

**BRITISH BEEKEEPERS' ASSOCIATION**  
**HOW THE MODULES ARE SET AND MARKED**  
**EXAMPLE MODULE 2 HONEYBEE PRODUCTS and FORAGE**

**How each module is set:**

Examiners are paired, one sets one paper, second examiner sets the other paper. Both examiners will mark both papers. At a brain storming week-end the papers with the mark scheme are discussed, checking that the questions are in syllabus, are fair, and unambiguous. The papers then go to the moderators who scrutinise them again and tidy up the mark scheme and any other minor points. The Examinations Secretary then reads them to make sure nothing has been missed. Questions that were badly answered the previous year are often repeated using slightly different terminology.

**The examination:**

The papers go out to the invigilators with guide lines for the candidates. The papers are returned to the Exam Sec who photocopies the papers – hence the requirement of black ink or black ball point and pencil. The photocopies go to the two examiners for marking – the originals remain with the Exam Sec in case a set gets lost (this happened some years ago in Essex), or the handwriting needs further interpretation by looking at the original script.

**The process of marking and moderation:**

**Instructions to Examiners:** 'The Marking Schedule is a working guide rather than a definitive document with a firm outline and marks are awarded for any relevant and valid points. Please do not penalise poor spelling so long as the meaning is perfectly clear, but ring round miss-spelt technical terms so that this may be taken into account in the moderation process if necessary'.

**The process:**

The examiners mark and return the papers to Val, usually by hand at the Stoneleigh Spring Convention. The marked papers now go to the moderators. Each question is checked to ensure all marks have been added correctly. Diverse marks between the examiners are highlighted and moderated. The final marks are returned to the Exam Sec and recorded. It is only at this stage that names are attached to the numbers on the papers. The Exam Sec then prepares the letters to each candidate and the results are published.

**Request for resumes:**

Candidates may request resumes of their papers at a cost set by the Board. This request should be made by the end of July. The requested paper is identified by number and the papers re-evaluated with the resume sent to the candidate by the end of October.

**Year on year results:**

Due to the small number of candidates relative to national examinations there is no target percentage pass or fail so marks are not adjusted year on year. Every effort is made to ensure the questions are equally weighted for ease/difficulty year on year.

**The examination:**

**READ THE QUESTIONS CAREFULLY AND ANSWER THE QUESTION AS SET, NOT WHAT YOU WOULD LIKE IT TO SAY.**

**SECTION A:** This section should take less than 10 minutes to answer, the answers should be written directly onto the space provided on the question paper one or a few words should suffice. This is a 'warm up' section.

**SECTION B:** Answer 4 questions out of a choice of 5. Each question should take no more than 10 minutes to answer. Use bullet points, followed by a **brief** explanation of the point made. Full sentences are not required.

**SECTION C:** Answer 1 question out of 2. This section should take about 30 minutes and requires a full answer in an essay style.

**CHECK:** There should be 10 minutes left to check the questions and your answers. Marks are not deducted for poor spelling unless it is a scientific name where this should be accurate. Hopefully

your handwriting is legible. In the years that I have moderated, there have been papers difficult to read, but never impossible, but please make an effort to write legibly.

No mark scheme is perfect and valid points will be included.  
Good luck and best wishes in the examinations.

Margaret Thomas NDB (Moderator BBKA Examinations).

### **Why examinations?**

These are a few reasons why we subject ourselves to the trial of taking examinations.

- Stimulate learning
- Incentive to learn
- Prove something/Get a certificate
- Engender a learning culture in the home
- Improve beekeeping practise
- Further the craft by informed discussion with public, local govt national govt, EU
- Teach beekeeping

### **A model paper and mark scheme:**

**SECTION A.**            *1 mark per question unless otherwise stated.*

**Q1    Give two main types of honey extraction.**

From Tangential, Radial, honey press etc

**Q2    Give a UK honey that is thixotropic.**

Ling heather or ling (no mark if just heather is written. Bell heather is not thixotropic).

**Q3    Give two instruments that may be used to measure the moisture content of honey.**

Refractometer, Hydrometer

**Q4    What is the term used to describe the tendency of honey to absorb moisture?**

Hygroscopicity

**Q5    Name two saleable honeybee products other than honey, beeswax and Royal Jelly.**

Propolis, Pollen, bee venom

**Q6    Give the two main chemical compounds produced from the fermentation of honey.**

Ethanol (Ethyl alcohol or alcohol), Carbon dioxide

**Q7    Name two plants that produce pollen in the early Spring in the UK (botanical names not required).**

Pussy Willow, Bluebell, Crocus, Snowdrop, aconite etc

**Q8    Name the secretion from the bodies of aphids**

Honeydew

**Q9 Give the relative density (specific gravity) of honey.**

1.4 (allow +/- 0.05) range 1.35 to 1.45

**Q10 What is Royal Jelly?**

Food for honeybee queen larvae

**SECTION B (40 marks, 10 for each question)**

**Q11 (a) Define pollination and fertilisation. 3**

Pollination. - transfer pollen from anthers to stigma of that or another flower

Fertilisation. - fusion male of a male gamete (from the pollen) with female gamete (in the ovule) to produce single cell (zygote)

**(b) What is meant by 'cross-pollination'? 1**

Pollen from different plant of same species transferred onto stigma

**(c) Outline the methods used by plants to favour cross-pollination. 6**

six from: self incompatibility (self unfruitful)

protandry (stamens ripen before stigma matures)

protogyny (stigma matures before stamens)

heterostyly (stigma and stamens situated at different levels in flower to prevent self pollination),

monoecious plants (having single sex flowers, but both sexes on same plant)

dioecious plants (single sex found on plant)

staminate (flower having only male parts),

pistillate (flower having only female parts)

Ref.: *Dadant H&H Ch 20 under 'The flower', Botanical text book 'A'/GCSE level type, Fitch and Salisbury Plant form and function. Ch on 'flower structure', Percival Floral Biology Ch 1, Aston and bucknall Plants and Honey bees P82 onwards, Davis The honeybee around and about P94 onwards.*

*Botanical or simple terms acceptable plus brief explanation .*

**Q12 (a) Give the typical components for beeswax. 5**

Hydrocarbons (C<sub>21</sub> – C<sub>33</sub>) odd numbers

Monohydric alcohols (C<sub>24</sub> – C<sub>36</sub>) even numbers

Diols (C<sub>24</sub> – C<sub>32</sub>)

Fatty acids (C<sub>12</sub> – C<sub>34</sub>) mostly C<sub>16</sub>

Hydroxy acids (C<sub>12</sub> – C<sub>32</sub>) mostly C<sub>16</sub>

Other substances plant pigments, propolis, detritus

*The C's are not essential, but show a distinction candidate.*

**(b) List the physical properties of beeswax. 5**

Density 0.95 – 0.97; floats on water;

melting point, 62 –64C (143F – 147F);

mixed composition so melts over range

decomposes if heated above about 75C (167F);

turns grey above 83C 180F;

has plastic malleability over range 32C – 35C (90F – 95F), so can be fashioned into foundation, models, flowers etc.;

becomes more malleable at room temperatures when rolled under pressure, therefore less brittle.

Insoluble in water

Slightly soluble in alcohol, chloroform, ether and benzene

Ref: *Beeswax, Ron Brown, p60; Hooper and Morse, p46/47.*

**Q13 (a) Give a typical composition for floral nectar in the United Kingdom. 3**

Water, sugars ie sucrose / glucose / fructose, salts, organic acids, enzymes, proteins, aromatic substances

**(b) What are the key changes that occur during the processing of nectar into honey? 3**

Reduction in water content to less than 20%

Addition of enzymes, invertase/sucrase, glucose oxidase, and diastase

Sucrose changed to glucose & fructose facilitated by enzyme invertase/sucrase

(chemical formula good)

**(c) List the common and botanical name of four floral sources of unpalatable honey in the UK. 4**

Ragwort - *Senecio jacobaea*,

Privet - *Ligustrum spp.*

Ivy - *Hedera helix*

Rhododendron - *Rhododendron ponticum* and some other Ericaceae (Azalea, Kalmia)

*Note: Botanical names an advantage on moderation.*

**Q14 (a) Define 'Extra-floral nectaries'. 1**

Extra-floral nectaries (areolar glands) are glands, located in places other than the flowers (*Extra floral nectaries consist of patches of glandular tissue found on the cotyledons, on the trunk, leaves, stipules, bracts, petioles etc. of certain species of plant. Sometimes they are barely distinguishable from the surrounding plant tissue.*)

**(b) List the common and botanical names of 3 plants that have extra-floral nectaries in UK. 3**

Broad bean – *Vicia spp*;

Cherry – *Prunus spp*;

Cherry laurel – *Prunus laurocerasus*;

Bracken – *Pteridium aquilinum*

**(c) Show with simple diagrams the location of the extra-floral nectaries on two of the plants listed in (b) 6**

Broad bean,

*Vicia spp* is highly variable in the number of large, dark purple spots on the light green stipules, at the base of the leaf petioles

Cherry;

The leaves of these trees have on the underside pairs of nectaries close to the leaf petiole.

Cherry laurel;

Two pairs of extra floral nectaries are found on the underside of the leaf, on either side of the central leaf vein close to the leaf stem. (If attacked by a fungus they appear as four black spot).

Bracken

At base of frond where joins onto main stem.

. *Good photo in Davies the Hb around and about P 110,111, Diagram Yates page 158 Note diagram for cherry not consistent with description on P 146, Aston and Bucknall Plants and honeybees P 33, Percival Floral Biology P 80,81*

**Q15 (a) List the legal requirements in the UK affecting the extracting, processing and preparation of honey for sale. Do not include bottling or labelling in your answer.**

**5**

- Requirements for extracting less rigorous than for preparation for sale:
- walls, floors etc. to be non-absorbent and washable;
- work surfaces to be stainless steel, or food grade;
- separate sinks for washing equipment and hands;
- all other equipment to be stainless steel or food grade plastic;
- room to be insect and animal proof;
- enclosed storage for cleaning materials;
- effective ventilation;
- operatives to wear clean overalls and hair net/hat;
- two doors to separate off toilet facilities and hand washing.

**(b) What are the legal requirements for the composition of blossom honey for sale?**

**5**

- **Moisture content not more than 20% except heather 23%**
- **Fructose & glucose content (sum of both) not less than 60g/100g**
- **Sucrose content not more than 5g/100g**
- **Water insoluble content not more than 0.1g/100g**
- **Diastase activity not less than 8**
- **HMF content not more than 40mg/kg**
- **All except Bakers honey not to have foreign tastes or odours, have begun to ferment or have fermented**
- Bakers honey HMF not more than 80mg/kg, water not more than 23%
- Sucrose content may be more in specific honeys (15%) – borage, lavender,(in UK honeys)
- Moisture content for bakers honey from heather not more than 25%
- Electrical conductivity not more than 0.8 mS/cm
- Free acid not more than 50 milli-equivalents acid per 1000 grams
- No pollen or constituent particular to honey maybe removed.

*Highlighted points are the essential.*

*Schedule 2 Honey (England) Regulations 2003 Statutory Instrument 2243, amended 2005 No 1920 highlighted points essential.*

**SECTION C (25 marks)**

*Note the mark scheme is not in essay form, you will be expected to write an essay.*

**Q16 (a) Give four methods used to uncap honeycombs prior to honey extraction.**

**2**

Knife, honey fork, honey plane, hot air blower/flame, flails

**(b) For two of the methods given in (a) describe fully the advantages and disadvantages of their use.**

**6**

Knife: quick on straight comb,  
Sharp blade, danger cutting operator, hard work repetitive strain syndrome  
Use of water to heat knife may add water to honey unless wiped dry  
electric version very easy – may overheat honey  
heating may be dangerous,  
Fork: less honey in tray, cheap

Very slow, easier with brood combs, easier with irregular comb  
 Plane: easy to use on new comb, not on irregular comb  
 Need electricity, can overheat, difficult to clean  
 Hot air Spits wax about  
 Very slow  
 Dangerous,  
 Flails: Good for large scale/commercial operation, damage to comb  
 Expensive, dangerous without care, need large space for equipment

**(c) Starting with the cappings obtained in (a) describe how to make a 454g (+/- 50g) block of beeswax for a competition class.**

17

Choose only new clean cappings

Remove propolis

Wash in rainwater to remove honey, etc

Methods to melt comb or cappings

**melt in oven suspending in net like nylon stocking over old coffee tin with base cut out care not to overheat as wax darkens (grey) above 180°F**

allow to set

*The above is preferred method as temperature can be controlled.*

Or solar wax extractor - difficult to control temperature  
 insulated box with double glazed top, angled 40° to sun  
 wax filtered through metal wire or nylon stocking

In addition the wax block will need:

to have scum removed from bottom when hardened

500g approx weighed out for second stage (to allow for loss in filtration)

remelted and fine filtered through lint or filter paper.

Equipment for final moulding:

Large bowl to act as waterbath, oven,

perfect pyrex bowl/dish for mould suitable for thickness in schedule,

plate glass to fit over waterbath/bowl.

Weigh 454g water, add to bowl, mark height on outside of pyrex, dry

Rub inner surface of pyrex with washing up liquid, remove excess

Warm oven to approx 160F,

Waterbath bowl in oven containing warm rain water to slightly higher temperature

stand pyrex in bowl on trivet (water underneath)

Melt wax – filter through filter paper into warmed jug

Pour gently into pyrex – no bubbles

Close oven gently

When surface hardened add warm water to cover

Add glass sheet

Turn off oven and leave overnight

Un-mould following day – place in fridge if necessary

Block can be polished with silk or left.

*Ref: NHS Show leaflets, Ron Brown Beeswax Ch 6*

**Q17 (a) Describe how to prepare liquid honey for sale in a shop starting from a 15kg tub of unfiltered granulated honey. 9**

Remove bits from top of tub

**Warm tub 50 - 52°C 120 - 125°F in heating cabinet**

**until fully liquid for approx. 24 hrs,**

**strain through fine mesh, nylon cloth plus 100 mesh to the inch**

**settle for bubbles to rise, for some hours, skim scum**

wash and drip dry jars, run into jars then lid

**re-warm in water bath (even temperature distribution and heat conduction quicker through water than air for 1 hour at 60 - 62°C 140 - 145°F to melt remaining crystals to give 'shelf life')**

*Please note that temperatures given in other literature will need much longer heating time and sometimes do not clear the honey completely leading to re-granulation.*

*Ref. Hooper B&H Ch 11 warming and bottling, Hooper and Morse Honey shelf life P222, pasteurisation P220, packing P217-220*

**(b) List the legal requirements in the UK for labelling the honey for sale in 454g jars. You may wish to draw a sketch to illustrate your answer. 10**

**Honey** – can use word 'pure'

County or location eg Devon or Castle Howard OK

**Type of honey can be identified only if 'wholly or mainly'** of that type eg heather

**Name and address of beekeeper, packer or retailer**

**Weight in metric**, imperial is optional but must come after and only closely separated g for gram, and lb for pound

**Height of weight lettering 4mm**

**County of origin UK**, (*Other wording is dubious, eg produced in the UK not acceptable as this can be used when processing foreign honey in the UK*)

**Best before date**

**Lot number is optional if the Best before date identifies the batch, usually including day:month:year of bottling.**

**All this on the same visual surface except best before can state 'see base of jar or lid'**

**(c) Other than in the 454g honey jar, how can honey be marketed for sale? 6**

any size or container provided the weight is clearly labelled

Comb honey, eg Sections or cut comb

Chunk honey – honey containing one or more pieces of comb honey

Run honey - in any of the above containers

*2003 Honey Regulations amended 2005*