

# THE BRITISH BEEKEEPERS' ASSOCIATION

Founded in 1874

Registered Charity No. 212025

## EXAMINATION FOR PROFICIENCY IN APICULTURE

### MODULE 7 SELECTION AND BREEDING OF HONEYBEES

8<sup>th</sup> November 2014 Time Allowed 1½ hours

Candidate Number:

#### Instructions to Candidates

Read the questions carefully. Answer All Sections. It is recommended not to spend more than 10 minutes on Section A, 50 minutes on Section B or 30 minutes on Section C.

Unless stated otherwise questions apply to Honeybees.

Use **BLACK** pen for text. **Black** pencil may only be used for diagrams. **DO NOT USE COLOURS.**

#### Examiner Use Only

Question	Sec A	B11	B12	B13	B14	B15	C16	C17	Total
Mark									
Moderated									

### SECTION A (10 marks, 1 for each question)

Answer **ALL** the questions in this section. Use one or two word or short phrase answers.

**Please write your answers to Section A on the question paper.**

- Q1 If a cell containing 42 Chromosome divides by mitosis how many chromosomes will each of the daughter cells have? .....
- Q2 What is spermatogenesis? .....
- Q3 Name a virus associated with *Nosema apis*. .....
- Q4 What would be a suitable time interval between inspection when queens have been clipped? .....
- Q5 What would a Butler cage be used for? .....
- Q6 Give one reason why a queen will become a drone layer. ....
- Q7 Drones are produced by virgin birth. What is the scientific name for this process? .....
- Q8 During which technique would a bee breeder use carbon dioxide gas? .....
- Q9 A cell or organism having TWO copies of each homologous chromosomes is said to be---? .....
- Q10 In what structure would you find the chorion? .....

**PLEASE HAND IN THIS SHEET AT THE END OF THE EXAMINATION**

# MODULE 7 SELECTION AND BREEDING OF HONEYBEES

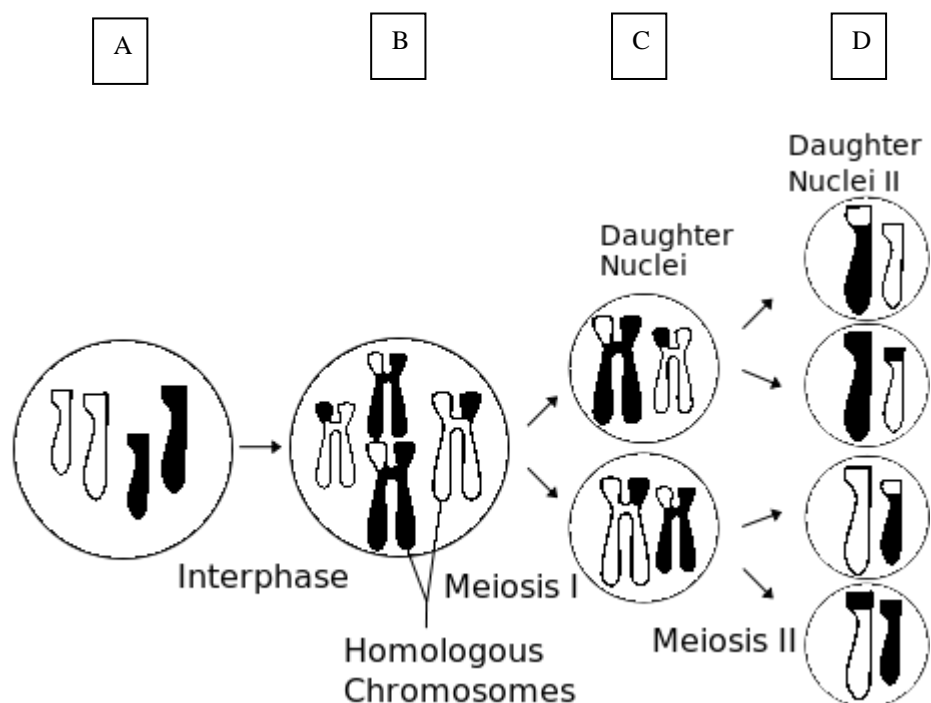
8<sup>th</sup> November 2014

## SECTION B (60 marks, 15 for each question)

Answer any **FOUR** questions from this section. Write short notes for your answers.

Marks

- Q11 (a) Complete the table provided which concerns the different features of each sub-species of the honeybee. 7
- (b) In the heading first column of the table provided explain fully what the ( **A. m. ...** ) stand for? 4
- (c) Give the four main characteristics that are used in morphometry to identify bee subspecies 4
- Q12 (a) What is the international marking colour for a queen raised in 2015? 1
- (b) A beekeeper wishes to introduce a mated queen into a colony which has a laying queen which does not match the colony selection criteria. Write a list to explain the steps to be taken to introduce a mated queen into this colony. 14
- Q13 Examine the diagram below which shows the stages in meiosis then answer the questions concerning the reproduction of the honeybee.



- (a) How many chromosomes would be present in **the germ cells** found in:
- (i) The a queen? 2
- (ii) In a drone? 3
- (b) What are homologous chromosomes? 3
- (c) Account for the changes in the pattern of shading on the chromosomes between cells B and cells C. 4
- (d) Using your answers to part (c) above explain how any genetic variation between cell A and the daughter cells in column D may occur. 4
- (e) Why is genetic variation so important? 2

Continued ...

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## SECTION B continued

(60 marks, 15 for each question)

Answer any **FOUR** questions from this section. Write short notes for your answers.

Marks

- Q14 (a) Draw a table to illustrate how a beekeeper may differentiate between types of sealed queen. Use the following headings: Type of queen cell, reason constructed, diagnostic feature. 12
- (b) Why and when is it possible to find laying workers in a colony once the queen has left the colony? 3
- Q15 Using 2 British Standard colonies how should a mating nucleus be made up? Indicate in your answer on which day in the queen rearing plan this should be done and why? 15

## SECTION C (30 marks)

Answer **ONE** question from this section. Give *labelled* diagrams where applicable.

- Q16 (a) Record keeping is vital for successful stock improvement. What information should be included and in what format should this information be recorded. Add a sketch of a record card a queen breeder might use. 16
- (b) From your record card select **ONE** feature for each of the following operations and explain it's importance. **You must select a different feature in each case.** 4
- (i) A beekeeper with 4 hives in a suburban backyard.
- (ii) A commercial operation with over 100 hives.
- (c) Queen breeders use two distinct units in their programmes to produce virgins: the cell starter/raiser and a cell finisher. Explain how each is used and the differences between them. In your answer stress the important components of each. 10
- Q17 (a) Describe the mating process from the time the queen leaves the colony until her return to the hive. 10
- (b) With the aid of simple diagrams, explain how eggs are produced in the queen and why the eggs are not genetically identical. 20

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11. (a) Complete the table below which concerns the different features of each sub-species of the honeybee.

7

Sub-species (A. m. ...)	Geographical origin	Common name	Body colour, especially abdomen	Average Tongue length (mm)
	Italian alps	Italian bee		6.5
<i>mellifera</i>	North west Europe.	Dark European (black) bee		
	South east Europe	Carniolan bee	Dark bee	6.6
	Ural mountains	Mountain grey bee	Dark bee with white abdominal hairs	

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