ANIMAL PRODUCTION

NTQF Level -II

Learning Guide -35

Unit of Competence: - Assist Beekeeping Operations

Module Title:- Assisting Beekeeping Operations

LG Code: AGR APR 2 M11 LO2- LG-36

TTLM Code: AGR APR 2 TTLM 0919v1

LO 1: Prepare for beekeeping work

Instruction Sheet	Learning Guide # 35

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ❖ Identifying and checking required materials, tools and equipment
- ❖ Techniques of loading and unloading materials
- ❖ Selecting, checking and using Suitable PPE
- ❖ Working safely around and with bees

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- ➢ Identify required materials, tools and equipment.
- ➢ Conduct checking all materials, tools and equipment, and insufficient or faulty items reported to supervisor.
- ➢ Use correct manual handling techniques when loading and unloading materials to minimize damage to self, others, load and vehicle.
- ➢ Select and check suitable PPE prior to use
- ➢ provide Work support according to OHS requirements and supervisor instructions

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 7.
3. Read the information written in the “Information Sheets 1,2, 3, 4”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” **in page 7, 11, 14 and 18.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the all Self-checks).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Identifying and checking required materials, tools and equipment

1.1. Identifying materials, tools and equipments for beekeeping work

Bee keeping equipment is material used (necessarily important) for bee keeping and also honey production. Every beekeeper should have to identify all beekeeping tools, equipments and material for doing beekeeping activities, and then prepare it for work. Before start doing with the tools and equipments, first he/she has to check its functionalities and normality. Some of the most important bee keeping equipments is: -

1. Beehive: The hive is the bees' home. There are three different types' of beehives.

I. **Traditional (local) hives**: - are hives made from locally available materials. The traditional (local) hives are different from place to place depending up on: Way of construction, locally available materials used to construct it and the way in which the beekeepers put. It can be made from material like clay, straw, bamboo, banana leaves, and bark of trees, logs and animal dung, woods.

II. **Transitional hive**. These type hives have a series of bars across the top, which allow for attachment of the comb. These bars are spaced to give the bees sufficient room to build a comb on centred each bar and to leave a bee space between the combs.

- Kenya Top Bar hives (KTBH)
- Tanzania Top Bar hives (TTBH)
- Mud block hive or chika hive.
- Chefaka (Ethio-Ribrab beehives)

These are hives with movable combs with top bars

Fig: transitional hives (Ethio-ribrib and Kenyan top bars)

III. Improved (modern) hives: These are the movable frame hives with a set of framed combs is suspended-like the files in the box. The number of frames in a hive box is determined by the width of the box and the spacing required between the frames. The bee space is **5-6 mm** for most Apis mellifera species of African bees. Modern hive has the following Components:

Hive stand **>>>>** Bottom Board**>>>>**Brood chamber **>>>>** Queen Excluder **>>>>** supers (may be added as needed) **>>>>** Inner Cover Telescoping cover (outer cover)

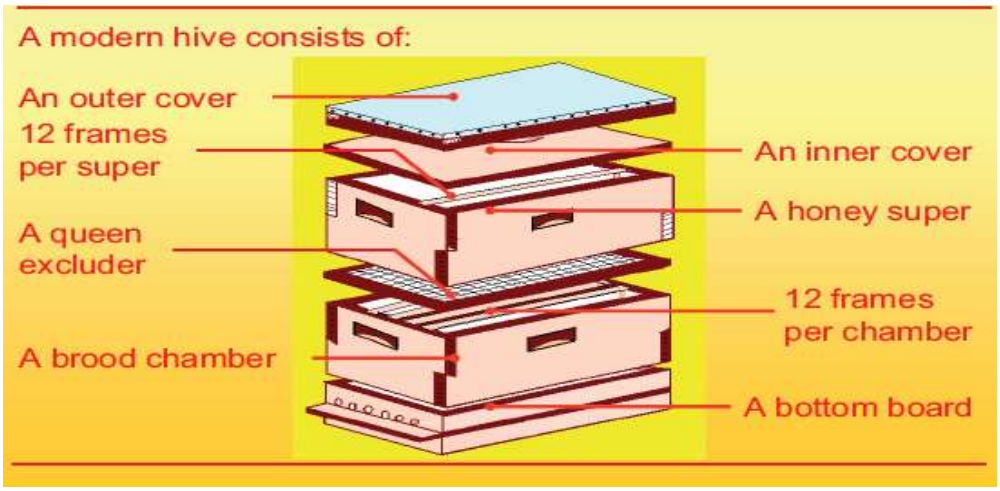


Fig 2: components of modern hive

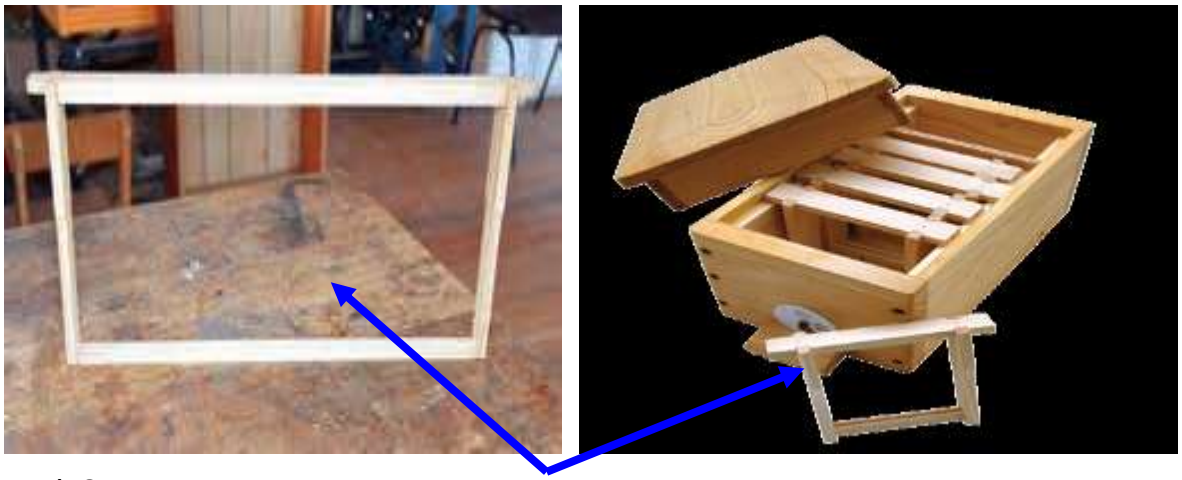


Fig3: Frames Frames

1. **Smokers**

Is manually operated materials used to smoke the hive. It calms down the bees (subdue) & induce them to engorge bees full of honey are easier to handle &expel the bees from the surrounding during work

Fig3: Bee smoker

2. Chisel /beekeepers tool

It is sharpened at both ends but curved at one end and should be painted with rustproof paint to avoid contamination of honey with corrosion and rusting with honey. It is used to open the hive, clean propels, wax and unnecessary materials from the farm, hive & seen in the hive

Fig4: Chisels

3. Casting mould /wax press/

The instrument used for making foundation sheet from bees wax with the imitation of honey comb cells. It is a metal coated with zinc. It is manually operated equipment used to make artificial comb foundation sheet

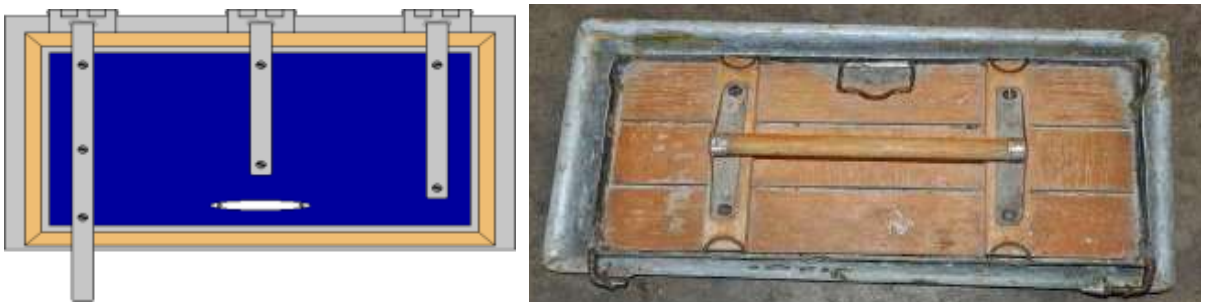


Fig5: casting mould.

4. Queen excluder

It is a sheet perforated or grid type made up of aluminum sheet or stainless steels, plastic and wire mesh that is placed between the brood chamber and honey chambers. It is a device used to form an appropriate partition between the brood and honey chambers so as to prevent the queen or drone from entering to honey chambers.

Fig6. Plastic queen excluder

6. Bee Brush

The bee brush should be made of soft natural fibre e.g. sisal fibre. One can also use bird quill feather or very soft leaves or grass provided they are clean which is used to remove the honey bees from the honey combs and draw the bees to hive while transferring

Fig 7:Bee brush

5. **Sprayer**: It is a material used to spray water on the bees/especially at low land areas/ to reduce aggressiveness and immediate evacuation from their nest.

6. **Uncapping fork/ knife :** Is a material used to de cup the cells of sealed honeycomb before the frame combs are placed in the honey extractor

7. **Frame wire:** is thin galvanized wire which is stretched through the holes of frames and used to attach & reinforce the foundation sheet to the frame. It supports the honey combs firmly during extraction, so that it will not break off easily

8. **Transformer: -** It is an electrical device having 18-24 volts and is used to fix the foundation sheet to frame wires. It converts 220 volts of electricity to 18-24 volts. In the absence of electricity, wax embedder (knife or hot wire) can be used.

a  b  c 

Fig 8. a. transformer, b wires c. uncapping knife and fork

9. **Honey extractor:** It can be manually or electrically operated centrifugal machine, with removing chambers into which the frames fit. As the handle is worked, honey flows out of the frames by the centrifugal force without breaking the comb.
10. **Honey presser:** It is used to extract honey by method of hand pressing of honeycombs, which are not framed.
11. ***The honey tank***: It is metal drum which is serves as a honey tank. The tank is fitting with a special ***honey tap*** near the bottom & a smaller tank on the top, the bottom of which is fitted with a honey-straining sieve. The top the small tank is fitted with a tight lid.

12. **Wax extractor:** Is used to separate wax from old brood combs and other impurities.
13. **Honey sieve:** Is a material that enables to separate honey from pollen, wax and other impurities. All honey as it comes from honey extractor and before it goes into honey jars should run through a strainer.


a

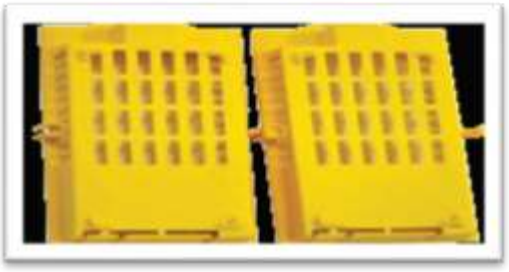
b

c

d

Fig 9. a-solar wax extractor, b-honey presser, c-honey tank, d-centrifugal honey extractor

14. **Honey weighing scale**: is used for weighing honey harvested.
15. **Queen Cage:** Small wooden & wire, or plastic, cage used to ship queens; usually with up to 6-8 attendant bees, also used to release them quietly into cluster.


queen cage

16. **Queen Cage candy:** A made from powdered sugar & invert sugar syrup to be used as bee- edible plug in queen cage, delaying release of queen to increase acceptance.
17. **Pollen trap:** Device installed over colony entrance with a great sized to scrape pollen pellets from legs of worker bees entering hive.

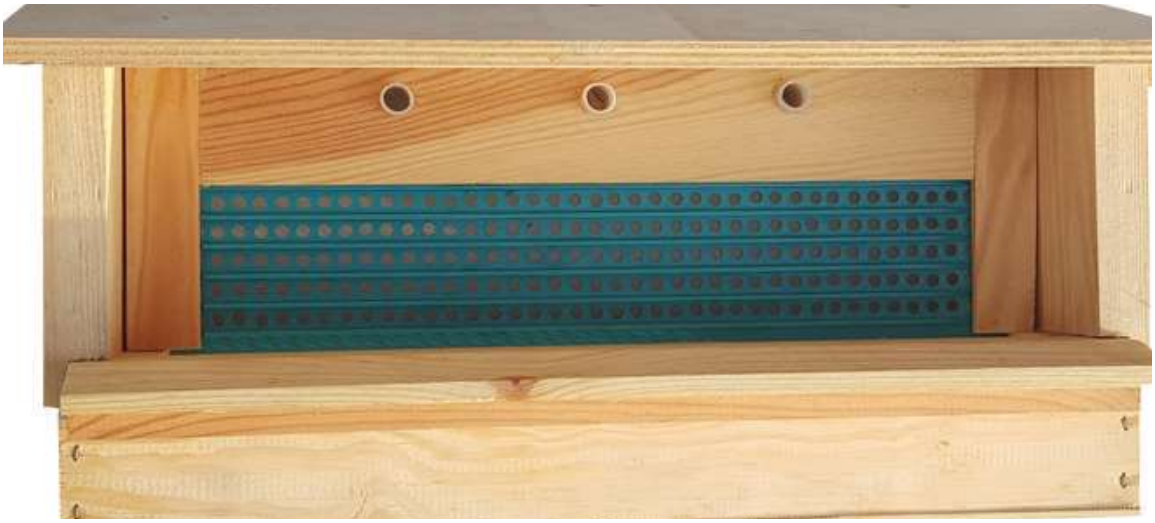


Fig 20: Pollen trap

18. **Honey jars** (glass or plastic) are materials important (used) in handling honey /extracted/ until reaching the consumer/contain 500gm/

19. **Bee-Escape board**: Bee escapes are used in removing bees from supers before it is taken from hive. It is a funnel – shaped structure on the inner board which allows the bees to go out the supper

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I: Matching (1pt each)

Match the following equipments under column B with their function under column A

A	B
1. Serve as the floor for beehives	A. Queen Excluder
2. Rooms for eggs and broods	B. Hive body
3. Remove bees from super during harvesting	C. Smokers
4. keeps queen out of super	D. Bee escape board
5. Serve as weapon for beekeepers during hive operation	E. Bottom board
	F. Chisel
	G. Honey chamber
	H. Frames

Part II. Choice (1pt each)

Choose the correct answer from given alternatives

1. Which component of hive is the part of Kenyan top bar?
   A. Top bar B. Frame C. Super D. brood chamber
2. The beekeeper's equipments which is used for removing extra combs and propolis from frames while hive opening
   A. Smoker B. chisels C. brush D. forks

Part II. Give short answer (6pts)

1. List at least three well known transitional hives

2. List at least six the main beekeepers equipments

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Question

PART I

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------

PART II

1. ----------
2. ----------

PART III

1 . ……2……3……

2.----------

Information Sheet-2	Using correct manual handling techniques of loading and unloading materials

2.1. General manual handling techniques in loading and unloading materials

When loading materials care should taken not to break and make damage the items, not to yourself. The equipments should not overcrowd, not throw away, and not mix different kind of equipments.

Everyone lifts, holds, carries, pushes and pulls on a daily basis whether it is during leisure activities or as a part of paid work. Manual material handling involves lifting light, heavy and awkward objects. Safe lifting is a critical aspect of daily activities and should be the focus of any manual material handling

Before lifting, remember the following:

- Wear supportive shoes;
- Use lift assists (hand dollies, carts, lift tables, forklifts);
- Carry all movements out horizontally (e.g., push and pull rather than lift and lower);
- Always use your body weight and not your feet when pushing;
- Try to have most workplace deliveries placed at hip height;
- Always keep objects in the comfort zone (between hip and shoulder height);
- Keep all loads close to and in front of the body;
- Keep the back aligned while lifting;
- Maintain the center of balance;
- Let the legs do the actual lifting; and
- Reduce the size of the material to keep it light, compact and safe to grasp

2.1.1. Squat lifting

Squat lifting should be done for a majority of all lifts. Squat lifting should be performed as follows:

- Stand as close to the load as possible;
- Move your feet shoulder width apart;
- Tighten your stomach muscles so you can tuck your pelvis;
- Bend at the knees, keeping your back straight and stomach tucked;
- Get a good firm grip on the load;

- Hug the load close to the center of your body;
- Lift smoothly with your legs gradually straightening the knees and hips into a standing position; and
- Avoid twisting your body as you lift.

2.1.2. Loading

- Keep the load close to the centre of your body to take full advantage of the mechanical leverage of your body;
- Do not change your grip on the load unless it is weight supported;
- Avoid twisting your body without pivoting your feet at the same time;
- If you must change direction, move your feet in that direction instead of twisting your trunk in that direction;
- Make sure you can see over the load; and
- Move carefully toward your destination

2.1.3. Unloading objects

Unloading objects should be done the same way as lifting objects, but in the reverse order as follows:

- Slowly bend your knees to lower the load;
- Keep your back straight and the weight close to the center of your body;
- Allow enough room for fingers and toes when the load is set down;
- Place the load on a bench or table by resting it on the edge and pushing it forward with your arms and body; and
- Secure the load to ensure that it will not fall, tip over, roll or block someone's way.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are lifting aids for lifting equipments (2pts)
2. Write the correct positioning during loading heavy materials(3pts)

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. ---

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2. ---

Information Sheet-3	Selecting, checking and using Suitable PPE

Selecting, checking and using Personal Protective Equipments

Protective equipment is to protect the beekeeper from bee stings. When beekeeper working with bees, they should select well fitted clothing with no punch and preferred colour, at minimum, wear a beekeeping hat and veil, and elbow length gloves that are leather and closed heel shoes. Bees are sensitive to color So that during the daylight hours, light-coloured clothing (preferably white, yellow or green) should be worn; for night work, dark colours are better. All protective clothing must be cleaned regularly with a brush and water to remove the smell of the sting.

Personal protective equipments are:

- **Bee –veil*:*** It is a head veil made of mosquito- netting & is used – is the material used to protect head region, face & neck from bee's sting. The hat is ventilated, keep its shape and be firm enough to support the veils that fit over them and provide space that keeps the away from the face.

- **Gloves*:*** are generally used to protect the hands and fingers against sting by bees. Gloves need to be strong, but pliable. A band of elastic should be sewn into the cloth sleeve at the elbow end to make it bee resistant.

- **Overall*:*** An overall is useful while working in an apiary to prevent the bees from going up your selves or into your garments.

- Boot /foot wear: it should be closed toe and closed heel shoes should be worn.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

3. Write the prerequisite of using protective clothing.(2pts)
4. List all protective equipment and their uses(3Pts)

Note: **Satisfactory rating – 3 points** **Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. ---

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2. ---

Information sheet 4	Working safely around and with bees

4.1. Precautions in working with bees

The beekeeper should take into account that bees react strongly to certain smells such as perspiration, alcohol, soap and perfume.

In order not to be stung:

- Work with bees during appropriate time (early in the morning /late in the evening.
- avoid carrying these strong smells when you inspect and do with the bee colonies,
- do not keep any animals near the bees,
- avoid jerky movements in and around apiary
- Cover you head and wear clothes made of smooth fabric to prevent entangling of bees in hair and in woollen clothing.
- When bees are aggressive they will always go for dark colours first. Wear clothing of the lightest possible colour.
- Avoid fast movement and waving your hand if bees buzz at you.
- You should especially avoid banging against the hive. Even if you have been stung, first calmly put the frame back into the hive before paying attention to the stinger.

4.2. Identifying Occupational Health and Safety (OHS) Hazards

The most common hazards associated with beekeeping includes, but not limited the following:

- Allergic reaction to bee venom
- Burns the fires from use of the smoker
- Improper lifting techniques

The sting

The worker sting is a highly modified for its defensive purpose. The sting is found in the sting chamber, invisible, last segment.

Factors motivating a worker honey bee to sting

1. Genetic make up
   - ✓ Some are highly aggressive. e.g. Tropical bees
   - ✓ Some bees are highly gentle/docile/. e.g. European bees
2. Condition of time
   - ✓ when there is scarcity of forage or less nectar flow

- ✓ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions to stings

In human reactions to stings take place on three levels

- ✓ Localized reaction
- ✓ Systematic reaction
- ✓ Anaphylactic

1. **Localized reaction (normal reaction)**

   Normal reaction includes: some pain, redness, itching and swelling at site

2. **Systematic reaction(mild to moderate reaction)**

A systematic reaction generally occurs within a few minutes of stinging and it may involves persistent or spreading pain, itching or swelling, large or uncomfortable areas of pain, redness, ongoing symptoms over several days.

Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ✓ Abdominal pain or Vomiting
- ✓ Difficult or noisy Breathing
- ✓ Swelling of tongue
- ✓ Tightness of throat
- ✓ Wheezing or persistent cough
- ✓ Hoarse voice
- ✓ Falling blood pressure that can load to loss of consciousness and death from circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

- ✓ The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.
- ✓ An ice-cold compress applied after sting has been removed will relieve the pain
- ✓ Anti-histamine; may assist with persistent itching
- ✓ Adrenaline injection

In addition to these;

- ✓ Work with bees in the late or in the evening

- ✓ Avoid working bees in rainy, windy time
- ✓ Smoke under the frame and wait two minutes before opening
- ✓ While moving in the apiary, move slowly and quietly
- ✓ Avoid crashing
- ✓ Wash your protecting materials (glove, overall, etc) after three operation times.
- ✓ When bee stings develop into large swelling and rash, medical advice should be sought straight away.
- ✓ Anyone who is acutely allergic to bee sting and knows that unconsciousness may our a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

4.3. Applying OHS requirements

Apply OHS requirements in accordance with regulations/codes of practice and enterprise safety policies and procedures. It is following general guidance's of bee farm/ beekeeping

- ✓ Any person with suspected or known allergies to bee venom must seek medical advice from their primary care physician prior to participating beekeeping activities.
- ✓ Proper lifting techniques shall be used when lifting boxes
- ✓ Telephone must be on site any time participants are present
- ✓ Be aware that bees are sensitive to dark colours and odours such as perfume, dogs and diesels
- ✓ Maintain a fire extinguisher within 50 feet of the area where smoker will be used and information about training fire extinguisher may be found
- ✓ Keep the area around the hive free of combustible materials
- ✓ Using of relevant protective clothing and appropriate size
- ✓ use of tooling and equipment,
- ✓ use of fire fighting equipment, enterprise first aid e.g. for bee sting
- ✓ Following Occupational health and safety procedures designated for the task.

Any beekeeper has to follow emergency procedures on the following task:

- ✓ emergency shutdown and stopping of equipment,
- ✓ using extinguishing fires,
- ✓ First aid application and site evacuation

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are OHS hazards associated with beekeeping?(2pts)
2. List the condition that motivate bees for sting(2Pts)
3. Identify characteristics of human blood reaction to sting (3pts)

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1. ---

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2. ---

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3. ---

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4. ---

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