

# THE BRITISH BEEKEEPERS' ASSOCIATION

Founded in 1874

Registered Charity No. 212025

## EXAMINATION FOR PROFICIENCY IN APICULTURE

### MODULE 7 SELECTION AND BREEDING OF HONEYBEES

19<sup>th</sup> March 2016

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 and 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 on the question paper.

- Q1 How many ovaries are there in a queen honeybee? .....
- Q2 Give one characteristic behaviour of *Apis mellifera ligustica*. .....
- Q3 What are identical genes for a given characteristic called? .....
- Q4 How can queenlessness be confirmed in a colony? .....
- Q5 Give one reason for marking queens. ....
- Q6 Name the organs in which the drone stores sperm. ....
- Q7 Name one pathogen that can affect queen rearing. ....
- Q8 Which word describes the development of an individual from an unfertilised egg? .....
- Q9 How many pairs of chromosomes are contained within a diploid cell of a honeybee? .....
- Q10 How can emergency queen cells be recognised by the bee keeper? .....

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

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

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

Marks

- Q11 (a) Briefly describe how to make up a four frame queen mating nucleus to be retained in the same apiary for the introduction of a ripe queen cell. Include any necessary precautions which should be taken. 12
- (b) How and why could the make up of the nucleus be different if it is to be moved immediately to a remote apiary? 3
- Q12 (a) Describe the causes and signs of inbreeding in a colony and how inbreeding can be assessed. 8
- (b) A queen that has sex alleles  $K_1, K_3$  is instrumentally inseminated with drone semen that collectively has  $K_1, K_2, K_3, K_4$  and  $K_5$  sex alleles:
- (i) give the possible combinations of sex alleles; 5
- (ii) what is the percentage of expected non-viable brood and what happens to it? 2
- Q13 (a) List **five** desirable characteristics that may be used on a record card to assist with the selection of a potential breeder queen, giving a reason why these characteristics are desirable. 10
- (b) How could the information be quantified? 1
- (c) Give four methods that could be used to maximise the chances of a virgin queen mating with drones of desirable characteristics. 4
- Q14 Give an outline account of the method of instrumental insemination from the point in time when the queen and drones are mature. 15
- Q15 Describe briefly how to introduce a mated queen into a vicious colony. 15

## SECTION C (30 marks)

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

- Q16 Give a detailed account of a large scale queen rearing system, using grafting, to produce batches of ripe queen cells to be introduced into mating nuclei. Use the following five headings: 30
- Details of the equipment required;  
Selection and grafting of larvae;  
Method of cell raising;  
Queen mating;  
Precautions to be taken.
- Q17 (a) With the help of diagrams, give an account of meiosis and explain the unusual nature of meiosis in the drone. 24
- (b) Given a yellow queen mating with a black drone and a yellow drone what will be the outcome in the first generation where yellow is recessive and black is dominant? 6