

- A. *r*-selected
- B. *K*-selected

3. The size at which a population stabilises in a particular point is defined as the \_\_\_\_\_ for that species. (4.5)

- A. Max growth potential
- B. optimum size
- C. biotic potential
- D. carrying capacity

4. Consider a few hedgehogs are released on an island with plenty of resources but without any hedgehog and its

predator. During the initial phase, the growth of the hedgehog population is limited majorly by \_\_\_\_\_. (4.5)

- A. the carrying capacity
- B. the biotic potential
- C. only density-dependent factors
- D. specific natality rate

**A4.** Choose the correct option(s) (Multiple options are correct). Partial marks would be awarded for not choosing all correct answers. However, -1 M would be awarded if wrong option is chosen. (6)

i. The following would be included under the umbrella of "inclusive fitness"?

- A. reproduction by nieces and nephews
- B. reproduction by unrelated colony members
- C. reproduction by siblings
- D. reproduction of the individual

ii. Living as a group member may offer the following advantage(s) to the species

- A. increased feeding rate
- B. greater protection from predators
- C. more individuals scan environment for dangers
- D. being more resistant to disease and parasites

iii. Which of the following statement(s) is/are true for IC50 calculation?

- A. Obtained using an in-vitro assay
- B. Is the concentration of the chemical at which 50% of cells die
- C. Obtained using an in-vivo assay
- D. Is the concentration of the chemical at which 50% of cells die
- E. Obtained using dose-response curve

**A5.** Answer the following questions. (2)

I. As discussed in class, \_\_\_\_\_% of all global deaths are linked to the environment.

- A. 24
- B. 42
- C. 48
- D. 12

II. ADME analysis is a \_\_\_\_\_(A)\_\_\_\_\_ process used in toxicology. The abbreviation ADME stands for \_\_\_\_\_(B)\_\_\_\_\_.

Choose from the options below for (B).  
Absorption, Adsorption, Assimilation  
Distribution, Digestion, Degradation  
Materials, Metabolism, Marker  
Excretion, Ecology, Excipients

**A6.** State true or false. Justify your answer. (3)

1. Generally, the number of mimics in a Müllerian mimicry system must be less than the number of models.

2. In Müllerian mimicry, the participants are both mimics and models.
3. A Müllerian mimic is "a sheep in wolf's clothing".

**A7.** Match the following

(2)

<b>A.</b> Microplastic	<b>I.</b> <0.25mm
<b>B.</b> Primary microplastics	<b>II.</b> particles that result from the breakdown of larger plastic items
<b>C.</b> Secondary microplastics	<b>III.</b> Stimulate cytokine/chemokine production
<b>D.</b> Polystyrene	<b>IV.</b> <0.5 mm
	<b>V.</b> tiny plastic particles designed for commercial use

### Part B

**B1.** Differentiate between fundamental niche and realized niche. Give pictorial representation. (4)

**B2.** Give an example of Gause's exclusion principle. (3)

**B3.** How does a [+ -] interaction become [+ +]? (3)