QUESTION 1 (30 marks)

a) Define the following terms:

(i) Nematocysts
(ii) Phylogeny
(iii) Cladistics
(iv) Binomial nomenclature
(v) Monophyletic
(vi) Parthenogenesis
(vii) Exoskeleton
(viii) Deuterostomes
(ix) Hemimetaboly
(x) Holometaboly (3 marks each).

QUESTION 2 (20 marks)

a) Name one class of invertebrate in which all the members have an endoparasitic lifestyle. (1 mark)

(ii) What morphological adaptations does this class have to facilitate an endoparasitic lifestyle? (5 marks)

(iii) Explain why having a complex life cycle is important for endoparasites. (5 marks)
b)  
(i) Name one class of invertebrate that has a sessile way of life. (1 mark)  
(ii) What morphological adaptations does this class have for living a sessile life? Explain how these adaptations benefit the animals in the class (5 marks)  

C)  
(i) Name one class of invertebrate in which all the members are hermaphrodites. (1 mark)  
(ii) Explain what is meant by hermaphroditism. (2 marks)  

QUESTION 3 (30 marks)  

Name five (5) key innovations during the evolution of invertebrates. Using invertebrate clades as examples, describe how each of these innovations has allowed expansion into new niches. (6 marks for each)  

QUESTION 4 (30 marks)  

a) Identify specimens A and B to the lowest level possible and differentiate between the two specimens based on their observable distinct characteristics. (10 marks)  

b) Draw a simple labelled diagram to illustrate each of the following terms: (10 marks)  

(i) Acoelomate  
(ii) Coelomate  

C) Describe the two types of cleavage that may occur in a developing zygote. (10 marks)
QUESTION 5 (20 marks)

Invertebrates provide many benefits to human society, ranging from ecosystem services, cultural value, utilitarian purposes to scientific value. Discuss this statement using two topics as your guideline and providing named examples.

QUESTION 6 (50 marks)

Fig. 1 presents the results of a study conducted on a grassland habitat at the Pietermaritzburg campus of the University of KwaZulu-Natal. The first section was burnt during the previous year, while the second section was mowed. Examine the information provided in Fig.1 and answer the following questions.

a) Write a short introduction for a scientific paper in which Fig. 1 could have been presented. Your introduction should include the rationale for the study, some background information and the aim and objectives of the study. (15 marks)

b) Considering that three (3) sampling techniques were used, describe how the data presented could have been collected and processed. (15 marks)

c) Explaining what the key invertebrate groups represent, describe the main trends presented in Fig.1. (10 marks)

d) Provide some explanation for the results. What recommendations can be made for the University’s Estates Division to best maintain the diversity of invertebrates in the grassland? (10 marks)
**Fig. 1. Invertebrate diversity in burned and mowed grassland**

- **Araneae**: 87 (burned grass), 12 (mowed grass)
- **Coleoptera**: 52 (burned grass), 9 (mowed grass)
- **Diplopoda**: 42 (burned grass), 7 (mowed grass)
- **Hemiptera**: 42 (burned grass), 6 (mowed grass)
- **Orthoptera**: 120 (burned grass), 15 (mowed grass)

The bar chart compares the number of morphospecies and individuals for each invertebrate group in burned and mowed grassland.