UNAM
UNIVERSITY OF NAMIBIA

FACULTY	AGRICULTURE, ENGINEERING AND NATURAL SCIENCES		
DEPARTMENT	ENVIRONMENTAL SCIENCE		
SUBJECT	BEHAVIOURAL ECOLOGY		
SUBJECT CODE	EBL3812		
DATE	NOVEMBER / DECEMBER 2021		
DURATION	**3 Hours**	**MARKS**	**120**

SUPPLEMENTARY / SPECIAL EXAMINATION

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Moderator: Prof. C. T. Downs (University of KwaZulu-Natal)

This examination consists of 5 pages including the front page

UNIVERSITY OF NAMIBIA EXAMINATIONS

SECTION A: COMPULSORY QUESTIONS (Total 60 marks)

Answer **ALL** questions in this section

Question 1 [10 marks]

Male wasps, *Zapilothynnus trilobatus,* are sexually attracted to flowers of the orchid *Drakaea glyptodont.* This is probably because of the scent of the orchids, which mimic the pheromones of the flightless female wasp. At short range, there is also a visual similarity of the orchid flower to a female wasp. Figure 1 below depicts the mean number of times wasps visit the orchid with time.

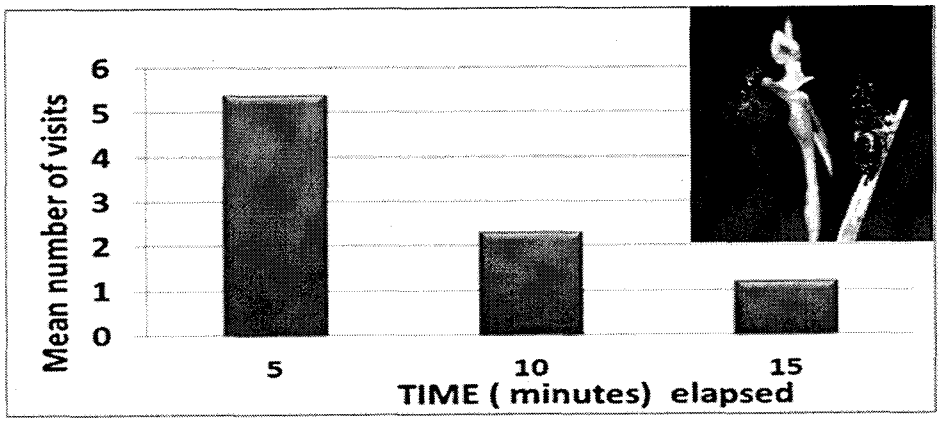

Figure 1. Mean number of visits made by wasps to the orchid with time.

(a) Briefly, what trends do results presented in Figure 1 reveal? [2]

(b) What type of learning is displayed by the wasp based on the results presented in Figure 1? Give reasons for your answer. [3]

(c) Briefly describe three (3) main characteristics of this type of learning. [3]

(d) Briefly describe the adaptive advantage of the type of learning described in Figure 1. [2]

Question 2 [10 marks]

(a) In terms of association, differentiate between:
(i) Classical conditioning [1]
(ii) Operant conditioning [1]

(b) The four major elements of classical conditioning are abbreviated as US, UR, CS, CR. Provide the full name for each element and state the example for each element from the scenario presented below. [8]

Scenario: "To discourage jackals from attacking their sheep, ranchers feed the jackals small pieces of mutton tainted with poison that, when ingested, causes the jackals to experience extreme dizziness and nausea. Later, when the jackals are allowed in the pen with the sheep, the mere smell of the sheep causes the jackals to run frantically away from their former prey".

Question 3 [5 marks]

Reflex action is a good example of a very simple behaviour in animals. Using proximate causation, describe the knee jerk reflex. [5]

Question 4 [5 marks]

List five (5) benefits of mate choice. [5]

Question 5 [10marks]

(a) Briefly list three (3) ways from which signals used in communication in animals may have evolved. [3]

(b) When honeybees communicate, what are the three (3) messages they communicate, and how are these communicated when they arrive at the hive. [7]

Question 6 [10 marks]

(a) While walking to a lecture on a UNAM campus, you notice rosy-faced lovebirds (*Agapornis roseicollis*), calling from the top of a tree in the early morning sun. Using your knowledge of Tinbergen's four questions, match the terms in Columns 2 and 3 to Column 1, to explain the causes of such behaviour. (8)

Column 1	**Column 2**	**Column 3**
1.1 Causation	2.1 Phylogeny	3.1 The song is learned during a sensitive period, when birds are predisposed to learn the songs of conspecifics
1.2 Development	2.2 Adaptation	3.2 Songs function as signals both to warn off rivals and attract
1.3 Evolution	2.3 Mechanism	3.3 Songs in many populations change through a process in which song elements are differentially transmitted across lineages
1.4 Function	2.4 Ontogeny	3.1 Songs are produced from a well-mapped neural circuitry of brain nuclei and their projections within the bird brain

(b) Identify which terms in Column 2 refer to proximate causes of the behaviour. (2)

Question 7 [10 marks]

While on a hike, you hear the bushes next to you rustle, and you get a big fright. Your pupils dilate, your heartbeat and breathing rate increase, and your mouth goes dry. You turn and run away as fast as you can. Discuss the role of your nervous system in your behavioural response and what physiological changes will take place to return you to a state of calmness? (10)

SUBTOTAL: 60 MARKS

SECTION B: CHOICE QUESTIONS (Total 60 marks)

Answer any **TWO** questions from this section.

Question 1 [30 marks]

Many organisms live in groups, and they derive some benefit from such behaviour. Kenward trained a goshawk to attack pigeons. He placed pigeons in different flock sizes and subjected them to the attack by the goshawk. He recorded the distance at which the pigeons reacted to the attacking hungry goshawk and the proportion of successful attacks. These are presented in Figure 2 below.

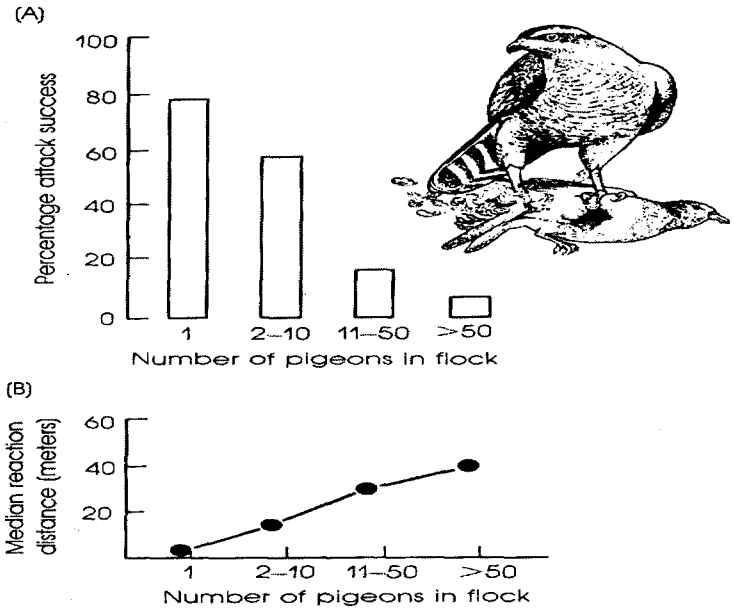

Figure 2. Success of goshawk in attacking pigeons placed in different flock sizes (A) and mean reaction distance of pigeons in flocks of different sizes (B).

Regarding the results of the goshawk attacks on pigeons:

(a) Describe the trends observed in Figure 2 (A) and (B) [4]

(b) Suggest the adaptive significance of living in groups of different flock sizes for pigeons. [2]

(c) Discuss the adaptive significance of group living in animals. [24]

OR

Question 2 [30 marks]

Discuss the different mating systems in animals, especially endotherms. Give a specific example for each type of mating system.

OR

Question 3 **[30 marks]**

Figure 3 below depicts a general communication system in animals.

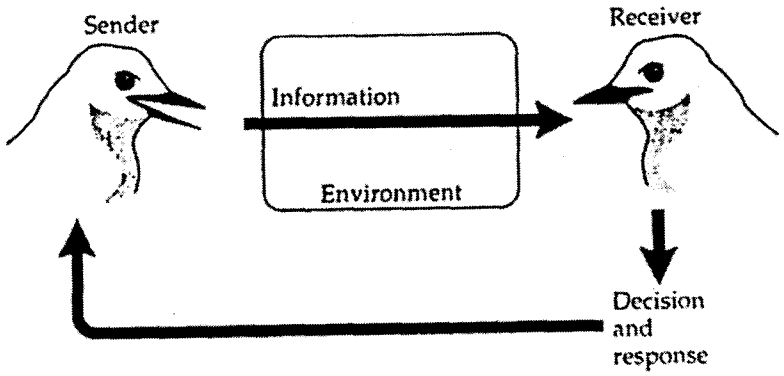

Figure 3. General communication system in animals.

(a) What are the three (3) main processes involved in effective communication when animals use signals? [3]

(b) State the four (4) possible sources from which signals used in communication in animals may have evolved. [4]

(c) Briefly describe Zahavi's (1975) handicap principle as it may be applicable in a signalling system in communication in animals. [6]

(d) Choose any communication behaviour that confers an adaptive advantage to an animal of your choice.

(i) Describe the context in which this behaviour is displayed and how it confers an adaptive advantage to the animal. [5]

(ii) Discuss how this behaviour may have evolved, using Darwin's premises to describe evolution by natural selection. [12]

TOTAL MARKS

SECTION A = 60 MARKS
SECTION B = 60 MARKS
GRANDTOTAL = 120 MARKS

**********END OF EXAMINATION**********