Technical, Education, Vocational and Entrepreneurship Training Authority (TEVETA)

DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY

DIPLOMA YEAR II

Biology Techniques II

Record of Practical Assessment

Learner's name: _____

Learner's NRC no.: _____

Learner's TEVETA No.:_____

Institution Name: _____

Institution TVA No.:_____

Assessment Period: _____

PREFACE

The Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA) is an institution created under the Technical Education, Vocational and Entrepreneurship Training Act Number13 of 1998, as amended by the Technical Education, Vocational and Entrepreneurship Training (Amendment) Act Number 11 of 2005.

The Act among other things provides that TEVETA shall:

(a) regulate and conduct national examinations and assessments relating to technical education, vocational and entrepreneurship training;

(b) charge and collect fees in respect of examinations, assessments and other services provided by the Authority;

(c) award certificates to persons who succeed in examinations and assessments undertaken under this Act

(d) do all such things connected with or incidental to the functions of the Authority under this Act.

Through this mandate, the Assessment and Qualifications Division of TEVETA has developed Practical Assessment Tool Kits to enable learners achieve the competences that are congruent with the demand of the workplace tasks. These tool kits in part are also intended to ensure that similar conditions under which all students in TEVET are assessed and examined apply wherever the course is undertaken in Zambia.

The Trainers shall work with theLearnersto collect evidence of competence, using the benchmarks provided by the unit standards.During the year, the Learners shall be required to undertake a series of practical assessment tasks. It is the sum of all these assessments tasks that deems a Learner to be competent (or not).

This approach to assessment is not a one-off event but one that giveslearners many opportunities to demonstrate skill and allow for the capturing and recording of these demonstrations.

For the Learner to be deemed competent, they must demonstrate competency in every aspect of the practical tasks being undertaken. It must however be understood by the Trainer that Competency does not mean expert. It means that the candidate has attained sufficient skill and knowledge to perform the activity or service to a degree and quality that is acceptable to the industry and the customer in a time within which a competent person at the level could reasonably be expected to perform the task.

While this will be undertaken at institutional level, it is therefore envisaged that the Assessment principles of VALIDITY, RELIABILITY, FAIRENESS and FLEXIBILITY shall at all times be adhered to.

Pre-Assessment

Assessment process explained to the employee (✓ if Yes).	☐
Any appeal relating to the outcome of the assessment or the way in which the assessment was conducted shall be made through the company's *fair treatmentpolicy* as explained to the employee (✓ if Yes).	☐

Employee/Trainee	**Assessor**	
Employee/Trainee name: _____(Print) Employee/Trainee comments:	Assessor name: _____ (Print) Assessor comments:	
I fully understand the assessment and appeals process.	Theory assessment sighted and checked as satisfactory.	☐
Signature: _____ Date: _____	Signature: _____ Date: _____	

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Prepare for the practical assessment

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Work Health and Safety

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Customising the assessment

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Carrying out the assessment

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Completing the assessment

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Assessor qualifications

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Expiry status of assessment

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Resources required

Add text here

Range of variables

Add text here

1. **DISSECTION OF THE RAT**	**Satisfactory**			**Not Satisfactory**		
During observation of work activities, the candidate demonstrated that they can:	**Attempt No**			**Attempt No**		
	1	**2**	**3**	**1**	**2**	**3**
Perform the dissection of a Rat(Guinea pig/rabbit may also be used) .This should include A. Preparing the rat for dissection. This should include - Killing the rat with chloroform by enclosing it in a container with cotton wool soaked in the chemical - Disinfecting the rat with phenol, Lysol or some other disinfectants, - Thoroughly washing the rat with water before use. - Pinning the rat by the limbs on a dissection - Making a small incision on the throat of the rat	☐	☐	☐	☐	☐	☐
B. Making the initial incision: This should include - Making a small cut at the throat of the rat - Beginning from the cut at the throat of the rat, cutting down the centre of the rat until you reach the genitals. - At the posterior end of the cut (by the genitals), cutting laterally so that the two flaps of skin are created so as to open from the centre of the rat. - Feeling for the bottom of the rib cage and Making similar lateral cuts just below the rib cage. - Opening the flaps of skin and pinning them on dissection board	☐	☐	☐	☐	☐	☐
C. Examining the cardiovascular system. This should include - Locating the heart which is centrally located in the thoracic cavity. - Identifying the atria which are the two dark colored chambers at the top of the heart - Identifying the ventricle which are the dark chambers at the bottom of the heart - Identifying the left ventricles whose walls are thicker than those of the right - Identifying the pericardium a thin membrane around the heart	☐	☐	☐	☐	☐	☐

D. Examining the digestive system.This should include □ Locating the liver a large, reddish brown mass that lies immediately posterior to the diaphragm □ Locating the stomach a bean-shaped sac and removing the left lobe of liver to easily observe the entire stomach and esophagus. □ Examining the stomach and locating the place where it joins with the small intestine. □ Without tearing the mesentery that binds the coils together, tracing the small intestine to its junction with the large intestine. □ Locating the Pancreas an irregular mass of brownish glandular tissue in the mesentery dorsal to the stomach. □ Locating the caecum a blind sac found at the junction of the small and large intestine. □ Running from the caecum locating the colon which ascends, crosses the abdominal cavity, and descends again. □ Locating the rectum which connects posteriorly to colon □ Locating the anus to when the rectum connects to posteriorly	☐	☐	☐	☐	☐	☐

E. Examining the Urino-genital system: This should include □ Locating the kidneys by moving the stomach and the intestines to one side with the probe. □ Examining the posterior wall of the abdominal cavity to locate the two kidneys. □ Carefully stripping away part of the membrane covering a kidney with forceps. □ Locating the ureters by Following the course of one of the ureters and wiggling the kidneys to help locate these tiny tubes. □ Locating the small yellowish adrenal glands embedded in the fat atop the kidneys. □ Identifying if the rat is male or female. If male it should have a scrotal bag which holds the testes □ Cutting through the sac carefully to reveal the testis. □ Locating on the surface of the testis a coiled tube called the epididymis □ Locating the tubular vas deferens moves sperm from the epididymis to the urethra, □ Locating the urethra which carries sperm though the penis and out the body. □ Locating the lumpy brown glands located to the left and right of the urinary bladder are the seminal vesicles. □ Locating the gland below the bladder is the prostate gland □ If the rat is female □ Identifying the vagina; a short grey tube lying dorsal to the urinary bladder is. □ Locating the two uterine horns that are formed when the vagina divides into two □ Locating the ovaries which are found on the ends of two fallopian tube that are joined to the two uterine horns that originate from the vagina and extend toward the kidneys. □ Identifying the duplex uterus is common in some animals and will accommodate multiple embryos (a litter).	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

2. EFFECT OF EXERCISE ON PULSE RATE	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Investigate the effect of exercise on pulse rate. This should include: □ To be done in pairs one recorder and the other exercise participant □ Recording the resting pulse rate by gently pressing the index and third finger on the radial artery in the wrist.(number of pulses in 1 minute) □ Performing a standardized exercise like jogging on the spot for one minute □ recordingimmediately after the exercise your pulse rate □ Resting for a period of 5 minutes and doing the same exercise for 5 minutes and recording the pulse rate immediately. □ Repeating the exercise for varying time intervals (10, 15,20,25,30 minutes) and immediately record the pulse rates at these time intervals. □ Remembering to rest for about 5 minutes between the exercise time intervals. □ Recording the results in a table showing your pulse rate and the period of the exercise □ Plotting a graph to show the relationship between pulse rate and the duration of exercise □ Explaining the results as fully as you can	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

3. **BLOOD SMEAR PREPARATION**	**Satisfactory**			**Not Satisfactory**		
During observation of work activities, the candidate demonstrated that they can:	**Attempt No**			**Attempt No**		
	1	**2**	**3**	**1**	**2**	**3**
Perform a practical on making a blood smear and stain it. A. Making a blood smear ☐ Choosing a clean slide and writing an identifier on the frosted slide whilst avoiding putting fingerprints on the slide. ☐ Cleaning the skin at the base of thumb nail with methylated spirit. ☐ Pressing the thumb from below with fingers and quickly pricking with a sterilised lancet ☐ Placing a drop of blood approximately 4 mm in diameter on the slide about 2 cm form one end of the slide ☐ Spreading the drop by using another slide (called here the "spreader"), placing the spreader at a 45° angle and backing into the drop of blood. ☐ Air drying the smear	☐	☐	☐	☐	☐	☐
B. Staining the smear ☐ Dipping the slide for five minutes in absolute methanol to fix the smear leave for about 1 minute ☐ Air drying the smear. ☐ Dipping the slide with the smear into a staining jar containing the freshly prepared giemsa stain and leave it in there for about 10 minutes. ☐ Rinsing the smear gently with distilled water. ☐ Air drying the slide and wipe the back of the slide. ☐ Observing under medium power (x40) and high power (x100). ☐ Recording the observations in form of drawing(s) and short notes	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

4. SKELETON PRESERVATIONS OF SMALL ANIMALS	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Identify the structure and function of the skeletal system by making skeleton preservations of small animals like Guinea pig, birds or frogs. This should include ☐ Capturing of animal ☐ Ethical killing the animal ☐ Organ extraction ☐ Disconnection of joints ☐ Excision of soft tissue from bone ☐ Decomposition of soft tissues not completely removed during the excision step ☐ Delipidation (fat removal) of bones ☐ Bleaching of bones Drying of bones	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

5. IDENTIFICATION OF NEUROGLIA	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Identify the cells and tissues responsible for information regulation in in the nervous system. This should include - Mounting of permanent slides of different neurons and neuroglia to the stage of a compound light microscope - Focusing at x40 to view the slide preparations - Correctly identifying different types of neurons which include motor ,sensory and interneurons - Correctly identifying different types of neuroglia which include astrocytes, oligodendrocytes and microglia	☐	☐	☐	☐	☐	☐

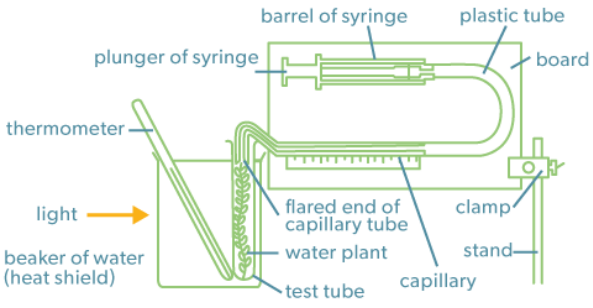
Assessor comments:

Signed: Assessor: Trainee:

6. IDENTIFICATION OFGLANDS AND ORGANS OF THE ENDOCRINE SYSTEM	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Identify the glands and organs responsible for information regulation in in the Endocrine system.This should include ☐ Correctly identifying preserved glands and organs of the Endocrine Systemwith the aid of hand lenses. ☐ Organs include; adrenal glands, ovaries, testis, pancreas,	☐	☐	☐	☐	☐	☐

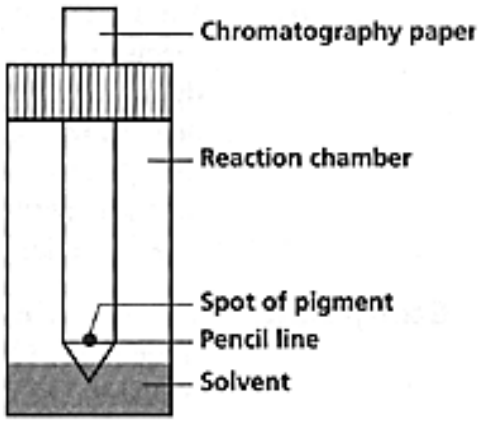
Assessor comments:

Signed: Assessor: Trainee:

7. FACTORS AFFECTING THE RATE OF PHOTOSYNTHESIS	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Investigate how carbon dioxide, light and temperatureaffect the rate of photosynthesis. This should include ☐ Correctly assembling different laboratory glassware and apparatus (boiling tube with sodium hydrogen carbonate, stoppers, syringe, beaker with cool water, capillary tubes, ruler to form a photosythometer) ☐ Using different concentrations of sodium hydrogen carbonate to show that Carbon dioxide is required in photosynthesis as measured by the photosythometer ☐ Directing light bulbs of different wattage to the photosythometer to demonstrate the effect light intensity on rate of photosynthesisas measured by the photosythometer ☐Using different temperature of water baths to demonstrate effect of temperature on rate of photosynthesisas measured by the photosythometer A photosynthometer  	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

8. SEPARATION OF PHOTOSYNTHETIC PIGMENTS	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Performing an experiment on separation of plant photosynthetic pigments by paper chromatography. This should include - Cutting the bottom of the chromatography paper into a "V" shape. - Obtaining a leaf of spinach and folding it over the glass slide. - Gently rubbing the leaf about 2cm from the bottom of the chromatography paper to make a dark green line. - Folding the top of your chromatography paper and using a thumbtack to attach the paper to the rubber stopper (as seen in figure below). - Putting the chromatography paper and stopper into the flask labelled ALCOHOL so that the bottom of the paper touches the solution, but the green pigment line DOES NOT get into the solution. It should look Figure 1 below. - Letting it sit for 8 minutes. The solvent will move up the paper, separating the pigments in the leaf. - Removing the chromatography paper to dry and submitting it for assessment.  	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

9. IDENTIFICATION OF EPITHELIAL TISSUE	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Identify epithelial tissues like squamous, cuboidal, ciliated, columnar, stratified and transitional. This should include • Mounting prepared permanent slides of the tissues one at a time • Focusing the slides at x40 to view the slides • Identifying the epithelial tissues according to appearance in terms of shape, presence or absence of cilia, and number of layers • Drawing and labelling the observed structures	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

10. IDENTIFICATION OF MUSCLE TISSUE	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Identify the three types of muscle tissues including smooth, skeletal and cardiac. This should include - Mounting prepared permanent slides of the tissues one at a time - Focusing the slides at x40 to view the slides - Identifying the different types of muscle with reference to shape, presence or base of striations and connections between the components cells - Making neat labelled drawing of tissues observed	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

10. IDENTIFICATION OF CONNECTIVE TISSUE	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Identify two types of connectivetissues ;bone and cartilage. This should include - Mounting prepared permanent slides of the tissues one at a time - Focusing the slides at x40 to view the slides - Distinguishing between bone and cartilage tissue based on observations made - Making neat labelled drawing of tissues observed	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

11. PREPARATION OF EOSIN METHYLENE BLUE MEDIA AND INOCULATION OF BACTERIA	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
A. Prepare Eosin Methylene Blue media. This should include ☐ Suspending 36 grams of EMB Agar in 1000 ml of distilled water. ☐ Heating the mixture to dissolve the medium completely. ☐ Dispensing it into a heat resistant conical flask and sterilizing it by autoclaving at15 lbs. pressure (121 °C) for 15 minutes. Overheating should be avoided. ☐ Cooling the media to 50 °C ☐ Shaking the medium in order to oxidize the methylene blue (i.e. to restore itsBlue colour) and to suspend the flocculent precipitate. ☐ Dispensing 15 ml amounts into 4 sterile petri plates aseptically ☐ Allowing the media to completely cool down and placing the Petri dishes base up in readiness for inoculation	☐	☐	☐	☐	☐	☐
B. Inoculate, incubate and differentiate microorganism using Eosin Methylene Blue media. This should include ☐ Inoculating the *Escherichia coli* organism directly onto the surface of an EMB agar plate ☐ Streaking using the quadrant method for isolation. ☐ Labelling the plates medium with the date of preparation and name of organism inoculated. ☐ Incubating inoculated plate aerobically at 37°C. ☐ Examining for growth after 18-24 hours of incubation. ☐ Repeating the prior step to inoculate and incubate *Enterobacter aerogenes* ☐ Coliforms that utilize the lactose and/or sucrose are blue/black with a greenish metallic sheen. Indicative of *Escherichia coli*.	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

12. PREPARATION OF BLOOD AGAR MEDIA AND INOCULATION OF BACTERIA	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
A. Prepare Blood Agar Media. This should include ☐ Preparing the Blood Agar base as instructed by the manufacturer. ☐ Sterilizing the media by autoclaving at 121°C for 15 minutes. ☐ Transferring the thus prepared blood agar base to a 50°C water bath. ☐ Waiting for the agar base to cool to 50°C and then adding sterile warm to the blood agar base aseptically ☐ Mixing the Blood Agar base and blood well gently whilst avoiding formation of air bubbles. ☐ Dispensing 15 ml amounts into10 sterile petri plates aseptically ☐ Labelling the plates medium with the date of preparation and give it a batch number (if necessary). ☐ Storing the plates at 2-8°C, preferably in sealed plastic bags to prevent loss of moisture.	☐	☐	☐	☐	☐	☐

B. Inoculate fastidious microorganism on blood agar media. This should include □ Obtaining three pure cultures of *E coli , Streptococcus pyogenes, Staphylococcus aureus* □ Inoculating and Streaking the bacteria one at time in a long W pattern using the wire loopWhereby one third is has with E coli, one third has Streptococcus pyogenes and one third has Staphylococcus aureus whilst observing aseptic techniques to avoid mixing of the organisms in the three regions □ Adding the name of microorganisms inoculated and date of inoculation to labelling details □ Incubating the plates aerobically, anaerobically, or under conditions of increased CO2 (5 - 10%) in accordance with established laboratory procedures. □ Making observation of plates using light to establish if the three microorganisms used are haemolytic and if they are the type haemolysis they exhibit ▪ A clear zone around bacterial growth -RBC haemolysed completely (Beta-haemolysis and pathogenic) ▪ A greenish zone around growth - RBC partially haemolysed (Alpha-haemolysis) ▪ No change around growth -blood is not haemolysed (Gamma-haemolysis or no haemolysis)	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

13. PREPARATION OF POTATO DEXTROSE AGAR MEDIA AND INOCULATION OF YEAST	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
A. Prepare potato dextrose agar .This should include ☐ Suspending 39 grams in 1000 ml distilled water. ☐ Heating to boiling to dissolve the medium completely. ☐ Sterilizing the media by autoclaving at 15 lbs pressure (121°C) for 15 minutes. ☐ Obtaining a medium with pH of 3.5 by adding 1.8 ml of sterile tartaric acid onto 100 ml of cooled sterilised potato dextrose agar base and mixing well. ☐ Dispensing 15 ml of the acidified potato dextrose agar aseptically into each of the 4 petri dishes. ☐ Allowing the media to solidify ☐ Putting the plates base up in readiness for inoculation	☐	☐	☐	☐	☐	☐
B. Inoculate microorganism to inoculate microorganism into the potato dextrose agar. This should include ☐ Obtaining the one of Petri dishes with the potato dextrose agar and streaking the *Saccharomyces cerevisiae* by quadrant method onto the medium with a sterile inoculating loop in order to obtain isolated colonies. ☐ Repeating the inoculation and streaking step using distilled water ☐ Labelling the plates medium with the date of preparation and microorganism inoculated. ☐ Incubating the plates at 25 – 30°C in an inverted position (agar side up) with increased humidity. ☐ examining at least weekly for fungal growth ☐ continuing with observations for 4 – 6 weeks before reporting them as negative ☐ making note of number of colonies, their colour and appearance	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

14. DIRECT MICROSCOPIC COUNT	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Apply the Direct microscopic count using a counting chamber method to calculate the number of yeast cells in a sample. This should include - Sterilization and mounting of counting chamber onto the microscope stage - Cleaning of counting chamber with methanol and lens paper and then place it on the microscope stage. - Viewing of counting chamber at X4 objective lenses - Removal of counting and correct placement of a coverslip over the calibrated surface of the counting chamber. - Transfer of some the yeast suspension to the groove of the counting chamber to fill the chamber by capillary action. - Placement of the counting chamber back onto the microscopic stage and correct observe the cells under 4X and then at high-dry objective (40 X) - Accurate counting the number of yeast cells in at least 50 of the small squares. - Accurate calculation of the number of yeast cells = yeast cells per small square divided by volume of each small square multiplied by dilution factor	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

15. VIABLE CELL COUNT	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	3	1	2	3
Apply the Viable cell count of yeast identification method.This should include ☐ Properly diluting the of original sample ☐ Correctly plating aliquots of the dilutions onto potato dextrose agar ☐ Incubating of the plates under proper conditions to allow colonies formation. ☐ Accurately counting of colonies after incubation ☐Accurately calculation of colony forming unit's total number of viable cell by multiplying the number of colonies on a dilution plate by the corresponding dilution factor.	☐	☐	☐	☐	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

Final Assessment Summary

Practical assessment summary	**Satisfactory**	**Not Satisfactory**
1. Dissection of the rat	☐	☐
2. Effect of exercise on pulse rate	☐	☐
3. Blood smear preparation	☐	☐
4. **Skeleton preservations of small animals**	☐	☐
5. **Identification of neurons and neuroglia**	☐	☐
6. **Identification of glands and organs of the endocrine system**	☐	☐
7. **Factors affecting the rate of photosynthesis**	☐	☐
8. **Separation of photosynthetic pigments**	☐	☐
9. **Identification of epithelial tissue**	☐	☐
10. **Identification of muscle tissue**	☐	☐
11. **Identification of connective tissue**	☐	☐
12. **Preparation of eosin methylene blue media and inoculation of bacteria**	☐	☐
13. **Preparation of blood agar media and inoculation of bacteria**	☐	☐
14. **Preparation of potato dextrose agar media and inoculation of bacteria**	☐	☐
15. **Direct microscopic count**	☐	☐
16. **Microbiology techniques:viable cell count**	☐	☐

Assessor comments:

Signed: Assessor: Trainee:

Assessment Outcome

Satisfactory ☐

Not Satisfactory ☐

Employee/Trainee	**Assessor**
Employee/Trainee name: _____ (Print)	Assessor name: _____ (Print)
Employee/Trainee comments:	**Assessor comments:**
Signature: _____ Date: _____	Signature: _____ Date: _____

VALIDATION OF THE ASSESSMENT

NAME:……..

DATE:……..

POSITION: **PRINCIPAL/HEAD OF INSTITUTION** SIGNATURE:……..

NAME INSTITUTION:……

STAMP: