ASSESSMENT RESOURCES BOOK

UTILITY LABORATORY TECHNICIAN SERVICES IV

GREEN CLIMATE FUND

MNSDA

Ministry of Environment
Climate Change & Technology

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Instructions to the Assessor on Competency Based Assessment (CBA)

Assessment is the process of identifying a participant's current knowledge, skills and attitudes sets against all elements of competency within a unit of competency.

Suggested Assessment Methods
For each unit of competency, a number of assessment tools have been identified including:

- ✓ Work Projects
- ✓ Oral Questions
- ✓ Written Questions
- ✓ Third Party Statements
- ✓ Observation Checklists.

Instructions and Evidence Recording Sheets have been identified in this Assessment Manual for use by Assessors.

Alternative Assessment Methods
Whilst the above-mentioned assessment methods are suggested assessment methods, the assessor may use an alternate method of assessment taking into account:

a. The nature of the unit
b. The strengths of participants
c. The number of participants in the class
d. Time required to complete assessments
e. Time dedicated to assessment
f. Equipment and resources required.

Alternate assessment methods include:

- ✓ Practical demonstrations
- ✓ Practical demonstrations in simulated work conditions Problem solving
- ✓ Portfolios of evidence
- ✓ Critical incident reports
- ✓ Journals
- ✓ Oral presentations
- ✓ Interviews
- ✓ Videos
- ✓ Visuals/slides/audio tapes
- ✓ Case studies
- ✓ Log books
- ✓ Projects and Role plays
- ✓ Group projects
- ✓ Recognition of Prior Learning.

Whilst there is no specific instruction or evidence collection documents for all the alternative assessment methods, assessors can record competency in the „Other‟ section within the "Competency Recording Sheet‟.

Selection of Assessment Methods
Each assessor will determine the combination of Assessment Methods to be used to determine Competency for each Competency Unit on a student by student basis.
"Sufficient‟ evidence to support the „Competent‟/‟Not Yet Competent‟ decision must be captured.
In practice this means a minimum of two - three Assessment Methods for each candidate for each Competency Element is suggested.

At least one method should provide evidence of practical demonstration of competence.

The following assessment methods deemed to provide evidence of practical demonstration of competence include:

- ✓ Practical Work Projects
- ✓ Third Party Statement
- ✓ Observation Checklist.

Assessing Competency
Competency based assessment does not award grades, but simply identifies if the participant has the knowledge, skills and attitudes to undertake the required task to the specified standard.

Therefore, when assessing competency, an assessor has two possible results that can be awarded:

- ✓ "Competent" (C)
- ✓ "Not Yet Competent (NYC)

Competent (C)
If the participant is able to successfully answer or demonstrate what is required, to the expected standards of the performance criteria, they will be deemed as "Competent" (C).

The assessor will award a "Competent" (C) if they feel the participant has the necessary knowledge, skills and attitudes in all assessment tasks for a unit.

Not Yet Competent' (NYC)
If the participant is unable to answer or demonstrate competency to the desired standard, they will be deemed to be „Not Yet Competent" (NYC).

This does not mean the participant will need to complete all the assessment tasks again. The focus will be on the specific assessment tasks that were not performed to the expected standards.

The participant may be required to:

a. Undertake further training or instruction
b. Undertake the assessment task again until they are deemed to be "Competent".

Trade Testing (Recognition of Prior Learning)

Trade Testing or Recognition of Prior Learning is the process that gives current industry professionals who do not have a formal qualification, the opportunity to benchmark their extensive skills and experience against the standards set out in each unit of competency/subject.

This process is a learning and assessment pathway which encompasses:

- ✓ Recognition of Current Competencies (RCC)
- ✓ Skills auditing
- ✓ Gap analysis and training
- ✓ Credit transfer.

Code of practice for assessors

This Code of Practice provides:

- ✓ Assessors with direction on the standard of practice expected of them
- ✓ Candidates with assurance of the standards of practice expected of assessors
- ✓ Employers with assurance of the standards maintained in the conduct of assessment.

The Code detailed below is based on the available international code of ethics and practice.

- ✓ The differing needs and requirements of the person being assessed, the local enterprise and/or industry are identified and handled with sensitivity
- ✓ Potential forms of conflict of interest in the assessment process and/or outcomes are identified and appropriate referrals are made, if necessary
- ✓ All forms of harassment are avoided throughout the planning, conducting, reviewing and reporting of the assessment outcomes
- ✓ The rights of the candidate are protected during and after the assessment
- ✓ Personal and interpersonal factors that are not relevant to the assessment of competency must not influence the assessment outcomes
- ✓ The candidate is made aware of rights and process of appeal
- ✓ Evidence that is gathered during the assessment is verified for validity, reliability, authenticity, sufficiency and currency
- ✓ Assessment decisions are based on available evidence that can be produced and verified by another assessor
- ✓ Assessments are conducted within the boundaries of the assessment system policies and procedures
- ✓ Formal agreement is obtained from both the candidate and the assessor that the assessment was carried out in accordance with agreed procedures
- ✓ The candidate is informed of all assessment reporting processes prior to the assessment
- ✓ The candidate is informed of all known potential consequences of decisions arising from an assessment, prior to the assessment
- ✓ Confidentiality is maintained regarding assessment results
- ✓ The assessment results are used consistently with the purposes explained to the candidate
- ✓ Opportunities are created for technical assistance in planning, conducting and reviewing assessment procedures and outcomes.

Instructions and checklist for assessors

Instructions

General instructions for the assessment

- ✓ Assessment should be conducted at a scheduled time that has been notified to the candidate
- ✓ Facilitators must ensure participants are made aware of the need to complete assessments and attend assessment sessions
- ✓ If a participant is unable to attend a scheduled session, they must make arrangements with the Assessor to undertake the assessment at an alternative time
- ✓ At the end of the assessment the Assessor must give feedback and advise the participant on their C/NYC status
- ✓ Complete the relevant documentation and submit to the appropriate department.

Preparation

- ✓ Gain familiarity with the Unit of Competency, Elements of Competency and the Performance Criteria expected
- ✓ Study details assessment documentation and requirements
- ✓ Brief candidate regarding all assessment criteria and requirements.

Briefing Checklist

- ✓ Begin the assessment by implementing the following checklist and then invite the candidate to proceed with assessment.

Checklist for Assessors

#	Activity to Follow	Tick	Remarks
	Prior to the assessment I have:		
1	Ensured the candidate is informed about the venue and schedule of assessment.		
2	Received current copies of the performance criteria to be assessed, assessment plan, evidence gathering plan, assessment checklist, appeal form and the company's standard operating procedures (SOP).		
3	Reviewed the performance criteria and evidence plan to ensure I clearly understood the instructions and the requirements of the assessment process.		
4	Identified and accommodated any special needs of the candidate.		
5	Checked the set-up and resources for the assessment.		
	During the assessment I have:		
6	Introduced myself and confirmed identities of candidates.		
7	Put candidates at ease by being friendly and helpful.		
8	Explained to candidates the purpose, context and benefits of the assessment.		
9	Ensured candidates understood the assessment process and all attendant procedures.		
10	Provided candidates with an overview of performance criteria to be assessed.		
11	Explained the results reporting procedure.		
12	Encouraged candidates to seek clarifications if in doubt.		
13	Asked candidates for feedback on the assessment		
14	Explained legal, safety and ethical issues, if applicable.		
	After the assessment I have:		
14	Ensured candidate is given constructive feedback.		
16	Completed and signed the assessment record.		
17	Thanked candidate for participating in the assessment.		

Instructions for recording competency

Specifications for Recording Competency

The following specifications apply to the preparation of Evidence Gathering Plans:

- ✓ A Competency Recording Sheet must be prepared for each candidate to ensure and demonstrate all Performance Criteria and Competency Elements are appropriately assessed. This Sheet indicates how the Assessor will gather evidence during their assessment of each candidate
- ✓ This Competency Recording Sheet is located at the end of the Assessment Plan It is the overriding document to record competency
- ✓ Assessor may vary the Competency Recording Sheet to accommodate practical and individual candidate and/or workplace needs
- ✓ Assessor must place a tick (☒) in the „Assessment Method" columns to identify the methods of assessment to be used for each candidate
- ✓ Multiple Competency Elements/Performance Criteria may be assessed at the one time, where appropriate

- ✓ The assessor and participant should sign and date the Competency Recording Sheet, when all forms of evidence and assessment have been completed
- ✓ The assessor may provide and feedback or clarify questions which the participant may have in regards to the assessment grade or findings
- ✓ All documents used to capture evidence must be retained, and attached to the Competency Recording Sheet for each candidate for each Competency Unit.

Instructions for different assessment methods

Specifications for Work Project Assessment

These guidelines concern the use of work projects.
The work projects identified in the Training Manuals involve a range of tasks, to be performed at the discretion of the Assessor.
Work project tasks can be completed through any form of assessment as identified in the Trainer and Trainee Manuals and stated at the start of this section.
Assessors should follow these guidelines:

- ✓ Review the Work Projects at the end of each „Element of Competency" in the Trainee Manual to ensure you understand the content and what is expected
- ✓ Prepare sufficient resources for the completion of work activities including:
  - Time – whether in scheduled delivery hours or suggested time participants to spend outside of class hours
  - Resources – this may involve technical equipment, computer, internet access, stationery and other supplementary materials and documents

- ✓ Prepare assessment location (if done in class) making it conducive to assessment
- ✓ Explain Work Projects assessment to candidate, at the start of each Element of Competency. This ensures that participants are aware of what is expected and can collate information as delivery takes place.
- ✓ Assessors can use the following phrase as a guide (where an „X" is identified, please input appropriate information):

  "At the end of each Element of Competency there are Work Projects which must be completed. These projects require different tasks that must be completed.
  These work projects are part of the formal assessment for the unit of competency titled X.

  - ➢ You are required to complete these activities:
    - Using the 'X' method of assessment.
    - At 'X' location
    - You will have 'X time period' for this assessment.
  - ➢ You are required to compile information in a format that you feel is appropriate to the assessment.
  - ➢ Do you have any questions about this assessment?"
- ✓ Commence Work Project assessment:
- ✓ The assessor may give time for participants to review the questions at this time to ensure they understand the nature of the questions. The assessor may need to clarify questions.
- ✓ Participants complete work projects in the most appropriate format

- ✓ Participants must submit Work Project evidence to the assessor before the scheduled due date
- ✓ Assessor must assess the participant's evidence against the competency standards specified in each Element of Competency and their own understanding. The assessor can determine if the participant has provided evidence to a "competent" standard.
- ✓ Transcribe results/details to Competency Recording Sheet
- ✓ Forward/file assessment record.

Specifications for Oral Question Assessment

These guidelines concern the use of oral questioning. Assessors should follow these guidelines.

- ✓ Prepare Assessment Record for Oral Questioning. One record for each candidate:
  - Enter Student name
  - Enter Assessor name
  - Enter Location

- ✓ Familiarize self with Questions to be asked
- ✓ Prepare assessment location (table and chairs) making it conducive to assessment
- ✓ Explain Oral Questioning assessment to candidate, using the following phrase as a guide (where a "X" is identified, please input appropriate information):
  "These oral questions are part of the formal assessment for the unit of competency titled X.
  There are X questions and you are required to answer all of them to the best of your ability and I will record whether or not you have answered correctly.
  - I will give you feedback at the end of the assessment.
  - Do you have any questions about this assessment?"

- ✓ Commence Oral Questioning assessment
- ✓ Complete Assessment Record for the Oral Questioning by:
  - Ticking C or NYC, as appropriate
  - Entering „Remarks" as required
  - Completing Oral Questioning within 60 minutes

- ✓ Complete Oral Questioning and provide feedback to candidate
- ✓ Transcribe results/details to Competency Recording Sheet
- ✓ Forward/file assessment record.

Specifications for Written Question Assessment

These guidelines concern the use of written questioning.
Assessors should follow these guidelines.

- ✓ Familiarize self with Questions and Answers provided.
- ✓ Print and distribute copies of „Written Questions" for participants. Ideally this should take place with adequate time for participants to answer all questions before the expected due date.
- ✓ Explain Written Questioning assessment to candidate, using the following phrase as a guide (where a „X" is identified, please input appropriate information):

  "These written questions are part of the formal assessment for the unit of competency titled X.
  There are X questions and you are required to answer all of them to the best of your ability.

You may refer to your subject materials, however where possible try to utilise your existing knowledge when answering questions.
Where you are unsure of questions, please ask the Assessor for further instruction. This may be answering the question orally or asking the assessor to redefine the question.
We have X time for this assessment.

- The due date for completion of this assessment is X
- On this date you must forward the completed questions to the assessor by X time on the date of X
- Do you have any questions about this assessment?"

- ✓ The assessor may give time for participants to review the questions at this time to ensure they understand the nature of the questions. The assessor may need to clarify questions. Participants may record written answers (where possible)
- ✓ Participants must submit the written answers to the assessor before the scheduled due date
- ✓ Assessor must assess the participant's written answers against the model answers provided as a guide, or their own understanding. The assessor can determine if the participant has answered the questions to a "competent" standard.
- ✓ Transcribe results/details to Competency Recording Sheet
- ✓ Forward/file assessment record.

Specifications for Observation Checklist

These specifications apply to the use of the Observation Checklist in determining competency for candidates.
Only an approved assessor is authorized to complete the Observation Checklist.
The assessor is required to observe the participant, ideally in a simulated environment or their practical workplace setting and record their performance (or otherwise) of the competencies listed on the Observation Checklist for the Competency Unit.
To complete the Observation Checklist the Assessor must:

- ✓ Insert name of candidate
- ✓ Insert assessor name
- ✓ Insert identify of location where observations are being undertaken
- ✓ Insert date/s of observations – may be single date or multiple dates
- ✓ Place a tick in either the „Yes" or „No" box for each listed Performance Criteria to indicate the candidate has demonstrated/not demonstrated that skill
- ✓ Provide written (and verbal) feedback to candidate – as/if appropriate Sign and date the form
- ✓ Present form to candidate for them to sign and date
- ✓ Transcribe results/details to Competency Recording Sheet for candidate
- ✓ Forward/file Observation Checklist.

This source of evidence combines with other forms of assessment to assist in determining the "Competent" or "Not Yet Competent" decision for the participant.

Specifications for Third Party Statement

These specifications relate to the use of a relevant workplace person to assist in determining competency for candidates.
The Third-Party Statement is to be supplied by the assessor to a person in the workplace who supervises and/or works closely with the participant.
This may be their Supervisor, the venue manager, the Department Manager or similar.
The Third-Party Statement asks the Supervisor to record what they believe to be the competencies of the participant based on their workplace experience of the participant. This

experience may be gained through observation of their workplace performance, feedback from others, inspection of candidate's work etc.
A meeting must take place between the Assessor and the Third Party to explain and demonstrate the use of the Third-Party Statement.
To complete the Third-Party Verification Statement the Assessor must:

- ✓ Insert candidate name
- ✓ Insert name and contact details of the Third Party
- ✓ Tick the box to indicate the relationship of the Third Party to the candidate
- ✓ Present the partially completed form to the Third Party for them to finalize
- ✓ Collect the completed form from the Third Party
- ✓ Transcribe results/details to Competency Recording Sheet for candidate Forward/file Third Party Statement.

The Third Party must:

1. Record their belief regarding candidate ability/competency as either:
    - Competent = Yes
    - Not Yet Competent = No
    - Unsure about whether candidate is competent or not = Not Sure
2. Meet briefly with the assessor to discuss and/or clarify the form.
   This source of evidence combines with other forms of assessment to assist in determining the „Competent" or "Not Yet Competent" decision for the candidate.
   A separate Third-Party Statement is required for each Competency Unit undertaken by the candidate.

Unit-1: Write technical reports

Unit No	01
Unit Title	Write technical reports
Unit Code	**CONCM08V1/21**

Evidence Matrix

Following matrix is developed using which the Assessment will be planned and undertaken.

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Plan the research and write the proposal							
Purpose or objective of the research is identified, and confirmed with stakeholders	✓	✓	✓	✓	✓	✓	✓
Scope and nature of the information requirements are identified	✓		✓	✓	✓		✓
All possible sources of the required information are researched and identified	✓	✓		✓	✓	✓	
A systematic research or information collection plan is designed to optimize the process		✓	✓	✓		✓	✓
Resources are obtained and scheduled to service the research requirements	✓	✓	✓		✓	✓	✓
2. Conduct research							
Research is undertaken effectively in accordance with the plan	✓	✓	✓	✓	✓	✓	✓
Experiments and tests to support the research effort are conducted in a manner which ensures the demonstrable integrity of the outcomes or findings	✓		✓	✓	✓		✓
Research findings are logged, documented and stored to maintain traceability	✓	✓		✓	✓	✓	
Preliminary analysis is conducted to identify requirements for variations or additions to the research plan		✓	✓	✓		✓	✓
3. Analyse the information							
Information is sorted, documented and prepared for the analytical process	✓	✓	✓	✓	✓	✓	✓

Information and data is manipulated to enable reasonable comparisons and judgments	✓		✓	✓	✓		✓
Clarification by way of expert advice and opinion is sought	✓	✓		✓	✓	✓	
4. Prepare and present the report							
Report clearly defines the objectives, process, findings and further actions	✓	✓	✓	✓	✓	✓	✓
Report addresses and satisfies the stated objective and timeframe	✓		✓	✓	✓		✓
Report and associated presentation materials are of a standard and quality for the intended audience	✓	✓		✓	✓	✓	
Reader comprehension of the report is aided by use of executive summaries and attachments		✓	✓	✓		✓	✓
Information management requirements, including documenting and repository actions are satisfied in accordance with enterprise procedures	✓	✓	✓		✓	✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

#	Questions	Answers
1	What is the purpose of a proposal?	A proposal allows the writer to clarify what it is he/she wants to do, why and how he/she wants to do it and present what you want to do in the manner and timeframe proposed.
2	What are the components to a proposal?	1. Title 2. Introduction 3. Research question 4. Method 5. Project 6. Timeline 7. References
3	Explain what a research plan is	The research plan shall detail completely the prosecution of the research, including the submission of an acceptable final report. The plan ultimately becomes a part of the contract by reference of the proposal; therefore, it should describe, in a specific and straightforward manner, the proposed approach to the solution of the problem described in the project statement.
4	While evaluating a research project an expert opinion is important. What is an expert opinion?	This method involves obtaining the opinions of people who are knowledgeable about the subject of the research and the impact of the project being evaluated. The experts can be internal or external to the agency.

5	What is user or client opinion?	This method involves obtaining the opinions of clients, often through technical advisory committees or project panels.
6	What are the advantages of case studies?	The advantage of case studies is that they afford the best opportunity of identifying the relationship between the research study and the impact of the research results. They are particularly useful for evaluating projects that benefit the public good, rather than using cost-benefit analyses that assign dubious values to some impacts such as the value of a human life. Because the results are usually qualitative, it is difficult to use case studies to compare the value of projects, or to aggregate the results to demonstrate the value of research programs.
7	What is a report?	A report is a written presentation of factual information based on an investigation or research.
8	What makes an effective report?	✓ Clear, concise and accurate ✓ Easy for the audience to understand ✓ Appropriate for the audience ✓ Well organized with clear section headings
9	What are the content that a report must cover?	✓ Title page ✓ Table of contents ✓ Abstract or executive summary ✓ Introduction (or Terms of Reference & Procedure) ✓ Findings and / or Discussion ✓ Recommendations ✓ References
10	What is the purpose of "Terms of Reference" in a report?	Briefly states the purpose and scope of the report. This includes who requested the report, the main issues or problems to be identified, the reason for undertaking the report and the due date of the report.

2. PT=Practical Test

#	Practical activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to writing technical reports, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Plan the research and write the proposal ✓ Conduct research ✓ Analyse the information ✓ Prepare and present the report

3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Plan the research and write the proposal ✓ Conduct research ✓ Analyse the information ✓ Prepare and present the report
4	Prepare and present a report	Every student is expected to conduct a research effectively in accordance with the plan. The information is sorted, documented and prepared for analytical process. Students must clearly define the objective, process, findings & further actions

3. OW =Observation at work Place

#	Types of Skills	Techniques for validation
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Plan the research and write the proposal ✓ Conduct research ✓ Analyse the information ✓ Prepare and present the report
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to identifying and analysing requirements, planning and conducting research, evaluating information and findings, and developing, documenting and presenting technical reports. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Presenting the report	Every student is expected to conduct a research effectively in accordance with the plan. The information is sorted, documented and prepared for analytical process. ✓ Accuracy of the information shared ✓ Report addresses and satisfies the stated objective and time frame. ✓ Relevancy of the information ✓ Application of different knowledge to relevant situations

4. OQ=Oral Questioning

#	Questions	Answers
1	Plan the research and write the proposal	Make sure the students answer questions related to the following areas ✓ Purpose or objective of the research is identified, and confirmed with stakeholders ✓ Scope and nature of the information requirements are identified. ✓ All possible sources of the required information are researched and identified ✓ A systematic research or information collection plan is designed to optimize the process. ✓ Resources are obtained and scheduled to service the research requirements.
2	Conduct research	Make sure the students answer questions related to the following areas ✓ Research is undertaken effectively in accordance with the plan ✓ Experiments and tests to support the research effort are conducted in a manner which ensures the demonstrable integrity of the outcomes or findings ✓ Research findings are logged, documented and stored to maintain traceability ✓ Preliminary analysis is conducted to identify requirements for variations or additions to the research plan
3	Analyze the information	Make sure the students answer questions related to the following areas ✓ Information is sorted, documented and prepared for the analytical process. ✓ Information and data is manipulated to enable reasonable comparisons and judgements. ✓ Clarification by way of expert advice and opinion is sought.
4	Prepare and present the report	Make sure the students answer questions related to the following areas ✓ Report clearly defines the objectives, process, findings and further actions.

		✓ Report addresses and satisfies the stated objective and timeframe ✓ Report and associated presentation materials are of a standard and quality for the intended audience ✓ Reader comprehension of the report is aided by use of executive summaries and attachments. ✓ Information management requirements, including documenting and repository actions are satisfied in accordance with enterprise procedures.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-2: Apply and maintain Occupational Health and Safety

Unit No	02
Unit Title	Apply and maintain Occupational Health and Safety
Unit Code	**CONCM09V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Perform all work safely							
One's unique sense of purpose for working and the whys of work are identified, reflected on and clearly defined for one's development as a person and as a member of society.	✓	✓	✓	✓		✓	✓
Personal mission is in harmony with company's values.	✓		✓	✓	✓		✓
2. Ensure others in the work group are able to implement safe work practices							
Work values/ethics/concepts are identified and classified in accordance with companies' ethical standard guidelines.	✓	✓	✓	✓		✓	✓
Work policies are undertaken in accordance with company's policies, guidelines on work ethical standard.	✓		✓	✓	✓		✓
Resources are used in accordance with company's policies and guidelines.	✓	✓	✓	✓		✓	✓
Punctuality, absence from work, sick, family and annual leave is maintained alignment to the Employment Act of the Maldives	✓		✓	✓	✓		✓
3. Monitor observance of safe work practices in the work area							
Company ethical standards, organizational policy and guidelines on the prevention and reporting of unethical conduct/behavior are followed.	✓	✓	✓	✓		✓	✓
Work incidents/situations are reported according to company protocol/guidelines.	✓		✓	✓	✓		✓
Resolution and/or referral of ethical problems identified are reported/documented based on standard operating procedure	✓	✓	✓	✓		✓	✓
4. Participate in risk management processes							

Personal behavior and relationships with co-workers and/or clients are demonstrated consistent with ethical standards, policy and guidelines.	✓	✓	✓	✓		✓	✓
Work practices are satisfactorily demonstrated and consistent with industry work ethical standards, organizational policy and guidelines.	✓		✓	✓	✓		✓
Instructions to co-workers are provided based on ethical lawful and reasonable directives	✓	✓	✓	✓		✓	✓
5. Support the implementation of emergency procedures within the work group							
Ensure that workplace procedures for dealing with incidents and emergencies are available and known by work group	✓	✓	✓	✓		✓	✓
Implement processes to ensure that others in the work area are able to respond appropriately to incidents and emergencies	✓		✓	✓	✓		✓
Participate, as required, in investigations of hazardous incidents to identify their cause	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1.Written questions

#	Question	Answer
1	What is the objective of a safety program?	A safety program is to prevent injuries and to allow you to do your job efficiently and safely
2	Why is it important to let your supervisor know if you are under any medication?	As some medications may impair your ability to work or operate equipment safely.
3	What is workplace hazard?	Hazard means a situation or thing that has the potential to harm a person. Hazards at work may include: noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
4	What is Risk Control?	Risk control means taking action to eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable.
5	What does a risk assessment help determine?	✓ How severe a risk is? ✓ Whether any existing control measures are effective ✓ What action you should take to control the risk ✓ How urgently the action needs to be taken.
6	How would you work out the chain of events?	One way of working out the chain of events is to determine the starting point where things begin to go wrong and then consider: 'If this happens, what may happen next?' This will provide a list of events that sooner or later cause harm.
7	What are the things you should consider to estimate the severity of a hazard?	✓ What type of harm could occur? ✓ What factors could influence the severity of harm that occurs? ✓ How many people are exposed to the hazard and how many could be harmed in and outside your workplace? ✓ Could one failure lead to other failures?
8	"All hazards have the potential to cause different types and severities of harm." Give an example for this statement	For example, heavy liquefied petroleum gas (LPG) cylinders can cause muscular strain when they are handled manually. However, if the cylinder is damaged causing gas to leak which is then ignited, a fire could result in serious burns. If that leak occurs in a store room or similar enclosed space, it could result in an explosion that could destroy the building and kill or injure anyone nearby. Each of the outcomes involves a different type of harm with a range of severities, and each has a different likelihood of occurrence.
9	Describe 3 situations where a risk assessment is not necessary.	1. Legislation requires some hazards or risks to be controlled in a specific way – these requirements must be complied with. 2. A code of practice or other guidance sets out a way of controlling a hazard or risk that is applicable to your situation and you choose to use the recommended controls. In these instances, the guidance can be followed. 3. There are well-known and effective controls that are in use in the particular industry, that are suited to the circumstances in your workplace. These controls can simply be implemented
10	When should a risk assessment must be carried out?	When: ✓ There is uncertainty about how a hazard may result in injury or illness

		✓ The work activity involves a number of different hazards and there is a lack of understanding about how the hazards may interact with each other to produce new or greater risks ✓ Changes at the workplace occur that may impact on the effectiveness of control measures.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	✓ Students need to undertake assignments related to planning to monitor and maintain work health and safety (WHS) within a work area, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Perform all work safely ✓ Ensure others in the work group are able to implement safe work practices ✓ Monitor observance of safe work practices in the work area ✓ Participate in risk management processes Support the implementation of emergency procedures within the work group
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Perform all work safely ✓ Ensure others in the work group are able to implement safe work practices ✓ Monitor observance of safe work practices in the work area ✓ Participate in risk management processes ✓ Support the implementation of emergency procedures within the work group
4	Carryout risk assessment process	Students must participate ✓ In reporting and addressing any identified hazards and inadequacies in existing risk controls ✓ In identifying and analyzing risks ✓ In implementing procedures to control risk ✓ In ensuring records of incidents in the work area and other required documentation are accurately completed.

3. OW =Observation at work Place

#	Observation activity	Points to validate
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Perform all work safely ✓ Ensure others in the work group are able to implement safe work practices ✓ Monitor observance of safe work practices in the work area ✓ Participate in risk management processes ✓ Support the implementation of emergency procedures within the work group
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Carryout risk assessment process	Use the presentation and assess the following Participate in risk assessments to identify and analyses risks

4. OQ=Oral Questioning

#	Questions	Validating Student Performance
1	Perform all work safely	Make sure the students answer questions related to the following areas ✓ Use established work practices and personal protective equipment (PPE) to ensure personal safety and that of other workplace personnel ✓ Clean, care for and store equipment, materials and reagents as required ✓ Minimize the generation of wastes and environmental impacts ✓ Ensure safe disposal of laboratory/hazardous wastes

2	Ensure others in the work group are able to implement safe work practices	Make sure the students answer questions related to the following areas ✓ Ensure hazard controls and PPE appropriate to the work requirements are available and functional ✓ Provide and communicate current information about workplace health and safety policies, procedures and programs to others ✓ Ensure hazards and control measures relating to work responsibilities are known by those in the work area ✓ Provide support to those in the work area to implement procedures to support safety ✓ Identify and address training needs within level of responsibility
3	Monitor observance of safe work practices in the work area	Make sure the students answer questions related to the following areas ✓ Ensure workplace procedures are clearly defined, documented and followed ✓ Identify any deviation from identified procedures and report and address within level of responsibility ✓ Ensure personal behavior is consistent with workplace policies and procedures ✓ Encourage and follow up others to identify and report hazards in the work area ✓ Monitor conditions and follow up to ensure housekeeping standards in the work area are maintained
4	Participate in risk management processes	Make sure the students answer questions related to the following areas ✓ Report and address any identified hazards and inadequacies in existing risk controls within level of responsibility and according to workplace procedures ✓ Participate in risk assessments to identify and analyses risks ✓ Support the implementation of procedures to control risk (based on the hierarchy of control) ✓ Ensure records of incidents in the work area and other required documentation are accurately completed and maintained.
5	Support the implementation of emergency procedures within the work group	Make sure the students answer questions related to the following areas ✓ Implement processes to ensure that others in the work area are able to respond appropriately to incidents and emergencies ✓ Implement processes to ensure that others in the work area are able to respond appropriately to incidents and emergencies

		✓ Participate, as required, in investigations of hazardous incidents to identify their cause

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-3: Carry out data entry and retrieval procedures

Unit No	03
Unit Title	Carry out data entry and retrieval procedures
Unit Code	**CONCM10V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Initiate computer system							
The hardware components of the computer and their functions are correctly identified	✓	✓	✓	✓		✓	✓
Equipment is powered up correctly	✓		✓	✓	✓		✓
Access codes are correctly applied	✓	✓	✓	✓		✓	✓
Appropriate software is selected or loaded from the menu	✓		✓	✓	✓		✓
2. Enter data							
Types of data for entry correctly identified and collected	✓	✓	✓	✓		✓	✓
Input devices selected and used are appropriate for the intended operations	✓		✓	✓	✓		✓
Manipulative procedures of Input device conform to established practices	✓	✓	✓	✓		✓	✓
Computer files are correctly located or new files are created, named and saved	✓		✓	✓	✓		✓
Data is accurately entered in the appropriate files using specified procedure and format	✓	✓	✓	✓		✓	✓
Back-up made in accordance with operative procedures	✓		✓	✓	✓		✓
3. Retrieve data							
The identity and source of information is established	✓	✓	✓	✓		✓	✓
Authority to access data is obtained where required	✓		✓	✓	✓		✓
Files and data are correctly located and accessed	✓	✓	✓	✓		✓	✓
Integrity and confidentiality of data are maintained	✓		✓	✓	✓		✓
The relevant reports or information retrieved using approved procedure	✓	✓	✓	✓		✓	✓
Formats of retrieved report or information conform to that required	✓		✓	✓	✓		✓

Copy of the data is printed where required	✓	✓	✓	✓		✓	✓
4. Amend data							
Source of data/information for amendment is established	✓	✓	✓	✓		✓	✓
Data to be amended is correctly located within the file	✓		✓	✓	✓		✓
The correct data/information is entered, changed or deleted using appropriate input device and approved procedures	✓	✓	✓	✓		✓	✓
The Integrity of data is maintained	✓		✓	✓	✓		✓
5. Monitor the operation of equipment							
The system is monitored for correct operation of tasks	✓	✓	✓	✓		✓	✓
Routine system messages are promptly and correctly dealt with	✓		✓	✓	✓		✓
Error conditions within level of authority are dealt with promptly and uncorrected errors are promptly reported	✓	✓	✓	✓		✓	✓
Output devices and materials are monitored for quality	✓		✓	✓	✓		✓
6. Access and transmit information via the Internet							
Access to the Internet is gained in accordance with the provider's operating procedures	✓	✓	✓	✓		✓	✓
Evidence of the ability to negotiate web sites to locate and access specified information and other services is efficiently demonstrated	✓		✓	✓	✓		✓
E-mail is sent and retrieved competently	✓	✓	✓	✓		✓	✓
7. Close down computer system							
The correct shut down sequence is followed	✓	✓	✓	✓		✓	✓
Problem with shutting down computer is reported promptly	✓		✓	✓	✓		✓
All safety and protective procedures are observed	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1.Written Question

#	Question	Answer
1	What are the basic functions that a computer is programed to do?	1. Receive input 2. Process information 3. Produce output 4. Store information
2	Any computer system is made of two parts. What are they?	✓ Hardware ✓ Software
3	What does a hardware consists of?	A hardware consists of the microprocessor (the computer's brain), the memory and the input or output connections which get data in and out of the microprocessor.
4	What are peripherals?	Peripherals are devices that allow us to communicate with the computer. Peripheral devices can be external -- such as a mouse, keyboard, printer, external zip drive or scanner -- or internal, such as a CD-ROM, CD-R or internal modem. Internal peripheral devices are often referred to as integrated peripherals
5	Software is divided into two categories. What are they?	1. System software 2. Application software
6	What are input devices	Input devices feed date into the computer. The keyboard is the most common input device. Other input devices include pointing devices like the mouse and trackball.
7	What are output devices	Output devices produces produce output through two main types of devices: monitor screens for immediate visual output and printers for permanent paper output.
8	What is a processor?	A processor or CPU (Central Processing Unit) processes information, performs all the necessary arithmetic calculations and make decisions based on information values.
9	What are the advantages of customizing your desktop configuration?	The most used programs are easily accessible in one area, and if you plan to run more than one program at a time, it is better to have them in the same group window.
10	Name 2 data types and describe their characteristics.	✓ **Categorical data** Categorical data represents characteristics. Therefore, it can represent things like a person's gender, language etc. Categorical data can also take on numerical values (Example: 1 for female and 0 for male). Note that those numbers don't have mathematical meaning ✓ **Nominal data** Nominal values represent discrete units and are used to label variables, that have no quantitative value. Just think of them as „labels ". Note that nominal data that has no order. Therefore if you would change the order of its values, the meaning would not change.
11	Why are data types important?	Datatypes are an important concept because statistical methods can only be used with certain data types. You have to analyze continuous data differently than categorical data otherwise it would result in a wrong analysis. Therefore knowing the types of data you are dealing with, enables you to choose the correct method of analysis.

12	What are the basic aspects of information retrieval?	✓ Information storage and organization ✓ Information representation ✓ Information access.
13	Name two information retrieval techniques	1. Basic Retrieval Techniques 2. Advanced Retrieval Techniques
14	How do you make sure the efficiency of equipment's?	Exercising preventive maintenance measures such as systematic and routine cleaning, adjustment and replacement of equipment parts at scheduled intervals. Manufacturers generally recommend a set of equipment maintenance tasks that should be performed at regular intervals: daily, weekly, monthly or yearly. Following these recommendations will ensure that the equipment performs at maximum efficiency
15	What is HTML?	Hyper Text Markup Language or HTML is a very simple language having a number of options to represent text. Many other scripting languages have now been developed which can be embedded into HTML, giving it the power to interact with the users
16	The internet is extensively used for a wide variety of purposes. Name any 3.	1. Search for information 2. Send and receive Emails 3. Teleconferencing
17	What are steps involved in sending an Email?	1. Click on "Compose" 2. Enter the e-mail address of the receiver against any of the three options - To, CC and BCC. 3. Write in the message in the text box as indicated in the figure 4. After typing in the message click on send option
18	What are steps involved in shutting down the computer?	1. Click the Windows Icon at the lower left side of the screen. 2. Click Shutdown button **OR** Press Ctrl+Alt+Del and click the power button in the bottom-right corner of the screen.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to planning operate computer to enter, manipulate, and retrieve and to access data and communicate via the Internet., as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Initiate computer system ✓ Enter data ✓ Retrieve data ✓ Amend data ✓ Monitor the operation of equipment ✓ Access and transmit information via the Internet ✓ Close down computer system

3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Initiate computer system ✓ Enter data ✓ Retrieve data ✓ Amend data ✓ Monitor the operation of equipment ✓ Access and transmit information via the Internet
4	Undertake proper starting of the workplace computers	While performing the task, students will demonstrate knowledge and skills on the use of the computer and understand name of various parts and functions of workplace computers. Students will use proper starting procedures for safe and long-term use of the computers.
5	Possess skills to organise and manage folders and files in the computer	Workplace computers will have several documents and folders and need to be properly handled and managed. During preforming the practical activity, student will know where different folders are located and follow common procedures of handling workplace documents stored within the computers.

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Initiate computer system ✓ Enter data ✓ Retrieve data ✓ Amend data ✓ Monitor the operation of equipment ✓ Access and transmit information via the Internet
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Perform proper shut down of computer	As the students shut down computers, make sure they follow proper procedures and align these procedures to the workplace standards of the respective organizations. While

		shutting down, make sure manufacture recommendations are also taken applied.

4. OQ=Oral Questioning

#	Questions	Answers
1	Initiate computer system	Make sure the students answer questions related to the following areas ✓ The hardware components of the computer and their functions are correctly identified. ✓ Equipment is powered up correctly ✓ Access codes are correctly applied. ✓ Appropriate software is selected or loaded from the menu.
2	Enter data	Make sure the students answer questions related to the following areas ✓ Types of data for entry correctly identified and collected ✓ Input devices selected and used are appropriate for the intended operations. ✓ Manipulative procedures of Input device conform to established practices. ✓ Computer files are correctly located or new files are created, named and saved ✓ Data is accurately entered in the appropriate files using specified procedure and format. ✓ Back-up made in accordance with operative procedures.
3	Retrieve data	Make sure the students answer questions related to the following areas ✓ The identity and source of information is established. ✓ Authority to access data is obtained where required. ✓ Files and data are correctly located and accessed. ✓ Integrity and confidentiality of data are maintained ✓ The relevant reports or information retrieved using approved procedure ✓ Formats of retrieved report or information 18 conform to that required ✓ Copy of the data is printed where required
4	Amend data	Make sure the students answer questions related to the following areas

		✓ Source of data/information for amendment is established. ✓ Data to be amended is correctly located within the file ✓ The correct data/information is entered, changed or deleted using appropriate input device and approved procedures. ✓ The Integrity of data is maintained.
5	Monitor the operation of equipment	Make sure the students answer questions related to the following areas ✓ The system is monitored for correct operation of tasks. ✓ Routine system messages are promptly and correctly dealt with ✓ Error conditions within level of authority are dealt with promptly and uncorrected errors are promptly reported. ✓ Output devices and materials are monitored for quality
6	Access and transmit information via the Internet	Make sure the students answer questions related to the following areas ✓ Access to the Internet is gained in accordance with the provider's operating procedures. ✓ Evidence of the ability to negotiate web sites to locate and access specified information and other services is efficiently demonstrated. ✓ E-mail is sent and retrieved competently
7	Close down computer system	Make sure the students answer questions related to the following areas ✓ The correct shut down sequence is followed. ✓ Problem with shutting down computer is reported promptly. ✓ Problem with shutting down computer is reported promptly.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records.

		In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-4: Apply mathematics for water operations

Unit No	04
Unit Title	Apply mathematics for water operations
Unit Code	**CONCM11V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Perform simple mathematic calculations							
Perform simple calculations on: fractions and decimals, calculations to a number of significant figures, decimal places	✓	✓	✓	✓		✓	✓
Identify and use the multiples and sub- multiples of units	✓		✓	✓	✓		✓
Perform calculations on: perimeter and area of plane figures (i.e. square and rectangle, triangle, circle), volume and surface area (i.e. cube, rectangular prism, cylinder), mass of containers and their contents (i.e. cube, rectangular prism, cylinder)	✓	✓	✓	✓		✓	✓
Perform mathematical calculations involving formulas, angles, triangles and geometric construction	✓		✓	✓	✓		✓
Identify and use formulas for SI quantities: length, area, volume, mass, density	✓	✓	✓	✓		✓	✓
2. Apply knowledge of mathematics in water operations							
Identify and use units of Measurement	✓	✓	✓	✓		✓	✓
Perform calculations on: Conversion Factors, Weight, Concentration, and Flow	✓		✓	✓	✓		✓
Perform mathematical calculations involving Typical Water/Wastewater Conversion Examples	✓	✓	✓	✓		✓	✓
Perform Temperature Conversions and Population Equivalent (PE) or Unit Loading Factor	✓		✓	✓	✓		✓
Perform calculations on: Specific Gravity and Density, Flow and Detention Time	✓	✓	✓	✓		✓	✓
Perform chemical Addition Conversions	✓		✓	✓	✓		✓
3. Undertake water/wastewater calculations							
Perform Faucet Flow Estimation	✓	✓	✓	✓		✓	✓

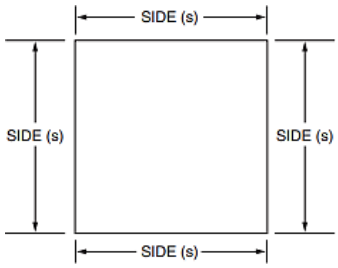
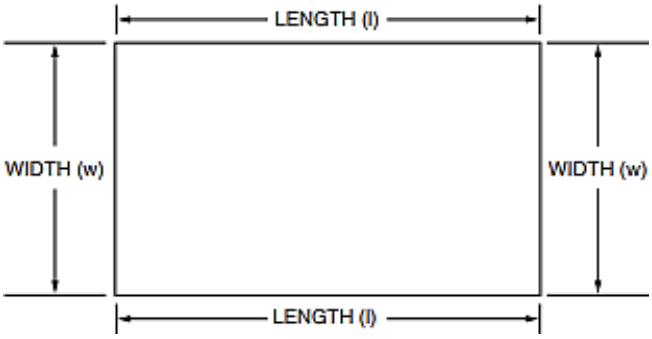
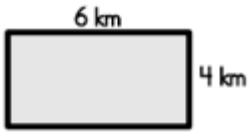
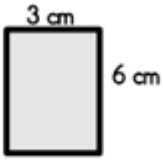
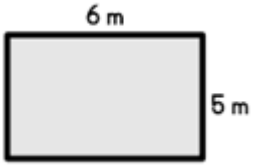
Calculate Service Line Flushing Time	✓		✓	✓	✓		✓
Perform Composite Sampling Calculation (Proportioning Factor) and Biochemical Oxygen Demand (BOD) Calculations	✓	✓	✓	✓		✓	✓
Perform mathematical calculations on Moles and Molarity, Normality, Settleability (Activated Biosolids Solids), Settleable Solids, Biosolids Total Solids, Fixed Solids, and Volatile Solids	✓		✓	✓	✓		✓
Calculate Biosolids Volume Index (BVI) and Biosolids Density Index (BDI)	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

	Question	Answer
1	What are the 2 types of fractions?	1. Common fractions 2. Decimal fractions
2	What is a denominator?	The bottom number (the denominator) of every fraction shows the number of pieces any one whole object is divided into; all pieces are of equal size
3	What is the top number of a fraction called?	A numerator.
4	What is a decimal point?	A decimal point separates the whole numbers from the parts, and the whole numbers are always to the left of the decimal point.
5	Round off the following to tenths ✓ .68 ✓ .64	✓ 7 ✓ 6
6	Round off the following to hundredths ✓ .357 ✓ .351	✓ .36 ✓ .35
7	What are significant figures?	The significant figures of a number are digits that carry meaning contributing to its measurement resolution.
8	What are the base units used for the following? 1. Mass 2. Lenghth 3. Time 4. Temperature	1. Kilogram (kg) 2. Meter (m) 3. Second 4. Kelvin (K)

9	How would you identify a square? Illustrate.	All four sides are of equal length, and all four angles are 90°. 
10	How would you identify a Rectangle? Illustrate.	The lengths are equal only to each other and the widths are equal only to each other. All four angles are 90°. 
11	Find the area of the following    	✓ A=L x H = 6 x 4 = 24 ✓ A=L x H = 3 x 6 = 18 ✓ A=L x H = 6 x 5 = 30

12	A cuboid measures 16 cm by 13 cm by 9 cm. Find the capacity of the cuboid. Give your answers in liters.	Solution: Volume = 16 × 13 × 9 = 1872 cm3.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to: Use calculation to solve simple problems, construct plane figures, and develop patterns., as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Perform simple mathematic calculations ✓ Apply knowledge of mathematics in water operations ✓ Undertake water/wastewater calculations
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Perform simple mathematic calculations ✓ Apply knowledge of mathematics in water operations ✓ Undertake water/wastewater calculations
4	Use calculations to solve simple problems	While answering, make sure they use correct formulas while calculating perimeter, area, volume and other mathematical calculations.

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Perform simple mathematic calculations ✓ Apply knowledge of mathematics in water operations ✓ Undertake water/wastewater calculations
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities

		related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Apply knowledge of mathematics in water operations	Assessor can verbally ask questions on the identification of unit measurements and how to perform calculations on Conversion Factors, Weight, Concentration, and Flow

4. OQ=Oral Questioning

#	Questions	Answers
1	Perform simple mathematic calculations	Make sure the students answer questions related to the following areas ✓ Perform simple calculations on: fractions and decimals, calculations to a number of significant figures, decimal places ✓ Identify and use the multiples and sub-multiples of units ✓ Perform calculations on: perimeter and area of plane figures (i.e. square and rectangle, triangle, circle), volume and surface area (i.e. cube, rectangular prism, cylinder), mass of containers ✓ and their contents (i.e. cube, rectangular prism, cylinder) ✓ Perform mathematical calculations involving formulas, angles, triangles and geometric construction ✓ Identify and use formulas for SI quantities: length, area, volume, mass, density
2	Apply knowledge of mathematics in water operations	Make sure the students answer questions related to the following areas ✓ Identify and use units of Measurement ✓ Perform calculations on: Conversion Factors, Weight, Concentration, and Flow ✓ Perform mathematical calculations involving Typical Water/Wastewater Conversion Examples ✓ Perform Temperature Conversions and Population Equivalent (PE) or Unit Loading Factor ✓ Perform calculations on: Specific Gravity and Density, Flow and Detention Time ✓ Perform chemical Addition Conversions

3	Undertake water/wastewater calculations	Make sure the students answer questions related to the following areas ✓ Perform Faucet Flow Estimation ✓ Calculate Service Line Flushing Time ✓ Perform Composite Sampling Calculation (Proportioning Factor) and Biochemical Oxygen Demand (BOD) Calculations ✓ Perform mathematical calculations on Moles and Molarity, Normality, Settleability (Activated Biosolids Solids), Settleable Solids, Biosolids Total Solids, Fixed Solids, and Volatile Solids ✓ Calculate Biosolids Volume Index (BVI) and Biosolids Density Index (BDI)

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-5: Apply principles of chemistry to water systems and processes

Unit No	05
Unit Title	Apply principles of chemistry to water systems and processes
Unit Code	**CONS07CR01V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Apply chemistry to water processes							
Apply relevant chemistry principles to improve performance of specific water processes.	✓	✓	✓	✓		✓	✓
Identify and describe chemical reactions specific to water processes	✓		✓	✓	✓		✓
2. Identify the use of chemicals in water industry processes							
Assess the functions of the range of industry chemicals in relation to their use in water processes.	✓	✓	✓	✓		✓	✓
Identify and describe factors influencing the effectiveness of chemical use.	✓		✓	✓	✓		✓
Store, handle and prepare chemicals	✓	✓	✓	✓		✓	✓
3. Select chemicals for specific water industry processes							
Identify the range of chemicals available for specific water industry processes.	✓	✓	✓	✓		✓	✓
Evaluate the factors affecting the selection of chemicals for particular water industry applications.	✓		✓	✓	✓		✓
Select suitable chemicals and calculate correct usage for a range of specific water industry processes	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

#	Question	Answer
1	Explain the chemical structure of water.	Each molecule of water consists of one atom of oxygen and two atoms of hydrogen, so it has the chemical formula H2O. In each water molecule, the nucleus of the oxygen atom (with 8 positively charged protons) attracts electrons much more strongly than do the hydrogen nuclei (with only one positively charged proton). This results in a negative electrical charge near the oxygen atom (due to the "pull" of the negatively charged electrons toward the oxygen nucleus) and a positive electrical charge near the hydrogen atoms.
2	What is a polarity?	A difference in electrical charge between different parts of a molecule is called polarity.
3	What is hydrogen bonds?	Hydrogen bonds form between positively and negatively charged parts of water molecules. The bonds hold the water molecules together.
4	What is chemical reactions?	**Chemical reactions** occur when chemical bonds between atoms are formed or broken. The substances that go into a chemical reaction are called the reactants**,** and the substances produced at the end of the reaction are known as the products.
5	Break down the reaction of hydrogen peroxide (H_2O_2) into water and oxygen.	$2H_2O_2$(hydrogen peroxide) → $2H_2O$(water) + O_2(oxygen)
6	Define equilibrium.	In a reversible reaction, reactants turn into products, but products also turn back into reactants. In fact, both the forward reaction and its opposite will take place at the same time. This back and forth continues until a certain relative balance between reactants and products is reached—a state called equilibrium.
7	What is the purpose of chlorine?	Chlorine is the most widely used primary disinfectant and is also often used to provide residual disinfection in the distribution system. Monitoring the level of chlorine in drinking water entering a distribution system is normally considered to be a high priority (if it is possible), because the monitoring is used as an indicator that disinfection has taken place.
8	What is the purpose of monochloramine?	Monochloramine, used as a residual disinfectant for distribution, is usually formed from the reaction of chlorine with ammonia. Careful control of monochloramine formation in water treatment is important to avoid the formation of di- and trichloramines, because these can cause unacceptable tastes and odours.
9	What are the essential aspects of safe handling practices?	• Reading & re-reading each chemical SDS to minimize the risk of mishandling. • Wearing PPE. • Disposing of hazardous chemicals appropriately. • Being prepared for emergencies with first aid. • Not working with or handling chemicals while alone.

		• Using all precautions to avoid spillage, leakage or dropping chemicals during transportation. Use specialized carriers and carts, such as a transportable gas bottle trolley.
10	What are the areas that a team should be trained on all procedure and policies?	• Emergency plans if any unexpected accidents or reactions occur. • Information on where fire safety and first aid equipment is stored. • The correct way to decommission any chemical storage or handling systems. • Spill containment systems for hazardous chemicals. • How to assess risk surrounding dangerous goods.
11	What are the different types of water treatment chemicals?	• Algaecides • Antifoams • Biocides • Boiler water chemicals • Coagulants • Corrosion inhibitors • Disinfectants • Defoamers • Flocculants • Neutralizing agents • Oxidants • Oxygen scavengers • Ph conditioners • Resin cleaners • Scale inhibitors
12	Mention few oxidizing and non-oxidizing agents.	**1. Oxidizing agents:** Chlorine Chlorine dioxide Chloroisocyanurates Hypochlorite Ozone **2. Non-oxidizing agents:** Acrolein Amines Chlorinated phenolics Copper salts Organo-sulphur compounds Quaternary ammonium salts
13	What are the following applications that are used in boiler water chemicals?	• Oxygen scavenging; • Scale inhibition; • Corrosion inhibition; • Antifoaming; • Alkalinity control.

14	What are the five different kinds of corrosion inhibitors?	Passivity inhibitors (passivators). Cathodic inhibitors Organic inhibitors. Precipitation inducing inhibitors. Volatile Corrosion Inhibitors (VCI).
15	Disinfectants kill present unwanted microorganisms in water. What are different types of disinfectants?	• Chlorine (dose 2-10 mg/L) • Chlorine dioxide • Ozone • Hypochlorite
16	Define hypochlorite disinfection.	Hypochlorite is applied in the same way as chlorine dioxide and chlorine. Hypo chlorination is a disinfection method that is not used widely anymore, since an environmental agency proved that the Hypochlorite for disinfection in water was the cause of bromate consistence in water.
17	What are the chemicals that can be oxidized with ozone?	• Absorbable organic halogens; • Nitrite; • Iron; • Manganese; • Cyanide; • Pesticides; • Nitrogen oxides; • Odorous substances; • Chlorinated hydrocarbons; • PCB's.
18	Show a reaction of the oxidation of iron and manganese with oxygen	$2\ Fe^{2+} + O_2 + 2\ OH^- \rightarrow Fe_2O_3 + H_2O$ $2\ Mn^{2+} + O_2 + 4\ OH^- \rightarrow 2\ mno_2 + 2\ H_2O$
19	Define oxygen scavengers.	Oxygen scavenging means preventing oxygen from introducing oxidation reactions. Most of the naturally occurring organics have a slightly negative charge. Due to that they can absorb oxygen molecules, because these carry a slightly positive charge, to prevent oxidation reactions from taking place in water and other liquids.
20	What are the factors affecting the selection of chemicals for particular water industry applications?	• Environmentally friendly • Byproducts • Effectivity • Investment • Operational costs • Fluids • Surfaces

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to identifying and applying to water systems and processes the principles of chemistry, and to select the relevant and effective chemicals required for specific processes, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Apply chemistry to water processes ✓ Identify the use of chemicals in water industry processes ✓ Select chemicals for specific water industry processes
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Apply chemistry to water processes ✓ Identify the use of chemicals in water industry processes ✓ Select chemicals for specific water industry processes
4	Perform a practical test on the forming flocs in water	The student is expected to follow the correct step-by step process on forming flocs in water. The elements which should be assessed are: ✓ polymers are water-soluble and their molar weight varies between 10^5 and 10^6 g/ mol. ✓ cationic polymers, based on nitrogen, anionic polymers, based on carboxylate ions and polyampholytes, which carry both positive and negative charges

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Apply chemistry to water processes ✓ Identify the use of chemicals in water industry processes ✓ Select chemicals for specific water industry processes
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities

		related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to identifying and applying to water systems and processes the principles of chemistry, and to select the relevant and effective chemicals required for specific processes. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to disinfect using chlorine dioxide	As the students attend the practical test to demonstrate chlorine dioxide disinfection, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Apply chemistry to water processes	Make sure the students answer questions related to the following areas ✓ Apply relevant chemistry principles to improve performance of specific water processes. ✓ Identify and describe chemical reactions specific to water processes.
2	Identify the use of chemicals in water industry processes	Make sure the students answer questions related to the following areas ✓ Assess the functions of the range of industry chemicals in relation to their use in water processes. ✓ Identify and describe factors influencing the effectiveness of chemical use. ✓ Store, handle and prepare chemicals.
3	Select chemicals for specific water industry processes	Make sure the students answer questions related to the following areas ✓ Identify the range of chemicals available for specific water industry processes. ✓ Evaluate the factors affecting the selection of chemicals for particular water industry applications. ✓ Select suitable chemicals and calculate correct usage for a range of specific water industry processes.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being

		performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-6: Comply with water industry standards, guidelines and legislations

Unit No	06
Unit Title	Comply with water industry standards, guidelines and legislations
Unit Code	**CONS07CR02V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Interpret key legislation and guidelines of the water industry							
Access and interpret the relevant guidelines and legislative requirements.	✓	✓	✓	✓		✓	✓
Analyse the key features or elements.	✓		✓	✓	✓		✓
Establish the relationships between the guidelines and the state and territory requirements	✓	✓	✓	✓		✓	✓
2. Mix trial batch for evaluation							
Interpret organisation standards and processes for reporting compliance with legislative requirements.	✓	✓	✓	✓		✓	✓
Integrate legislative requirements into organisation water quality management plan.	✓		✓	✓	✓		✓
Provide advice on the links between the regulatory framework and work practices.		✓	✓	✓		✓	✓
Convey importance of multiple barrier principles and their general function to team members.	✓		✓	✓	✓		✓
Manage risks utilising the organisation's risk management principles.	✓	✓	✓	✓		✓	✓
Collate relevant collected data to support compliance and review for completeness and accuracy.	✓		✓	✓	✓		✓
Refine and disseminate compliance reporting procedures	✓	✓	✓	✓		✓	✓
3. Communicate compliance with legislation to team members							
Establish steps to monitor compliance and reporting function.	✓	✓	✓	✓		✓	✓
Address identified areas of non-compliance and take corrective action.	✓		✓	✓	✓		✓
Provide feedback on compliance issues to team members.	✓	✓	✓	✓		✓	✓

Make recommendation for preventative measures.	✓		✓	✓	✓		✓
Drive continuous improvement of work practices to achieve water quality outcomes	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

	Question	Answer
1	State one function of the basic legislation.	One of the functions of the basic legislation is to define the functions, authority, and responsibilities of the water-supply agency and the surveillance agency.
2	Define surveillance.	Surveillance is an investigative activity undertaken to identify and evaluate factors associated with drinking-water which could pose a risk to health. Surveillance contributes to the protection of public health by promoting improvement of the quality, quantity, coverage, cost, and continuity of water supplies.
3	What is the main role of surveillance in management?	The main role of surveillance in the management of community water supplies is to assess the safety and acceptability of the water distributed to the public so that consumers are consistently and reliably protected from the health hazards of contaminated supplies.
4	What are the steps that can be done to integrate legislative requirements into organization water quality management plan?	• Establishing national priorities • Establishing regional priorities • Establishing hygiene education • Enforcement of standards • Ensuring Community operation and maintenance
5	Discuss briefly about the intermediate phase of providing advice on the links between the regulatory framework and work practices.	• Train staff involved in programme • Complete inventories of supply systems • Establish and expand systematic routine surveillance • Expand analytical capability (often by means of regional laboratories, national laboratories being largely responsible for analytical quality control and training of regional laboratory staff) • Undertake surveys for chemical contaminants using wider range of analytical methods • Evaluate all methodologies (sampling, analysis, etc.) • Use draft standard methods (e.g. Analytical methods, fieldwork procedures) • Establish (and possibly computerize) database archive • Identify common problems, improve activities to address them at regional and national levels

		• Expand reporting to include interpretation at national level • Draft or revise national standards and legislation • Use legal enforcement where possible • Involve communities routinely in surveillance implementation
6	What is multi-barrier principles for ensuring safe drinking water?	An integrated system of procedures, processes and tools that collectively prevent or reduce the contamination of drinking water from source to tap in order to reduce risks to public health.
7	What is robust water treatment?	Having treatment trains with more than one step provides redundancy against treatment failure.
8	Describe the process of monitoring programs	Monitoring water quality at each of the above points (source, treatment plant, and tap) allows the treatment process to be adjusted to deal with fluctuations in water quality and ensures that the drinking water is safe at the point of human consumption.
9	Define specific goals.	The specific goal(s) defined for each issue and/or opportunity may depend on a hypothesis or guess about what is happening that can be tested using data collection techniques and analysis.
10	What locations or geographical areas will the data be gathered from?	Some data collection initiatives require gathering data from multiple sizes, groups or communities located in different locations and geographical areas. When determining where to collect information from, key factors to consider include who the data will be collected about and who the data will be compared to.
11	What are the examples of monitoring?	• Pre-activity approvals • Transaction reviews, such as travel expense reports • Reviews of in-process quality checks and outcome data • Review of staff-completed checklists • Listening to or reviewing recorded customer service intake calls • Attending sales presentations
12	State external factors of monitoring.	Timing Comprehensiveness
13	Explain metrics.	Metrics are an important part of any business process and critical to monitoring. The monitor must be able to determine whether an activity meets, comes close to or fails to meet its goals, and the responsible staff should be able to do the same. If an activity fails, the monitor needs to know the extent of the failure and, if possible, the reason why. Also, metrics help the monitor to know whether an activity is improving when the metrics improve (or visa versa). Even results that achieve but come close to missing objectives provide value, and monitoring of these metrics ensures that management can take appropriate action with this data.
14	While monitoring steps should be included and how	***The number of an activity's transactions.*** The fewer the transactions, the easier that monitoring the activity becomes.

	they should be designed and conducted depend on various determinants. What are those determinants?	***The cost of monitoring*** per transaction in money, staffing and other resources. ***The ease of monitoring***. For example, where management can employ technology to automate and expedite monitoring, this bodes well for the overall process. ***The risk of non-compliance*** – both its seriousness and likelihood. Serious consequences of non-compliance may encourage pre-transaction approval; non-compliance that is more likely to occur can suggest a need for monitoring of more transactions. ***Motives for operating staff not to comply***. Where staff may benefit from non-compliance, it behooves management to consider more stringent monitoring. For example, if sales staff can earn more commission from increased product dales by bypassing important paperwork, it may be important to monitor to ensure the paperwork's timely and accurate completion.
15	Explain self-monitoring technique.	This is a means by which a responsible individual or group – such as operations staff – monitors and reports on its own performance. Self-monitoring seeks to create greater accountability among the responsible parties and, in turn, reduce the need for monitoring by others, like management. Auditing can be used as a check to ensure that the self-monitoring actions are performed as expected and not otherwise compromised.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to ensuring compliance with the risk management principles established in the Environment Protection Agency (EPA) guidelines, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Interpret key legislation and guidelines of the water industry ✓ Mix trial batch for evaluation ✓ Communicate compliance with legislation to team members
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Interpret key legislation and guidelines of the water industry ✓ Mix trial batch for evaluation ✓ Communicate compliance with legislation to team members

4	Conduct a multi-barrier approach for ensuring safe drinking water	The student is expected to follow the correct step-by step process to conduct a multi-barrier approach. The elements which should be assessed are: ✓ Source water protection ✓ Robust water treatment ✓ A secure water supply network ✓ Monitoring programs ✓ Prepared responses to adverse conditions

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Interpret key legislation and guidelines of the water industry ✓ Mix trial batch for evaluation ✓ Communicate compliance with legislation to team members
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to ensuring compliance with the risk management principles established in the Environment Protection Agency (EPA) guidelines. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate self-monitoring technique.	As the students attend the practical test to check their knowledge about self-monitoring, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Interpret key legislation and guidelines of the water industry	Make sure the students answer questions related to the following areas ✓ Access and interpret the relevant guidelines and legislative requirements. ✓ Analyse the key features or elements.

		✓ Establish the relationships between the guidelines and the state and territory requirements.
2	Mix trial batch for evaluation	Make sure the students answer questions related to the following areas ✓ Interpret organisation standards and processes for reporting compliance with legislative requirements. ✓ Integrate legislative requirements into organisation water quality management plan. ✓ Provide advice on the links between the regulatory framework and work practices. ✓ Convey importance of multiple barrier principles and their general function to team members. ✓ Manage risks utilising the organisation's risk management principles. ✓ Collate relevant collected data to support compliance and review for completeness and accuracy. ✓ Refine and disseminate compliance reporting procedures.
3	Communicatecompliance with legislation to team members	Make sure the students answer questions related to the following areas ✓ Establish steps to monitor compliance and reporting function. ✓ Address identified areas of non-compliance and take corrective action. ✓ Provide feedback on compliance issues to team members. ✓ Make recommendation for preventative measures. ✓ Drive continuous improvement of work practices to achieve water quality outcomes.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.

		Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-7: Perform microbiological water contaminant analysis

Unit No	07
Unit Title	Perform microbiological water contaminant analysis
Unit Code	**CONS07CR03V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Investigate waterborne microorganisms							
Identify the samples of waterborne microorganisms found in water sources.	✓	✓	✓	✓		✓	✓
Identify the general characteristics of different types of microorganisms.	✓		✓	✓	✓		✓
Identify water quality or treatment problems caused by microorganisms.		✓	✓	✓		✓	✓
Identify microorganisms causing problems specific to water treatment processes.	✓		✓	✓	✓		✓
Identify the characteristics of, and diseases caused by, pathogenic microorganisms	✓	✓	✓	✓		✓	✓
2. Identify processes to remove organisms							
Assess the effectiveness of a range of filtration processes for physically removing pathogenic microorganisms according to organisational and legislative requirements.	✓	✓	✓	✓		✓	✓
Assess the effectiveness of a range of disinfection processes for inactivating pathogenic microorganisms according to organisational and legislative requirements.	✓		✓	✓	✓		✓
Identify and assess the implications of by-product formation resulting from disinfection processes.	✓	✓	✓	✓		✓	✓
Assess the effectiveness of various pre- or post-treatment processes for removing microorganisms, or their metabolites, causing nuisance and toxicity problem	✓		✓	✓	✓		✓
3. Determine appropriate water treatment processes							
Identify optimum treatment processes for the range of microorganisms found in water sources.	✓	✓	✓	✓		✓	✓
Report on effective treatment processes and associated sampling and testing requirements required to maintain water quality	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

	Question	Answer
1	What is colilert test?	A Colilert test is the routine test to determine if coliforms are absent or present in drinking water.
2	Identify the characteristics of, and diseases caused by, pathogenic microorganisms?	Water-borne diseases are caused by water that is contaminated with microorganisms. The microbes—typically bacteria, viruses, protozoa, and parasites—are usually found in the intestinal tracts of humans and other creatures. In most cases, the water becomes contaminated by feces that carry the microbes.
3	Identify microorganisms causing problems specific to water treatment processes?	There is a group of nuisance organisms collectively designated as iron, sulfur bacteria, and sulfate-reducing bacteria that may be found in drinking water. These bacteria are not pathogenic and are naturally found in the soil. These nuisance bacteria are responsible for various transformations of iron usually in the form of slime and often cause a bad odor and/or taste in the water. In addition, iron bacteria may cause plugging of well and a reddish tinge to the water. Sulfur and sulfate reducing bacteria may cause rusty water and corrosion of pipes.
4	Identify water quality or treatment problems caused by microorganisms?	Chemical disinfection utilizing some form of chlorine remains the choice for disinfecting private wells. Chlorine has been shown to be an effective disinfectant for bacteria and viruses, but standard knowledge of the vulnerability of protozoa and helminths to chlorine is incomplete. It is known that protozoa and helminths are more resistant to chlorine than bacteria. The presence of coliforms or E. Coli would warrant chlorination because of the potential risk for infection.
5	Define coagulation, flocculation and sedimentation.	***Coagulation, flocculation and sedimentation*** — by which small particles interact to form larger particles and settle out by gravity
6	Define bank infiltration.	Bank infiltration refers to the process of surface water seeping from the bank or bed of a river or lake to the production wells of a water treatment plant. During the water's passage through the ground, its quality changes due to microbial, chemical and physical processes, and due to mixing with groundwater.
7	Coagulation, flocculation and sedimentation are used in conjunction with subsequent filtration. Explain these processes.	Coagulation promotes the interaction of small particles to form larger particles. In practice, the term refers to coagulant addition (i.e. Addition of a substance that will form the hydrolysis products that cause coagulation), particle destabilization and interparticle collisions. Flocculation is the physical process of producing interparticle contacts that lead to the formation of large particles. Sedimentation is a solid–liquid separation process, in which particles settle under the force of gravity.
8	How can the process of improve the	The efficiency of the sedimentation process may be improved by using inclined plates or tubes.

	efficiency of the sedimentation?	
9	Explain the ion exchange process.	Ion exchange is a treatment process in which a solid phase presaturant ion is exchanged for an unwanted ion in the untreated water. The process is used for water softening (removal of calcium and magnesium), removal of some radionuclides (e.g. Radium and barium) and removal of various other contaminants (e.g. Nitrate, arsenate, chromate, selenate and dissolved organic carbon). The effectiveness of the process depends on the background water quality, and the levels of other competing ions and total dissolved solids.
10	How are disinfection byproducts formed?	Disinfection byproducts can form when disinfectants, such as chlorine, react with naturally present compounds in the water. The formation of these products mainly takes place during reactions in which organic substances, such as humid acid and fulvic acid, play a part. These materials end up in water during the decomposition of plant matter.
11	Which factors influence the formation of disinfection byproducts?	- The type of disinfectant - The disinfection dose - The disinfection residue
12	What is the effects of process variability?	Treatment efficiency for removal of microbes may vary between treatment plants, between unit treatment processes and between microbes.
13	What is total coliform bacteria?	Total coliform bacteria are a group of several kinds of bacteria commonly found in the environment, including soil, vegetation and untreated surface water. They also are found in the intestinal tract of warm-blooded animals, including humans.
14	What is a positive total coliform test?	A positive total coliform test would indicate unsanitary conditions and the possible presence of disease-causing organisms. Further testing should include the subgroup fecal coliform and its subgroup, Escherichia coli (E. Coli). A positive fecal coliform would indicate possible recent sewage or animal waste contamination.
15	Define alkalinity.	Alkalinity is a measure of the capacity of water to neutralize acids. The predominant chemicals present in natural waters are carbonates, bicarbonates and hydroxides. The bicarbonate ion is usually prevalent. However, the ratio of these ions is a function of ph, mineral composition, temperature and ionic strength. Water may have a low alkalinity rating but a relatively high ph or vice versa, so alkalinity alone is not of major importance as a measure of water quality.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to identifying microorganisms and assess the appropriate potable water or water reuse treatment processes for inactivation or removal, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.

2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Investigate waterborne microorganism ✓ Identify micro processes to remove organisms ✓ Determine appropriate water treatment processes
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Investigate waterborne microorganism ✓ Identify micro processes to remove organisms ✓ Determine appropriate water treatment processes
4	Interpretation of mineral analysis.	The student is expected to follow the correct step-by step process while interpreting any sort of mineral analysis. The elements which should be assessed are: ✓ Alkalinity ✓ Calcium and Magnesium ✓ Chloride ✓ Color ✓ Conductivity ✓ Fluoride ✓ Iron and Manganese ✓ Nitrates ✓ pH ✓ Potassium ✓ TDS

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Investigate waterborne microorganism ✓ Identify micro processes to remove organisms ✓ Determine appropriate water treatment processes
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to identifying microorganisms and assess the appropriate potable water or water reuse treatment processes for inactivation or removal.

		Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Conduct a positive total coliform test	As the students attend the practical test to check their knowledge and skills about fecal coliform and Escherichia coli (E. Coli), make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Investigate waterborne microorganism	Make sure the students answer questions related to the following areas ✓ Identifythesamplesofwaterborne microorganisms found in water sources. ✓ Identify the general characteristics of different types of microorganisms. ✓ Identify water quality or treatment problems caused by microorganisms. ✓ Identify microorganisms causing problems specific to water treatment processes. ✓ Identify the characteristics of, and diseases caused by, pathogenic microorganisms.
2	Identify micro processes to remove organisms	Make sure the students answer questions related to the following areas ✓ Assess the effectiveness of a range of filtration processes for physically removing pathogenic microorganisms according to organisational and legislative requirements. ✓ Assess the effectiveness of a range of disinfection processes for inactivating pathogenic microorganisms according to organisational and legislative requirements. ✓ Identify and assess the implications of by- product formation resulting from disinfection processes. ✓ Assess the effectiveness of various pre- or post-treatment processes for removing microorganisms, or their metabolites, causing nuisance and toxicity problem.
3	Determine appropriate water treatment processes	Make sure the students answer questions related to the following areas ✓ Identify optimum treatment processes for the range of microorganisms found in water sources. ✓ Report on effective treatment processes and associated sampling and testing requirements required to maintain water quality.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-8: Perform calibration on equipment and assist with maintenance

Unit No	08
Unit Title	Perform calibration on equipment and assist with maintenance
Unit Code	**CONS07CR04V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Perform set-up and pre-use checks of laboratory equipment							
Perform laboratory equipment set-up and pre-use checks in accordance with workplace procedures	✓	✓	✓	✓		✓	✓
Perform safety checks in accordance with relevant workplace and instrumental procedures	✓		✓	✓	✓		✓
Identify faulty or unsafe components and equipment and report to appropriate personnel	✓	✓	✓	✓		✓	✓
Complete equipment log books/records to meet workplace requirements	✓		✓	✓	✓		✓
2. Perform calibration checks							
Startup equipment according to operating procedures	✓	✓	✓	✓		✓	✓
Use specified standards for calibration check	✓		✓	✓	✓		✓
Check equipment in accordance with calibration procedures and schedules	✓	✓	✓	✓		✓	✓
Record all calibration data accurately and legibly	✓		✓	✓	✓		✓
Compare data with specifications and/or previous records to identify non-compliant equipment	✓	✓	✓	✓		✓	✓
Quarantine out-of-calibration equipment	✓		✓	✓	✓		✓
3. Assist with equipment maintenance							
Ensure all equipment work areas are clean during and after equipment use	✓	✓	✓	✓		✓	✓
Perform basic maintenance in accordance with workplace procedures	✓		✓	✓	✓		✓
Clean and store equipment according to workplace and/or manufacturer's specifications/procedures	✓	✓	✓	✓		✓	✓
Identify and replace, repair or dispose of damaged/worn equipment as appropriate	✓		✓	✓	✓		✓

4. Maintain records							
Record and report information on unsafe or faulty equipment according to workplace procedures	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1.Written questions

#	Question	Answer
1	What are few criteria to consider when selecting equipment?	• The instrument should be matched against the service the laboratory provides. • Should have warranty for equipment • Facility equipment • Understand the performance characteristics of instrument • Cost of the equipment is within the laboratory's budget
2	What are the factors to check before purchasing?	• wiring diagrams, computer software information, a list of parts needed, and an operator's manual are provided; • the manufacturer will install the equipment and train staff (covering travel expenses as necessary) as part of the purchase price; • the warranty includes a trial period to verify that the instrument performs as expected; • the manufacturer's maintenance can be included in the contract and if so, • whether maintenance is provided on a regular basis
3	What should be considered if an equipment is installed by the laboratory?	• check that the package contents contain all of the parts; • make a copy of any software that is part of the system; • do not allow the equipment to be used before it is completely installed, performance is verified, and testing personnel are trained
4	What important information should be provided while reporting a defective product?	• reasons you consider the product to be defective • details of any injuries or harm resulting from the defect • a description of the defect with, where relevant, measurements (such as gaps in safeguards and the distance through such gaps to parts giving rise to danger) • photographs of the product and the defect, if available • details of the markings / information on the product or accompanying documentation (eg type, serial number, date of manufacture, CE or other conformity markings)

		• full contact details of the manufacturer, any supplier(s) and date of supply
5	After equipment has been installed. What are the following details that needs to be addressed before putting the equipment into service?	• assign responsibility for performing the maintenance and operation programs; • develop a system for recording the use of parts and supplies; • implement a written plan for calibration, performance verification, and proper operation of the equipment; • establish a scheduled maintenance program that includes daily, weekly, and monthly maintenance tasks; • provide training for all operators; only personnel who have been trained specifically to properly use the equipment should be authorized as operators.
6	How to follow the manufacturer's direction carefully when performing the initial calibration of the instrument.	It is a good idea to calibrate the instrument with each test run, when first putting it into service. Determine how often the instrument will need to be recalibrated, based on its stability and on manufacturer's recommendation.
7	How to check equipment as per calibration procedures and schedules?	Prior to testing specimens, it is important to evaluate the performance of new equipment to ensure it is working correctly with respect to accuracy and precision. In addition, test methods using kits or laboratory instruments need to be evaluated for the ability to detect disease (sensitivity, specificity, positive and negative predictive value), and to determine normal and reportable ranges.
8	What are the steps that should be followed to verify performance?	• testing samples with known values and comparing the results to the expected or certified value; • if equipment is temperature controlled, establishing the stability and uniformity of the temperature
9	Explain function checks.	In order to verify that equipment is working according to the manufacturer's specifications, it is necessary to monitor instrument parameters by performing periodic function checks. This should be done before using the instrument initially, then with the frequency recommended by the manufacturer. These function checks should also be done following any instrument repairs. Some examples of function checks are daily monitoring of temperatures and checking the accuracy of wavelength calibration.
10	What does preventive maintenance includes?	Preventive maintenance includes measures such as systematic and routine cleaning, adjustment, and replacement of equipment parts at scheduled intervals.
11	What are the regular intervals that a set of equipment maintenance task should be performed?	daily, weekly, monthly, or yearly
12	How can regular intervals	• inaccurate test results due to equipment failure • delays in reporting results

	maintenance help to prevent?	• lower productivity • large repair costs
13	What is maintenance plan?	A maintenance plan will include preventive maintenance procedures as well as provision for inventory, troubleshooting, and repair of equipment.
14	When implementing an equipment maintenance program what are initial steps that should be followed?	• Assign responsibility for providing oversight. • Develop written policies and procedures for maintaining equipment, including routine maintenance plans for each piece of equipment. The plan should specify the frequency with which all maintenance tasks should be performed. • Develop the format for records, create logs and forms, and establish the processes to maintain records. • Train staff on the use and maintenance of the equipment, and assure that all staff understand their specific responsibilities.
15	To ensure that the laboratory does not run out of spare parts, an inventory record of those used most frequently should be kept for each piece of equipment. What does the record should include?	• part name and number; • average use of the part, and the minimum to keep on hand; • cost; • date when the part is placed into storage, and when it is used (in and out stock log); • quantity of each part remaining in inventory
16	What is troubleshooting?	Manufacturers frequently provide a flowchart that can help determine the source of problems.
17	If problems cannot be identified and corrected in-house, attempt to find a way to continue testing until the equipment can be repaired. What are some ways to achieve this?	• Arrange to have access to back-up instruments. It is often too costly for the laboratory to have its own back-up instruments, but sometimes a central stores agency can maintain back-up instruments to be shared throughout the local area or country. • Ask the manufacturer to provide a replacement instrument during repairs. • Send the samples to a nearby laboratory for testing.
18	How can service and repair may be done?	Manufacturers may provide service and repair of equipment that is purchased from them. Be sure to set up a procedure for scheduling service that must be periodically performed by the manufacturer. When instruments need repair, remember that some warranties require that repairs be handled only by the manufacturer.
19	How can you retire and dispose an equipment?	It is very important to have a policy and procedures for retiring older laboratory equipment. This will usually occur when it is clear that the instrument is not functioning and is not repairable, or when it is outmoded and should be replaced with new equipment.

		Once a piece of equipment is fully retired and it has been determined that it has no further usefulness, it should be disposed of in an appropriate manner. This last step is often neglected in laboratories, and old equipment accumulates, taking up valuable space and sometimes creating a hazard. When disposing of equipment, salvage any useable parts, particularly if the equipment is being replaced with another similar one. Then consider any potential biohazards, and follow all safety disposal procedures.
20	What should an equipment maintenance document should include?	• step-by-step instructions for routine maintenance, including frequency of performance, and how to keep records of performance; • instructions for carrying out function checks, frequency of performance, and how to record the results; • directions for calibrating the instrument; • guide for troubleshooting; • any required manufacturer's service and repair; • list of any specific items needed for use and maintenance, such as spare parts
21	What are the characteristics and maintenance elements of documenting equipment on logbooks?	• step-by-step instructions for routine maintenance, including frequency of performance, and how to keep records of performance; • instructions for carrying out function checks, frequency of performance, and how to record the results; • directions for calibrating the instrument; • guide for troubleshooting; • any required manufacturer's service and repair; • list of any specific items needed for use and maintenance, such as spare parts
22	On recording problems what should be sure to record?	• date problem occurred, and when equipment was removed from service; • reason for breakdown or failure; • corrective action taken; including a note about any service provided by the manufacturer; • date returned to use; • any changes to procedure for maintenance or function checks as a result of the problem.
23	What are some of the tools that are helpful for keeping records on equipment management?	• charts • logs • checklists • graphs • service reports

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to perform set-up, pre-use and in- house calibration/validation checks on equipment and assist with its maintenance, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Perform set-up and pre-use checks of laboratory equipment ✓ Perform calibration checks ✓ Assist with equipment maintenance ✓ Maintain records
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Perform set-up and pre-use checks of laboratory equipment ✓ Perform calibration checks ✓ Assist with equipment maintenance ✓ Maintain records
4	Demonstrate an inventory report keeping procedure.	The student is expected to follow the correct step-by step process to retiring and disposing an equipment. The elements which should be assessed are: ✓ part name and number; ✓ average use of the part, and the minimum to keep on hand; ✓ cost; ✓ date when the part is placed into storage, and when it is used (in and out stock log); ✓ quantity of each part remaining in inventory

3. OW=Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Perform set-up and pre-use checks of laboratory equipment ✓ Perform calibration checks ✓ Assist with equipment maintenance ✓ Maintain records
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities

		related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to perform set-up, pre-use and in- house calibration/validation checks on equipment and assist with its maintenance. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to retire and dispose an equipment	As the students attend the practical test to retire and dispose an equipment, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Perform set-up and pre-use checks of laboratory equipment	Make sure the students answer questions related to the following areas ✓ Perform laboratory equipment set-up and pre-use checks in accordance with workplace procedures ✓ Perform safety checks in accordance with relevant workplace and instrumental procedures ✓ Identify faulty or unsafe components and equipment and report to appropriate personnel ✓ Complete equipment log books/records to meet workplace requirements
2	Perform calibration checks	Make sure the students answer questions related to the following areas ✓ Startup equipment according to operating procedures ✓ Use specified standards for calibration check ✓ Check equipment in accordance with calibration procedures and schedules ✓ Record all calibration data accurately and legibly ✓ Compare data with specifications and/or previous records to identify non-compliant equipment ✓ Quarantine out-of-calibration equipment
3	Assist with equipment maintenance	Make sure the students answer questions related to the following areas ✓ Ensure all equipment work areas are clean during and after equipment use ✓ Perform basic maintenance in accordance with workplace procedures ✓ Clean and store equipment according to workplace and/ormanufacturer's specifications/procedures ✓ Identify and replace, repair or dispose of damaged/worn equipment as appropriate
4	Maintain records	Make sure the students answer questions related to the following areas ✓ Record and report information on unsafe or faulty equipment according to workplace procedures

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-9: Apply quality system in laboratory

Unit No	09
Unit Title	Apply quality system in laboratory
Unit Code	**CONS07CR05V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Satisfy quality system requirements in daily work							
Access information on quality system requirements for own job function	✓	✓	✓	✓		✓	✓
Record and report quality control data in accordance with quality system	✓		✓	✓	✓		✓
Follow quality control procedures to ensure products or data are of a defined quality as an aid to acceptance or rejection	✓	✓	✓	✓		✓	✓
Recognise and report non-conformances or problems	✓		✓	✓	✓		✓
Conduct work in accordance with sustainable work practices	✓	✓	✓	✓		✓	✓
Promote sustainability principles and work practices to other workers	✓		✓	✓	✓		✓
2. Analyse opportunities for corrective and/or optimization action							
Compare current work practices, procedures and process or equipment performance with requirements and/or historical data or records	✓	✓	✓	✓		✓	✓
Recognise variances that indicate abnormal or sub-optimal performances	✓		✓	✓	✓		✓
Collect and/or evaluate batch and/or historical records to determine possible causes for sub-optimal performance	✓	✓	✓	✓		✓	✓
Use appropriate quality improvement techniques to rank the probabilities of possible causes	✓		✓	✓	✓		✓
3. Recommend corrective and/or optimization action							
Analyse causes to predict likely impacts of changes and decide on the appropriate actions	✓	✓	✓	✓		✓	✓
Identify required changes to standards and procedures and training	✓		✓	✓	✓		✓
Report recommendations to designated personnel	✓	✓	✓	✓		✓	✓

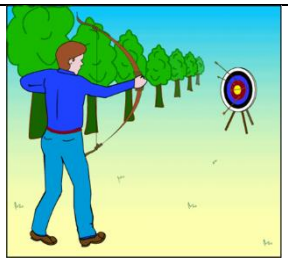
4. Participate in the implementation of recommended actions							
Implement approved actions and monitor performance following changes to evaluate results	✓	✓	✓	✓		✓	✓
Implement changes to systems and procedures to eliminate possible causes	✓		✓	✓	✓		✓
Document outcomes of actions and communicate them to relevant personnel	✓	✓	✓	✓		✓	✓
5. Participate in the development of continuous improvement strategies							
Review all relevant features of work practice to identify possible contributing factors leading to sub-optimal performance	✓	✓	✓	✓		✓	✓
Identify options for removing or controlling the risk of sub-optimal performance	✓		✓	✓	✓		✓
Assess the adequacy of current controls, quality methods and systems	✓	✓	✓	✓		✓	✓
Identify opportunities to continuously improve performance	✓		✓	✓	✓		✓
Develop recommendations for continual improvements of work practices, methods, procedures and equipment effectiveness	✓	✓	✓	✓		✓	✓
Consult with appropriate personnel to refine recommendations before implementation of approved improvement strategies	✓		✓	✓	✓		✓
Document outcomes of strategies and communicate them to relevant personnel	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	Define the term quality.	Quality is a term that is often used inaccurately.
2	Describe a quality system.	A quality system is formally described as 'the organisational structure, responsibilities, procedures, processes and resources for implementing the management of quality'.
3	Define Quality Control (QC).	Quality Control (QC) is defined as being 'the operational techniques and activities that are used to fulfil the requirements for quality'.
4	What are the operational techniques and activities in effect of quality control?	• Checking a process at appropriate stages to ensure it stays within defined limits (ie to produce the 'right' quality product) • Eliminating the causes of any unsatisfactory performance (ie reducing the rework and waste that otherwise cost companies money) • Removing or repairing any defective products before they get to the customer.
5	QC activities for Lab involve checks that are performed at various stages of the laboratory processes. What are those activities?	• Replicate analysis (checks for consistency) • Standards analysis (correctness) • Alternative methods (method validity) • Control charts (abnormal trends) • Comparison with other laboratories (independent cross-check).
6	What are the followings controlled documents used at simulab and what kind of information must it contain?	• All policies and procedures contained in the Quality Manual plus the Table of Contents and Amendment Record. • Standard Operating Procedures (sops) and other relevant documents in the Methods Manual, OHS Manual and Staff Manual. Each page of these documents shall contain the following information: • Simulab logo • Controlled document name or number • Version number • Date of version
7	How can you control the QC data?	Where an automated interface exists between an analyzer and a computer, the QC data is to be stored on the hard drive of the computer and backup copies of the data made onto floppy discs or CD roms as appropriate on a daily basis. Where data is extracted manually, the data is to be transcribed onto a DATA - Running Sheet and printouts, graphs etc attached to the running sheet. The running sheets are to be stored in the QC log for the test/machine.

8	How can you control and store data of statistical analysis?	All calculations, graphs and validation results are to be stored on the computer hard drive (with daily backup copies) or in manual folders. It was discussed earlier that QC for Lab is about performing activities that give operators confidence that test results are valid and true. Monitoring of test result validity is an important aspect of the Lab quality system. If you have not kept a copy of the Test Result Validation Procedure, use the following link to obtain it. Print it for the following activity, to check you understanding of handling QC data.
9	How can you validate test results? Explain the procedure briefly.	The validity of test results is monitored by QC standardization protocols prior to the run and routine testing of standards during the run. As appropriate, a range of check standards are used to cover low, medium and high ranges of the test samples being measured. This will monitor result accuracy. In addition, standards are employed to check for precision of results. As relevant, the results of standards are displayed on statistical control charts where out-of-control situations are identified by trends and individual data points. All out of control situations are investigated, the situation resolved and a record made. The requirement for re-analysis of test samples should be discussed with the Senior Technician. Only certified or validated materials are used as standards. Instructions are provided in the standard operating procedures (sops) of the Methods Manual for the selection, maintenance and use of such standards.
10	What does QC procedures generally involves?	• Measurement of a parameter • The concepts of accuracy and precision regarding that measurement • A range of acceptance (ie the defined limits of quality) • Recording of raw data, calculations and the decision to accept or reject • Recording of QC parameters to follow patterns over time
11	 Explain the picture with the concept of accuracy and precision.	We see that the shots are also concentrated close together but away from the bullseye. This archer is not accurate because he hasn't hit the target however we can say that he is at least precise. Precision is about how results are grouped or spread or, said in another way, how repeatable they are.

12	How is the range of acceptance for each CS determined? For example, using the Low CS we measure the % w/v glucose 100 times using good machinery and good operators. How can you apply basic statistics to the readings?	Firstly, we calculate the mean (the mean, also known as the **average**, can be found by adding the values of the individual readings and then dividing this by the number of readings). This figure is 2.05% glucose. Now we calculate the **standard deviation** which we find to be 0.025% glucose. Think of standard deviation as being a measure of how much the results are 'spread' - the wider apart our 100 results are spread, the greater will be the standard deviation. You can see from this that standard deviation is connected to precision - as standard deviation gets smaller, precision improves. Most statistical QC is based on the notion of a **95% confidence** limit which basically means that 95% or 19 out of 20 measurements of the Low CS would be expected to fall within an acceptable range defined by the confidence limit. The 95% confidence limit (acceptable range) is derived by subtracting and adding 2 standard deviations to the mean, as in the following example.
13	What is non-conformance?	In essence, a non-conformance occurs where a procedure in our quality system has not been followed in some way (ie you are not doing what you should be doing). There can also be times when a problem arises even though we appear to be doing everything correctly. In either case, quality or productivity may jeopardized.
14	What are the prices of conformance and non-conformance? Consider to compare both of these.	The price of conformance includes: • Prevention costs - the costs of reducing defects and non-conformances • Appraisal costs - at Lab the costs of running the quality system and any accreditations it holds. The price of non-conformance includes: • Appraisal costs - detecting non-conformances (ie QC) • Internal failure costs - unsatisfactory quality detected within simulab • External failure costs - costs associated with poor quality test results being detected outside the enterprise.
15	What are the factors for non-conformances or problems to occur across the quality system?	People and personalities: lazy habits QC: wrong SOP used Equipment: not calibrated Reagent and chemicals: used after expiry date Training: no employee induction Paperwork sops and instructions: superseded documents used Communication: client not notified Physical environment: laboratory temperature too high.
16	How can you identify non-conformances or problems?	• Customer complaints • Internal audits • QC activities • Instrument calibrations

		• Staff observations or supervision • Management reviews • Checking of consumable materials.
17	How can you compare current work procedures or equipment performance with requirements of historical data or records?	Different charts are often used to enable a laboratory technician to monitor and compare processes with requirements, historical data and records. One of the simple statistical charts used to monitor processes is the run chart. A run chart is simply a graphical means of depicting data in chronological order. This chart allows a visual means to see the performance of a particular test parameter and whether there are any trends developing. In this way problems can often be avoided before they occur.
18	How is variability caused?	Variability is caused by the sum of the errors in a process.
19	What are the details that a calibration log that must consist?	• Equipment number • Description of equipment • Calibration frequency • Calibration status
20	What are the two types of causes of variation?	Common and special causes.
21	Define common causes.	**Common Causes** are part of the system and lead to the normal variation you would expect to see in results. As they are part of the system the technician cannot fix them (without fundamental changes to the system). For example, the owner may decide to use the cheapest pipettes available; despite extreme care in their use, the cheap pipettes are inaccurate and deliver incorrect volumes.
22	Define special causes.	**Special Causes** are generally one-off causes and are assignable to a particular person or event. Special causes lead to variation in results which are not normal. For example, a momentary power failure causes the QC program on the analyser to reset to last year's parameters. This is not noticed until the end of the week and consequently 300 specimens have to be redone. Special causes can be identified and removed.
23	What are the four major steps to quality improvement?	1. Identifying the problem(s) 2. Deciding on an appropriate course of action 3. Reporting recommendations to the decision makers in such a way that a decision to change is more likely than less likely 4. Implementation, monitoring outcomes and adjustments.
24	What does the Deming circle represents?	The Deming circle represents the problem analysis process and the quality improvement cycle and provides focus on defect correction as well as defect prevention.
25	What are the 4 phases of Deming circle?	✓ P=PLAN the change ✓ D=DO implement the change ✓ C=CHECK that the change is having the desired effects

		✓ A=ACT to follow up and make adjustment based on outcomes to date.
26	Construct a Cause and Effect Diagram (Ishikawa or Fishbone Chart) relating to a problem from your own experience. In your answer you included: • The Cause and Effect Diagram • A description (two to three lines) of the problem or variation • The top three causes (in your opinion) • An explanation of how you would reduce the variation, linked with these causes.	In the following activity you will follow this procedure through to the next step. Assignment - Cause and Effect Diagram, Implementing Change In your Cause and Effect Diagram you produced earlier, you identified the top three factors involved that cause variation in your process and outlined how you would rectify them. In this activity imagine that you have implemented these three changes. What would happen? Who would be affected? Are there laboratory-resource implications (for example, equipment required)? **Provide clear, concise and detailed answers to these questions (above) and be sure to include the following:** • The effect of the changes to resources and procedures • The effect of the changes on staff (and customers if appropriate) • A list of documents that may need to be changed (the names only - do not write them!) • A brief 'guesstimate' of any training required • A rough estimate of additional costs or savings • Any other relevant factors.
27	How would you document the changes you decided were needed in the Assignment - Cause and Effect Diagram, Implementing Change and how would you communicate the changes to staff (and customers if appropriate)?	**Provide clear, concise and detailed answers to these questions (above) and be sure to include the following:** • The names of new or altered documents required • A full example of one document (choose the shortest one) • A list of changes that may need to be made to other documents, for example the creation of a new fire safety SOP may need to be referred to in another SOP • How and why you would communicate the changes to staff (and others if appropriate).
28	What are the important aspects of TQM?	• Quality and Competition • Continuous Improvement • Strong Customer Focus (both internal and external) • Variability Reduction • Employee Participation in Problem Solving
29	Define Total Quality Management.	This is an on-going strategy that changes the culture of an organisation. A philosophical approach that concentrates on the needs of the customer and strives to give outstanding

		customer service, and uses continuous improvement whilst maintaining 'fitness for purpose'.
30	Develop a strategy to move the Specimen and Sample Drop-off area with minimum disruption. How would you document this strategy and how (and to whom) would you communicate the strategy?	Your answer should be clear, concise and detailed and should include and address the following: • An outline of the strategy (a flow chart or diagram would be useful). • What major factors did you consider in the development of the strategy? • How would you document the strategy? • How would you communicate the strategy? • To whom and why?

6. PT=Practical Test

#	Activity to be performed	Activity to be evaluated and assessed
1	Student Assignments	Students need to undertake assignments related to ensuring the quality and integrity of their own work, detect non-conformances and work with others to suggest improvements in productivity and quality, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Satisfy quality system requirements in daily work ✓ Analyse opportunities for corrective and/or optimization action ✓ Recommend corrective and/or optimization actions ✓ Participate in the implementation of recommended actions ✓ Participate in the development of continuous improvement strategies
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Satisfy quality system requirements in daily work ✓ Analyse opportunities for corrective and/or optimization action ✓ Recommend corrective and/or optimization actions ✓ Participate in the implementation of recommended actions ✓ Participate in the development of continuous improvement strategies
4	Develop a strategy to move the Specimen and Sample Drop-off area with minimum disruption.	The student is expected to follow the correct step-by step process on developing to move specimen and sample drop-off area. The elements which should be assessed are: • An outline of the strategy (a flow chart or diagram would be useful). • What major factors did you consider in the development of the strategy?

		• How would you document the strategy? • How would you communicate the strategy? • To whom and why?

7. OW =Observation at work Place

#	Activity to be observed	Evaluative Assessment of the observed activity
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Satisfy quality system requirements in daily work ✓ Analyse opportunities for corrective and/or optimization action ✓ Recommend corrective and/or optimization actions ✓ Participate in the implementation of recommended actions ✓ Participate in the development of continuous improvement strategies
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to ensuring the quality and integrity of their own work, detect non-conformances and work with others to suggest improvements in productivity and quality. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Explain the procedure of validating test results	As the students attend the practical test to demonstrate procedure of validation of test results such as controlling the data quality and documentations make sure the student use the proper techniques and the information he shared is accurate.

8. OQ=Oral Questioning

#	Questions	Answers
1	Satisfy quality system requirements in daily work	Make sure the students answer questions related to the following areas ✓ Access information on quality system requirements for own job function ✓ Record and report quality control data in accordance with quality system

		✓ Follow quality control procedures to ensure products or data are of a defined quality as an aid to acceptance or rejection ✓ Recognize and report non-conformances or problems ✓ Conduct work in accordance with sustainable work practices ✓ Promote sustainability principles and work practices to other workers
2	Analyse opportunities for corrective and/or optimization action	Make sure the students answer questions related to the following areas ✓ Compare current work practices, procedures and process or equipment performance with requirements and/or historical data or records ✓ Recognise variances that indicate abnormal or sub-optimal performances ✓ Collect and/or evaluate batch and/or historical records to determine possible causes for sub-optimal performance ✓ Use appropriate quality improvement techniques to rank the probabilities of possible causes
3	Recommend corrective and/or optimization actions	Make sure the students answer questions related to the following areas ✓ Analyse causes to predict likely impacts of changes and decide on the appropriate actions ✓ Identify required changes to standards and procedures and training ✓ Report recommendations to designated personnel
4	Participate in the implementation of recommended actions	Make sure the students answer questions related to the following areas ✓ Implement approved actions and monitor performance following changes to evaluate results ✓ Implement changes to systems and procedures to eliminate possible causes ✓ Document outcomes of actions and communicate them to relevant personnel
5	Participate in the development of continuous improvement strategies	Make sure the students answer questions related to the following areas ✓ Review all relevant features of work practice to identify possible contributing factors leading to sub-optimal performance ✓ Identify options for removing or controlling the risk of sub-optimal performance ✓ Assess the adequacy of current controls, quality methods and systems ✓ Identify opportunities to continuously improve performance ✓ Develop recommendations for continual improvements of work practices, methods, procedures and equipment effectiveness ✓ Consult with appropriate personnel to refine recommendations before implementation of approved improvement strategies

		✓ Document outcomes of strategies and communicate them to relevant personnel

9. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-10: Undertake waste disposal in laboratory setting

Unit No	10
Unit Title	Undertake waste disposal in laboratory setting
Unit Code	**CONS07CR06V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Identify waste produced in lab							
Waste characteristics are identified.	✓	✓	✓	✓		✓	✓
Types of wastes are differentiated by waste stream or waste categories within lab setting	✓		✓	✓	✓		✓
Hazardous and dangerous waste and non-conforming waste are detailed.	✓	✓	✓	✓		✓	✓
Contaminants present in waste are noted.	✓		✓	✓	✓		✓
Further information on waste is obtained by questioning appropriate personnel to ensure correct identification	✓	✓	✓	✓		✓	✓
2. Identify hazardous and risks							
Other potential hazards and risks present in work environment are listed.	✓	✓	✓	✓		✓	✓
Supervisor and team members are informed of job requirements, hazards and risks.	✓		✓	✓	✓		✓
Safe work practices that prevent risk behaviour are outlined to supervisor.	✓	✓	✓	✓		✓	✓
Emergency response procedures are practised with team members	✓		✓	✓	✓		✓
3. Dispose of waste							
Appropriate disposal is arranged with regard to waste quality, quantity and EPA and government regulations	✓	✓	✓	✓		✓	✓
Waste is disposed of in an appropriate way to ensure compliance with workplace and EPA standards	✓		✓	✓	✓		✓
Any subcontractors are checked to ensure they comply with EPA and government regulation	✓	✓	✓	✓		✓	✓
Wastage rates are documented or collated for further review	✓		✓	✓	✓		✓

4. Prepare and fill documents							
Fill in the relevant document related to waste disposal	✓	✓	✓	✓		✓	✓
Update document on daily basis	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	How are types of wastes differentiated by waste stream or waste categories within lab setting?	Waste must be categorized as to its identity, constituents, and hazards so that it may be safely handled and managed. Categorization is necessary to determine a waste's regulatory status, hazardous waste ID number, and treatability group, and to determine its proper procedures for managing waste by the Environment Protection Agency of the Maldives.
2	What are the characterization of Off-site management?	When waste is to be shipped off-site for recycling, reclamation, treatment, or disposal, the waste characterization information needed depends on the waste management facility's requirements and its permit. Analytical methods have been established by the Environmental Protection Agency (EPA), and environmental laboratories that use EPA methods are often certified or accredited. Most of these methods are for commercially available chemicals, and so approved analytical procedures may not be available for some laboratory chemicals.
3	What are the information commonly required by treatment and disposal facilities before agreeing to handle unknown materials?	• Physical description • Water reactivity • Water solubility • pH level • Ignitability (flammability) • Presence of oxidizer • Presence of peroxides • Presence of sulfide • Presence of cyanide • Presence of halogen
4	How to conduct a test to check the presence of sulfide? Give a warning to look out while carrying out the experiment.	The test for inorganic sulfides is carried out only when the ph of an aqueous solution of the unknown is greater than 10. Add a few drops of concentrated hydrochloric acid to a sample of the unknown while holding a piece of commercial lead acetate paper, wet with distilled water, over the sample. Development of a brown-black color on the paper indicates generation of hydrogen sulfide. **Warning: This test produces hazardous and odiferous vapors. Use only small quantities of solution for the test and use appropriate ventilation.**

5	How to conduct a test to check the presence of peroxides?	• Peroxide test strips, which turn to an indicative color in the presence of peroxides, are available commercially. Note that these strips must be air dried until the solvent evaporates and exposed to moisture for proper operation. • Add 1 to 3 ml of the liquid to be tested to an equal volume of acetic acid, add a few drops of 5% aqueous potassium iodide solution, and shake. The appearance of a yellow to brown color indicates the presence of peroxides. Alternatively, addition of 1 ml of a freshly prepared 10% solution of potassium iodide to 10 ml of an organic liquid in a 25-ml glass cylinder produces a yellow color if peroxides are present. • Add 0.5 ml of the liquid to be tested to a mixture of 1 ml of 10% aqueous potassium iodide solution and 0.5 ml of dilute hydrochloric acid to which has been added a few drops of starch solution just prior to the test. The appearance of a blue or blue-black color within 1 minute indicates the presence of peroxides.
6	What are the four properties of exhibited by any kind of characteristics of wastes?	1. **Ignitability:** Hazardous wastes that demonstrate the characteristic of ignitability include the following: wastes with flashpoints of less than 60 degrees Celsius, non-liquid materials that cause fires, ignitable compressed gases and oxidizers. 2. **Corrosivity:** Corrosive hazardous wastes include acidic liquid wastes with a ph of two or less and basic liquid wastes that have a ph of 12.5 or more and can corrode steel. 3. **Reactivity:** Reactive hazardous wastes include wastes that are unstable under standard conditions, react with water, give off toxic fumes or have the capability to explode or detonate when they are heated. 4. **Toxicity:** Toxic hazardous wastes include wastes that are harmful to health when swallowed or absorbed. Toxic wastes are of particular concern because they can leach through soil and contaminate groundwater.
7	What are common examples of hazardous waste?	Many pesticides, herbicides, paints, industrial solvents, fluorescent light bulbs and mercury-containing batteries are classified as hazardous wastes. So are medical waste products such as cultures, human tissue, contaminated gloves, sharps and so forth.
8	What are the different categories of EPA'F list?	1. Spent solvent wastes 2. Electroplating and other metal finishing wastes 3. Dioxin- Containing wastes 4. Wastes from the production of chlorinated aliphatic hydrocarbons 5. Wood-preserving waste 6. Petroleum refinery wastewater treatment sludge 7. Leachate from multiple sources

9	What are the different categories of EPA'K list?	1. Wood preservation 2. Organic chemicals manufacturing 3. Pesticides manufacturing 4. Petroleum refining 5. Veterinary pharmaceuticals manufacturing 6. Inorganic pigment manufacturing 7. Inorganic chemicals manufacturing 8. Explosives manufacturing 9. Iron and steel production 10. Primary aluminum production 11. Secondary lead processing 12. Ink formulation 13. Coal processing into coke
10	Explain briefly about environmental hazard identification.	Environmental hazard identification is the first step in environmental risk assessment, which is the process of assessing the likelihood, or risk, of adverse effects resulting from a given environmental stressor. Hazard identification is the determination of whether, and under what conditions, a given environmental stressor has the potential to cause harm. In hazard identification, sources of data on the risks associated with prospective hazards are identified. For instance, if a site is known to be contaminated with a variety of industrial pollutants, hazard identification will determine which of these chemicals could result in adverse human health effects, and what effects they could cause. Risk assessors rely on both laboratory (e.g., toxicological) and epidemiological data to make these determinations.
11	What is conceptual model of exposure?	Conceptual models communicate the pathway connecting sources of a given hazard to the potentially exposed population(s).
12	What are the five elements that is included in a conceptual model of exposure?	✓ Environmental fate and transport, or how the hazard moves and changes in the environment after its release ✓ Exposure point or area, or the place at which an exposed person comes into contact with the hazard ✓ Exposure route, or the manner by which an exposed person comes into contact with the hazard (e.g., orally, dermally, or by inhalation) ✓ Potentially exposed populations.
13	What are the emergency response procedure of leakage or spillage of hazardous materials?	• If there is a spill, leak, or fire involving hazardous material (flammable, toxic, corrosive, oxygen, cryogenic), confine the spill, leak, fumes, or fire by exiting the space and shutting the door. Avoid contact with the material. If time permits, locate the Material Safety Data Sheets (MSDS) for any identifiable materials. • Sound the building fire alarm so evacuation can begin. • Dial 112 or 101 or use one of the Code Blue call boxes located throughout the campus. Give your name, department,

		location of the emergency, nature of the incident, and description of the material. • Evacuate to the designated evacuation area. DO NOT return to the building until instructed that it is safe to do so. • Even SUSPECTED hazardous materials, leaks, or suspicious odors should be reported to Campus Safety so appropriate action can be taken.
14	Define hazardous waste.	Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment.
15	Explain briefly about labelling of hazardous waste or materials.	All hazardous waste containers shall be properly labeled with the words "Hazardous Waste", a description of the waste contained in the container, the hazards associated with the waste, and the location where the material was generated. If bottles are reused, remove the old chemical name and hazards completely and indicate the type of chemical waste on the container without abbreviations. Hazardous waste containers not labeled in accordance with this policy shall not be removed from the area until such label is affixed to the container. If the contents of the container are unknown, please indicate this on the label and in the waste pick up request. Containers of unidentified wastes may need to be evaluated in person by waste vendor before they are removed for disposal.
16	Describe the procedure of packaging all hazardous waste.	• Use a leak-proof container that will safely contain the contents. Open chemical containers, plastic bags or culture dishes will not be accepted. • Containers must be closable. • The container shall not be overfilled with liquid waste. • Empty space of at least five percent of the container volume shall be left to allow for thermal expansion. • Be suspicious of any pressure build-up inside the container (e.g. Pirahna waste) • If this is a concern when closing the container, use a cap designed to allow venting of over-pressure or do not secure the cap tightly and if appropriate, place the container inside a fume hood or other well-ventilated area until the chemical reaction has reached equilibrium and is removed by the waste collector. • Old cans of dry picric acid or other shock sensitive compounds and all known or suspected peroxide forming chemicals (PFC) shall be left in place and not moved until the waste collector has evaluated the condition of the container. (Note: Friction, heat, and exposure to air can cause aging pfcs to explode).
17	State 5 Pfcs that must be disposed of within three (3) months of opening.	• Divinyl acetylene • Divinyl ether • Isopropyl ether

		• Potassium amide • Potassium metal
18	How to refrigerants must be disposed from a refrigerator or freezers?	Equipment containing refrigerants must be disposed of in a manner which is compliant with the EPA's Clean Air Act. For more information regarding the disposal of refrigerators, freezers or other small appliances containing <5 Gallons of refrigerant.
19	How should broke laboratory glassware must be disposed?	Broken laboratory glassware free from any biohazardous, radioactive, and chemical contamination shall be disposed of by packing in a designated broken glass receptacle, cardboard box, or other rigid container.
20	To minimize various potential hazards when discarding broken or un-serviceable glassware. What are the guidelines to be followed?	• Dispose of broken laboratory glassware in designated broken glass containers only. These shall be puncture proof, double-lined cardboard boxes or other containers specifically designed for the disposal of glassware not weighing more than 20 pounds when full. They can be obtained from various laboratory equipment distributors; • When the box is full, securely seal with tape to prevent any leaks; • Label the container as "TRASH"; • Never use broken glassware boxes for the disposal of sharps, medical/biohazardous materials or liquid wastes
21	What is the purpose of updating documents?	Regular reviews of the documentation (daily, monthly, bimonthly or quarterly) in regard to WHS can provide an indication of success, or any areas where adherence to WHS practices has been neglected in the preceding period. These should then be discussed at team meetings to ensure all workers know what is and is not being achieved in terms of safety practices.

2. PT=Practical Test

#	Practical Activity	Additional Details
1	Student Assignments	Students need to undertake assignments related to undertaking waste disposal in laboratory setting, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Identify waste produced in lab ✓ Identify hazards and risks ✓ Dispose of waste ✓ Prepare and fill documents
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following.

		✓ Identify waste produced in lab ✓ Identify hazards and risks ✓ Dispose of waste ✓ Prepare and fill documents
4	Demonstrate the practical emergency procedure of leakage or spillage of hazardous materials	The student is expected to follow the correct step-by step to act quickly during an emergency procedure. The elements which should be assessed are: ✓ •If there is a spill, leak, or fire involving hazardous material, confine the spill, leak, fumes, or fire by exiting the space and shutting the door. Avoid contact with the material. ✓ If time permits, locate the Material Safety Data Sheets (MSDS) for any identifiable materials. ✓ Sound the building fire alarm so evacuation can begin. ✓ Dial 112 or 101 or use one of the Code Blue call boxes located throughout the campus. Give your name, department, location of the emergency, nature of the incident, and description of the material. ✓ Evacuate to the designated evacuation area.

3. OW =Observation at work Place

#	Observation Area	Additional details of the observation
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Identify waste produced in lab ✓ Identify hazards and risks ✓ Dispose of waste ✓ Prepare and fill documents
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to managing the day-to-day running of water testing laboratories and applying safe and relevant process and protocols for disposal of waste being produced within the lab. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.

4	Demonstrate how to dispose broken laboratory glassware	As the students attend the practical test to check how they demonstrate packing in a designated broken glass receptacle, cardboard box, or other rigid container, make sure the student uses the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Assess and evaluating parameters
1	Identify waste produced in lab	Make sure the students answer questions related to the following areas ✓ Waste characteristics are identified. ✓ Types of wastes are differentiated by waste stream or waste categories within lab setting ✓ Hazardous and dangerous waste and non-conforming waste are detailed. ✓ Contaminants present in waste are noted. ✓ Further information on waste is obtained by questioning appropriate personnel to ensure correct identification.
2	Identify hazards and risks	Make sure the students answer questions related to the following areas ✓ Other potential hazards and risks present in work environment are listed. ✓ Supervisor and team members are informed of job requirements, hazards and risks. ✓ Safe work practices that prevent risk behaviour are outlined to supervisor. ✓ Emergency response procedures are practised with team members.
3	Dispose of waste	Make sure the students answer questions related to the following areas ✓ Appropriate disposal is arranged with regard to waste quality, quantity and EPA and government regulations ✓ Waste is disposed of in an appropriate way to ensure compliance with workplace and EPA standards ✓ Any subcontractors are checked to ensure they comply with EPA and government regulation ✓ Wastage rates are documented or collated for further review

4	Prepare and fill documents	Make sure the students answer questions related to the following areas ✓ Fill in the relevant document related to waste disposal ✓ Update document on daily basis

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-11: Contribute to continuous improvement of quality systems

Unit No	11
Unit Title	Contribute to continuous improvement of quality systems
Unit Code	**CONS07CR07V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Interpret and communicate quality system requirements							
The accreditation requirements for relevant water quality systems are interpreted, understood and communicated to work colleagues.	✓	✓	✓	✓		✓	✓
The implications of non-conformance with quality accreditation requirements are identified and communicated	✓		✓	✓	✓		✓
Standard operating procedures are regularly reviewed to ensure compliance with current quality standards	✓	✓	✓	✓		✓	✓
2. Implement quality systems							
Individual roles and responsibilities in quality system implementation are defined.	✓	✓	✓	✓		✓	✓
Standard operating procedures are implemented to ensure compliance with quality systems.	✓		✓	✓	✓		✓
Relevant data is recorded for quality system monitoring.	✓	✓	✓	✓		✓	✓
Observations of non-conformance with quality accreditation requirements are recorded and reported promptly	✓		✓	✓	✓		✓
3. Identify and correct quality system implementation problems							
System monitoring data is analyzed to identify variances that indicate abnormal or sub-optimal performance.	✓	✓	✓	✓		✓	✓
Non-conformance reports are reviewed to identify contributing factors.	✓		✓	✓	✓		✓
Corrective action to remove or control the risk of sub-optimal performance is identified	✓	✓	✓	✓		✓	✓

4. Contribute to improvement of quality system implementation							
Recommendations for continuous improvement of work practices, methods, equipment and procedures are developed to ensure continued compliance with quality accreditation requirements.	✓	✓	✓	✓		✓	✓
All relevant work colleagues are consulted to refine recommendations.	✓		✓	✓	✓		✓
Recommendations for quality system implementation improvements are documented and the required modifications to standard operating procedures are noted	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What are implication of non-conformance water quality taken cared of?	Non-compliance to water quality will jeopardise health of the consumers and could often become public health danger to a community. Being a Lab technician at a water testing facility, it is the responsibility of the lab technicians to report cases of non-compliance and undertake proper communication with respective personnel within or outside the organization.
2	What are the following parameters according to EPA standards and guidelines?	✓ Chlorides ✓ Nitrates ✓ Ammonia ✓ Iron ✓ Hydrogen Sulphide ✓ Total Hardness ✓ Suspended solids
3	Explain what is the individual roles and responsibilities in quality system implementation.	As a lab technician, you will be involved in a variety of laboratory-based investigations within biological, chemical, physical and life science areas. This can include sampling, testing, measuring, recording and analyzing results as part of a laboratory technician team. It is vital that all are aware of the roles and responsibilities of the quality system being followed to function effectively, while adhering to correct procedures and health and safety guidelines
4	Explain how relevant data is recorded for quality system monitoring.	Data related to the tests being performed involve collection of samples and gathering of data and it is vital that proper procedures are always followed for accurate and reliable test results being tested in the laboratory setting.

5	What are the key steps to implement a quality management system?	• Review and analyse product by breaking it down into key stages and processes. These will often be areas that are crucial to your clients' satisfaction. Water plant operators and senior staff should be involved on regular basis and discuss the changing parameters that may affect the water quality being produced or supplied. • Review and research your approach by deciding which resources you need and discuss the effectiveness of existing processes with staff. Conduct a gap analysis to determine what the current processes are and how they need to change. Assemble your team and develop an implementation plan. • Inform and train team members on the identified gaps and improved and enhance the processes that are identified to be problematic and that are affecting quality. Decide if new processes are necessary and tell staff about them. Provide training and explain how the new system will benefit both staff and customers. • Consider supporting documentation, such as quality policies, procedures, training materials, work instructions, etc. Use version control documents to keep your documentation in order. • Deploy the system and check that the processes are working. Give someone the responsibility for the system and ensure that proper procedures are followed. Set targets for how each process contributes to the success of quality goals. Control, measure and monitor your outputs to ensure that they meet the expected quality levels. • Review and revise processes where necessary. Schedule routine product or process audits to monitor compliance with policies and procedures, and any certification requirements. Continue to audit and review regularly to ensure continuous improvement.
6	When a non-conformance is indicated what should be done?	A non-conformance indicates a problem that should be addressed with corrective action. It's a sign that something went wrong in your service, process, product, supply side or in the system itself by not meeting the specifications. It can be identified via audits, external audits, customer complaints, incoming material inspection or routine testing. Developed procedure need to include immediate actions to stop further non-conformance. Assess and contain the effects of the problem by taking corrective action or placing defective items in quarantine and notifying affected customers, if necessary. It is also important to document your non-conformance procedure and keep a record of the problem and action taken.

7	What are different standards which covers different water treatment technologies?	Some standards cover UV disinfection while other ensure that reverse osmosis systems perform as claimed.
8	What is the purpose of certification?	Certification also helps verify that manufacturers have good customer service measures in place and offer adequate product literature or information as well.
9	How can you identify and correct quality system implementation problems?	We need to identify through research and investigation on the cause of these issues and continuously implement rectification process and procedures to ensure the water produced remain of high quality and be always above the basic water quality standards set by the local authorities.
10	What is the goal of creating a quality management system?	Creating a quality management system requires input from employees at all levels of an organisation, starting with top management. Their firm commitment to change and improvement is vital to the success of system implementation.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related on understanding and implementing quality systems in the water industry and to identify opportunities for improvement in quality outcomes for the organisation, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. • Interpret and communicate quality system requirements • Implement quality systems • Identify and correct quality system implementation problems • Contribute to improvement of quality system implementation
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. • Interpret and communicate quality system requirements • Implement quality systems • Identify and correct quality system implementation problems • Contribute to improvement of quality system implementation
4	Application of key steps to implement a quality management system	The student is expected to follow the correct step-by step to apply and implement a quality management system. The elements which should be assessed are:

		✓ Review and analyse product by breaking it down into key stages and processes. ✓ Review and research your approach by deciding which resources are in ineed ✓ Conduct a gap analysis to determine what the current processes are and how they need to change. ✓ Assemble your team and develop an implementation plan. ✓ Inform and train team members on the identified gaps and improved and enhance the processes that are identified to be problematic and that are affecting quality. ✓ Consider supporting documentation, such as quality policies, procedures, training materials, work instructions, etc. ✓ Deploy the system and check that the processes are working. ✓ Control, measure and monitor your outputs to ensure that they meet the expected quality levels. ✓ Review and revise processes where necessary. Schedule routine product or process audits to monitor compliance with policies and procedures, and any certification requirements.

3. OW =Observation at work Place

#	Questions	Answers
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Interpret and communicate quality system requirements ✓ Implement quality systems ✓ Identify and correct quality system implementation problems ✓ Contribute to improvement of quality system implementation
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to implementing

		quality systems in the water industry and to identify opportunities for improvement in quality outcomes for the organisation. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate on practical test on how relevant data is recorded for quality system monitoring.	As the students attend the practical test on collection of samples and gathering of data and reliable test results being tested in the laboratory setting., make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Interpret and communicate quality system requirements	Make sure the students answer questions related to the following areas ✓ The accreditation requirements for relevant water quality systems are interpreted, understood and communicated to work colleagues. ✓ The implications of non-conformance with quality accreditation requirements are identified and communicated ✓ Standard operating procedures are regularly reviewed to ensure compliance with current quality standards.
2	Implement quality systems	Make sure the students answer questions related to the following areas ✓ Individual roles and responsibilities in quality system implementation are defined. ✓ Standard operating procedures are implemented to ensure compliance with quality systems. ✓ Relevant data is recorded for quality system monitoring. ✓ Observations of non-conformance with quality accreditation requirements are recorded and reported promptly.
3	Identify and correct quality system implementation problems	Make sure the students answer questions related to the following areas ✓ System monitoring data is analyzed to identify variances that indicate abnormal or sub-optimal performance. ✓ Non-conformance reports are reviewed to identify contributing factors. ✓ Corrective action to remove or control the risk of sub-optimal performance is identified.
4		Make sure the students answer questions related to the following areas

	Contribute to improvement of quality system implementation	✓ Recommendations for continuous improvement of work practices, methods, equipment and procedures are developed to ensure continued compliance with quality accreditation requirements. ✓ All relevant work colleagues are consulted to refine recommendations. ✓ Recommendations for quality system implementation improvements are documented and the required modifications to standard operating procedures are noted.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-12: Process and interpret data

Unit No	12
Unit Title	Process and interpret data
Unit Code	**CONS07CR08V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Retrieve and check data							
Store and retrieve data using appropriate files and/or application software	✓	✓	✓	✓		✓	✓
Verify the quality of data using workplace procedures	✓		✓	✓	✓		✓
Rectify errors in data using workplace procedures	✓	✓	✓	✓		✓	✓
2. Calculate scientific quantities							
Calculate statistical values for given data	✓	✓	✓	✓		✓	✓
Calculate scientific quantities using given formulae and data and estimate uncertainties	✓		✓	✓	✓		✓
Ensure calculated quantities are consistent with estimations and expectations	✓	✓	✓	✓		✓	✓
Report all calculated quantities using the appropriate units and correct number of significant figures	✓		✓	✓	✓		✓
3. Present data							
Present data in clearly labelled tables, charts and graphs	✓	✓	✓	✓		✓	✓
Graph data using appropriate scales to span the range of data or display trends	✓		✓	✓	✓		✓
Report all data using the appropriate units and number of significant figures	✓	✓	✓	✓		✓	✓
4. Interpret data							
Interpret significant features of tables, charts and graphs, including gradients, intercepts, maximum and minimum values, and limit lines	✓	✓	✓	✓		✓	✓
Recognise and report trends in data	✓		✓	✓	✓		✓
5. Keep accurate records and maintain confidentiality							
Transcribe information accurately	✓	✓	✓	✓			

Verify the accuracy of records following workplace procedures	✓	✓	✓	✓		✓	✓
File and store workplace records in accordance with workplace procedures	✓		✓	✓	✓		✓
File all reference documents logically and keep them up-to-date and secured	✓	✓	✓	✓		✓	✓
Observe workplace confidentiality standards	✓		✓	✓	✓		✓

Note:

- "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

	Question	Answer
1	What are the steps in reading a table?	Read the title. Check the source of the data. Examine the column and row headings, particularly the units used. Check that you understand the meaning of any symbols or abbreviations. Extract the information you need from the main body of the table.
2	What are the steps of reading a chart or graph?	Read the title of the chart and check the source of the data. Check the axes. What is being measured? What units have been used? Examine the scales. How should these be interpreted? What does each interval represent? Check the key or legend. What does the shading or line represent? Finally, examine the chart or graph itself, reading off the information that you need. Are you looking for a specific value or a trend or some other information?
3	What are the steps of drawing a graph and charts?	Include a clear title—so that your reader can see at a glance whether this chart is the one they are interested in. Include the source of the data—so that your reader can make further checks on how the data was collected if they wish. Choose the simplest graph or chart that illustrates the point you wish to emphasize. Label axes with both words and units. Mark scales clearly, choosing a scale that is easy to interpret. Include a legend if you have used more than one type of shading or line.

4	What are the characteristics and maintenance elements of documenting equipment on logbooks?	• step-by-step instructions for routine maintenance, including frequency of performance, and how to keep records of performance; • instructions for carrying out function checks, frequency of performance, and how to record the results; • directions for calibrating the instrument; • guide for troubleshooting; • any required manufacturer's service and repair; • list of any specific items needed for use and maintenance, such as spare parts
5	On recording problems what should be sure to record?	• date problem occurred, and when equipment was removed from service; • reason for breakdown or failure; • corrective action taken; including a note about any service provided by the manufacturer; • date returned to use; • any changes to procedure for maintenance or function checks as a result of the problem.
6	What are some of the tools that are helpful for keeping records on equipment management?	• charts • logs • checklists • graphs • service reports
7	When planning and developing an information management system, whether it is a manual, paper-based system, or an electronic system. What are the important elements to consider?	• Unique identifiers for samples • Standardized test request forms (requisitions) • Logs and worksheets • Checking processes to assure accuracy of data recording and transmission • Protection against loss of data • Protection of patient confidentiality and privacy • Effective reporting systems • Effective and timely communication.
8	What is the purpose of quality control in laboratory?	Quality control in the laboratory is a statistical process used to monitor and evaluate the analytical process that produces patient results.
9	Let's assume the measured value of potassium in a patient's serum is 2.8 mmol/L (a unit of measure, millimoles per liter). This result is abnormally low and indicates an	It could be possible that the instrument is out of calibration and the patient's true potassium value is 4.2 mmol/L – a normal result. The question of reliability for most testing can be resolved by regular use of quality control materials and statistical process control.

	inappropriate loss of potassium. But how does the person performing the test know that this result is truly reliable?	
10	What are the two ranges of quality control results?	The acceptable range for the Level I (Normal Control) is 3.7 – 4.3 mmol/L. The range for Level II (Abnormal Control) is 6.7 – 7.3 mmol/L. When the daily QC result obtained for the normal control is compared to the range calculated for the normal control, it becomes apparent that each result lies somewhere within the expected range. This indicates that the analytical process is "in control" at the normal level on that day of testing.
11	How to calculate Mean (x)?	To calculate a mean for a specific level of control, first, add all the values collected for that control. Then divide the sum of these values by the total number of values.
12	What is used to calculate lb/day?	$\text{Average use (lb/day)} = \frac{\text{total chemical used (lb)}}{\text{number of days}}$
13	What is used to calculate in gallons per day (gpd)?	$\text{Average use (gpd)} = \frac{\text{total chemical used (gal)}}{\text{number of days}}$
14	What formulae is used to calculate supply in inventory?	$\text{Inventory supply (days)} = \frac{\text{total chemical in inventory (lb)}}{\text{average use (lb/day)}}$ $\text{Inventory supply (days)} = \frac{\text{total chemical in inventory (gal)}}{\text{average use (gpd)}}$
15	The average calcium hypochlorite use at a plant is 40 lb/day. If the chemical inventory in stock is 1100 lb, how many days of supply is this?	$\text{Inventory supply (days)} = \frac{1100 \text{ lb in inventory}}{40 \text{ lb/day average use}}$ $= 27.5 \text{ days}$
16	Determine the chlorinator setting (lb/day) required to treat a flow of 4 MGD with a chlorine dose of 5 mg/L.	$\text{Chlorine (lb/day)} = 5 \text{ mg/L} \times 4 \text{ MGD} \times 8.34 \text{ lb/gal}$ $= 167 \text{ lb/day}$

17	A pipeline that is 12 inches in diameter and 1400 ft long is to be treated with a chlorine dose of 48 mg/L. How many lb of chlorine will this require?	$\text{Volume (gal)} = 0.785 \times D^2 \times \text{length (ft)} \times 7.48 \text{ gal/cu ft}$ $= 0.785 \times 1 \text{ ft} \times 1 \text{ ft} \times 1400 \text{ ft} \times 7.48 \text{ gal/cu ft}$ $= 8221 \text{ gal}$ $\text{Chlorine (lb)} = 48 \text{ mg/L} \times 0.008221 \text{ MG} \times 8.34 \text{ lb/gal}$ $= 3.3 \text{ lb}$
18	A chlorinator setting is 30 lb per 24 hr. If the flow being chlorinated is 1.25 MGD, what is the Chlorine dosage (expressed as mg/L)?	$30 \text{ lb/day} = x \text{ mg/L} \times 1.25 \text{ (MGD)} \times 8.34 \text{ lb/gal}$ $x = \frac{30}{1.25 \times 8.34}$ $x = 2.9 \text{ mg/L}$
19	A flow of 1600 gpm is to be chlorinated. At a chlorinator setting of 48 lb per 24 hr, what would Be the chlorine dosage (in mg/L)?	$1600 \text{ gpm} \times 1440 \text{ min/day} = 2{,}304{,}000 \text{ gpd}$ $= 2.304 \text{ MGD}$ Now calculate the chlorine dosage in mg/L using Equation 19.1: $\text{Chlorine (lb/day)} = x \text{ mg/L} \times 2.304 \text{ MGD} \times 8.34 \text{ lb/gal} = 48 \text{ lb/day}$ $x = \frac{48}{2.304 \times 8.34}$ $= 2.5 \text{ mg/L}$
20	Define these terms. a. significant figures b. Precision c. accuracy	Significant Figures: The number of digits used to express a measured or calculated quantity. By using significant figures, we can show how precise a number is. If we express a number beyond the place to which we have actually measured (and are therefore certain of), we compromise the integrity of what this number is representing. It is important after learning and understanding significant figures to use them properly throughout your scientific career. Precision: A measure of how closely individual measurements agree with one another. Accuracy: Refers to how closely individual measurements agree with the correct or true value.
21	How many significant figures are in? 1. 12.548 2. 2. 0.00335 **3.** 3. 504.70	1. 12.548 There are 5. All numbers are significant. 2. 0.00335 There are 3. The zeros are simply placeholders and locate the decimal. They are not trailing zeros. They are not significant. 3. 504.70 There are 5. The two zeros are not simply placeholders. One is between two significant digits and the other is a final, trailing zero in the decimal portion. Hence, they are both significant.
22	What are graphs?	Graphs can also be used to explore relationships between sets of data, such as the way in which a sunflower grows over a season.
23	State different types of Bar charts.	• Component Bar chart • Comparative Bar chart

24	What is a Pie chart? Give an example.	Pie charts are often used where you want to compare different proportions in the data set. The area of each slice (or sector) of the pie represents the proportion in that particular category. For example, the pie chart below illustrates the favourite type of exercise for a group of people.
25	Developing an appropriate record-keeping system is an important step for inventory management. What are good tools for managing the stocks?	• Standardized forms • Card systems • Log books.
26	The stock logbook or card system will provide a way to keep track of all supplies and reagents that are on hand at any given time. What are the things which needs to be recorded in a logbook?	• Name and signature of the person receiving the materials • Date of receipt • Expiration date • Quantity of the material received • Minimum stock that should be on hand • Current stock balance.
27	Define confidentiality.	Confidentiality is the protection of personal information. Confidentiality means keeping a client's information between you and the client, and not telling others including co-workers, friends, family, etc.
28	Give examples of maintaining confidentiality standards.	• Individual files are locked and secured • Support workers do not tell other people what is in a client's file unless they have permission from the client • Information about clients is not told to people who do not need to know • Clients' medical details are not discussed without their consent • Adult clients have the right to keep any information about themselves confidential, which includes that information being kept from family and friends.
29	What type of information is considered to be confidential?	• Name, date of birth, age, sex and address • Current contact details of family, guardian etc • Bank details • Medical history or records • Personal care issues • Service records and file progress notes
30	Give an explanation of the importance of confidentiality?	One of the most important elements of confidentiality is that it helps to build and develop trust. It potentially allows for the free flow of information between the client and worker and acknowledges that a client's personal life and all the issues and problems that they have belong to them.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to retrieve data, evaluate formulae and perform scientific calculations, present and interpret information in tables and graphs and keep accurate records, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Retrieve and check data ✓ Calculate scientific quantities ✓ Present data ✓ Interpret data ✓ Keep accurate records and maintain confidentiality
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Retrieve and check data ✓ Calculate scientific quantities ✓ Present data ✓ Interpret data ✓ Keep accurate records and maintain confidentiality
4	Demonstrate how to draw a plotting (straight line) graph.	The student is expected to follow the correct step-by step process plot a graph. The elements which should be assessed are: ✓ Plot these points on a graph with the diameter on the horizontal (x) axis and the circumference on the vertical (y) axis. ✓ Draw a straight line through the points. ✓ Estimate the circumference of a circle of diameter 15 inches. Estimate the radius of a circle of circumference 30 inches.

3. OW =Observation at work Place

#	Questions	Answers
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Retrieve and check data ✓ Calculate scientific quantities ✓ Present data ✓ Interpret data ✓ Keep accurate records and maintain confidentiality

2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to retrieve data, evaluate formulae and perform scientific calculations, present and interpret information in tables and graphs and keep accurate records. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Interpreting and reading the chart or graphic	As the students attend the practical test to read a chart or graphs, make sure the student use the proper technical terms and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Retrieve and check data	Make sure the students answer questions related to the following areas ✓ Store and retrieve data using appropriate files and/or application software ✓ Verify the quality of data using workplace procedures ✓ Rectify errors in data using workplace procedures
2	Calculate scientific quantities	Make sure the students answer questions related to the following areas ✓ Calculate statistical values for given data ✓ Calculate scientific quantities using given formulae and data and estimate uncertainties ✓ Ensure calculated quantities are consistent with estimations and expectations ✓ Report all calculated quantities using the appropriate units and correct number of significant figures.
3	Present data	Make sure the students answer questions related to the following areas ✓ Present data in clearly labelled tables, charts and graphs ✓ Graph data using appropriate scales to span the range of data or display trends ✓ Report all data using the appropriate units and number of significant figures
4	Interpret data	Make sure the students answer questions related to the following areas

		✓ Interpret significant features of tables, charts and graphs, including gradients, intercepts, maximum and minimum values, and limit lines ✓ Recognise and report trends in data
5	Keep accurate records and maintain confidentiality	Make sure the students answer questions related to the following areas ✓ Transcribe information accurately ✓ Verify the accuracy of records following workplace procedures ✓ File and store workplace records in accordance with workplace procedures ✓ File all reference documents logically and keep them up-to-date and secured ✓ Observe workplace confidentiality standards

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-13: Perform laboratory testing

Unit No	13
Unit Title	Perform laboratory testing
Unit Code	**CONS07CR09V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Interpret test requirements							
Review test request to identify samples to be tested, test method and equipment involved	✓	✓	✓	✓		✓	✓
Identify hazards and workplace controls associated with the sample, preparation methods, reagents and/or equipment	✓		✓	✓	✓		✓
2. Prepare sample							
Record sample description, compare with specification, record and report discrepancies	✓	✓	✓	✓		✓	✓
Prepare sample in accordance with appropriate standard methods	✓		✓	✓	✓		✓
3. Check equipment before use							
Set up test equipment in accordance with test method	✓	✓	✓	✓		✓	✓
Perform pre-use and safety checks in accordance with workplace procedures and manufacturer instructions	✓		✓	✓	✓		✓
Identify faulty or unsafe equipment and report to appropriate personnel	✓	✓	✓	✓		✓	✓
Check calibration status of equipment and report any out-of-calibration items to appropriate personnel	✓		✓	✓	✓		✓
4. Perform tests on samples							
Identify, prepare and weigh or measure sample and standards to be tested	✓	✓	✓	✓		✓	✓
Conduct tests in accordance with workplace procedures	✓		✓	✓	✓		✓
Record data in accordance with workplace procedures	✓	✓	✓	✓		✓	✓
5. Maintain a safe work environment							
Use established safe work practices and personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel	✓	✓	✓	✓		✓	✓
Minimise the generation of wastes and environmental impacts	✓		✓	✓	✓		✓

Ensure safe disposal of laboratory and hazardous wastes	✓	✓	✓	✓		✓	✓
Clean, care for and store equipment and reagents as required	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	How does the sampling must be designed?	Sampling must be designed to obtain accurate data for identifying treatment process changes and varying water qualities. The objective is to remove a small portion that is representative of the entire flow and adequately reflects actual conditions in the water.
2	Where could be a suitable sample location?	The test requirements usually determine sample location. Obtain the sample where mixing is best and the water is of uniform quality. The sampling location must be accessible. Avoid slippery surfaces. Do not climb on or under guardrails.
3	What is composite samples?	This type of sample is taken to determine average conditions in a large volume of water whose chemical properties vary significantly over the course of a day. Small aliquots are taken at regular intervals and pooled into one large sample over a 24-h period.
4	What is grab sample?	A grab sample is taken all at once, at a specific time and place. Insert container upside down into the water. Rotate open end toward direction of flow and allow to fill under the surface.
5	What should be done if preservative or dechlorinating agent is added to empty sample bottle?	If preservative or dechlorinating agent has been added to empty sample bottle, adjust sampling technique so that the bottle does not overfill, or the chemical will be washed out.
6	Explain a shortly about sample bottle?	For chemical testing, the sample bottle must be clean. For bacteriological testing, the sample bottle must be clean and sterile. Bottles may be glass or plastic for most analyses; labels must be firmly attached to the sample bottle, not to the lid. Use labels that will not come off when damp. Use a water-insoluble ink pen. The label on a sample bottle should include sample ID number, date and time of collection, type of sample, location, adverse weather conditions, collector's initials, analysis to be performed, and sample preservation, if any.
7	What can be done while preservation and transport?	Dissolved oxygen, pH, and temperature should be analyzed on site, at the sampling location. Bacteriological tests must be performed within 24 h of sampling. All samples should be analyzed as soon as possible after collection.
8	What does the chain of custody records consist of?	• Sample labels — For sample identification • Sample seals — For shipped samples, to ensure no tampering

		• Field logbook — Includes all information on label, container type, sample size, field analysis, number of samples taken • Chain of custody record — Includes label information and change of possession forms
9	Process control and regulatory compliance depend upon the proper recording of laboratory analysis data. What does an analysis reports (bench sheets) consist of?	• Name, time, and date of analysis • Analyst name • Sample preparation • Analysis method • Test conditions (standards, reagents, instrument settings, temperature, and reaction time) • Results of analysis • Observations — comments
10	What should be dependable while selecting a sample size?	• Your resources for water quality testing and analyzing data • The total number of sampling points involved • The logistics in reaching the sampling points, especially those in rural, remote areas • How much data is needed to make a good decision • Your best judgment
11	Describe what ways can help you to decide which locations can be used for sample taking.	There are different methods to choose who or where you are going to sample. It is best to use a random sample (without a particular pattern) so that there is no bias in your results, but this might not always be possible.
12	What is a simple random sampling?	In this method, every household who took part in the project has an equal chance of being selected in the sample. You can use different methods to randomly select the households, such as drawing names or numbers from a hat, or using an online random number generator
13	What is systematic random sampling?	In this method, households are selected at particular intervals. The interval can be calculated by dividing the total number of households who took part in the project by the number of households to be selected (sample size).
14	What is cluster random sampling?	In this method, the population is divided into clusters or groups, and some of these are then chosen by simple random sampling. It is a good method to use for large projects. Samples taken from households of the same street or households within the same tribe are an example of cluster sampling.
15	What is convenience sampling?	Convenience sampling does not give you a random sample of the population because households are only selected if they can be accessed easily and conveniently. Many projects often use convenience sampling instead of random sampling due to limited time and resources.
16	Explain how to clean and sterilize sample containers.	You can reuse glass or heat resistant plastic sample containers. To prepare the containers, they should be washed with soap and rinsed at least three times (five is better) with distilled water to remove any residue. If distilled water is not available, clean chlorine-free water may be used (e.g., filtered and then boiled).

		After washing, sample containers for microbiological testing need to be sterilized. Sample containers for physical and chemical tests need to be clean, but not sterilized. However, often the same water sample is used for physical, chemical and microbiological testing, so then the container must be sterilized.
17	How can a container can be sterilized? State 4 methods.	1. Conventional oven: Heat at 180°C for 30 minutes 2. Boiling: Boil for 10 minutes 3. Autoclave: Heat at 121°C for 20 minutes 4. Pressure cooker: Heat for at least 30 minutes
18	While sampling on surface water. Where should you take the samples from?	For rivers or other moving water, you should try to obtain samples from a point where the water is well mixed and representative of the drinking water supply. Do not take samples that are too near the bank, too far from the point of where the drinking water is taken, or aa depth above/below the point of where the drinking water is taken. Surface water quality can also change depending on the time of day or season. It is important to sample at the same time of the day and record the weather conditions when you are taking your sample.
19	During dangerous cases of entering a water or taking sample by hand what technique can be used?	In these cases, you may need to tie your container to a piece of wire or rope and throw it into the water. A bridge is an excellent place at which to take a sample, but only if it is close to where people get their drinking water.
20	Explain the procedure of sampling a surface water source.	1. Carefully remove the cap from the container and put it facing up in a clean place or ask somebody to hold it. Take care to prevent dust from entering the container or anything else that may contaminate the sample. 2. Hold the sample container firmly and dip the open mouth of the container into the water. 3. Lower the container about 20 cm below the surface of the water and scoop up the water sample. This scooping action ensures that no external contamination enters the sample container. In areas where the water is moving (e.g., rivers), the sample should be taken against the direction of the flow of water. 4. Lift the sample container carefully and place on a clean surface where it cannot be knocked over. If the container is completely full, pour out a little water to leave an air space in the container. This allows space for mixing the water sample before analysis. Put the cap back on the container.
21	Explain the procedure of sampling an open well or tank.	1. Prepare the sample container. Use string, rope or cable to attach a weight (e.g., small rock) to the container. 2. Take a 20 m length of string, rolled around a stick, and tie it to the container. Open the container as described above. 3. Carefully remove the cap from the container and put it facing up in a clean place or ask somebody to hold it. Take care to prevent dust from entering the container or anything else that may contaminate the sample. 4. Lower the weighted sample container into the well or tank, unwinding the string slowly. Do not allow the container to

		touch the sides of the well or tank because it may pick up dirt and contaminate the sample. 5. Immerse the container completely in the water and continue to lower it below the surface of the water (about 20 cm although this can be difficult to judge). Do not allow the container to touch the bottom of the well or disturb any sediment. 6. Once the container is full, bring it up by rewinding the string around the stick. Lift the container carefully and place on a clean surface where it cannot be knocked over. If the container is completely full, pour out a little water to leave an air space in the container. This allows space for mixing the water sample before analysis. Put the cap back on the container.
22	Explain the procedure of sampling a tap?	1. Remove any attachments (e.g., nozzles, pipes, screens) from the tap. These attachments are a frequent source of contamination. 2. Optional - Use a clean cloth to wipe the tap and to remove any dirt. Sterilize the inside and outside of the tap for 1 minute. Pour alcohol on the outlet and flame it with a lighter or use tweezers to hold an alcohol-soaked cotton swab that is lit on fire. If the tap is made of plastic, then use an alcohol-soaked cotton swab that is NOT lit on fire, or else the plastic will melt! Sterilizing the tap will tell you the actual water quality. Not sterilizing the tap will tell you the water quality that people are drinking. 3. Open the tap before sampling. Carefully turn on the tap and allow water to flow at a moderate rate for 2-3 minutes to clear out any deposits in the pipes. 4. Carefully remove the cap from the container and put it facing up in a clean place or ask somebody to hold it. Take care to prevent dust from entering the container or anything else that may contaminate the sample. Hold the sample container under the water flow to fill it. Leave an air space in the container. This allows space for mixing the water sample before analysis. Put the cap back on the container.
23	What is colorimetric method?	Chemical reagents are added to the water sample which react with the particular chemical parameter of interest. The product that is formed absorbs light at a particular wavelength. The water sample is then analyzed in a colorimeter or spectrophotometer and compared to known standards.
24	What is electrode method?	Ion-selective electrodes can measure the concentration of certain ions in the water sample. pH is easily measured with an electrode and meter.
25	What is Atomic Absorption Spectrometer (AAS)?	AAS is used to analyze the presence of metals. Samples are heated either in a flame or electrically in a graphite furnace, and the concentration is determined by the metal atom's absorption of light at a particular wavelength.

26	What is Inductively Coupled Plasma (ICP)?	ICP is also used to analyze the presence of metals. Samples are broken down to the atomic level and metals are detected either through atomic emission spectroscopy or mass spectroscopy.
27	State a limitation of test strips?	The main limitation of test strips is that they are less accurate since they require a visual interpretation of the results.
28	It is important to use the required activation method for the test strip you are using. Different products that require different activation methods. Mention different types of activation methods.	• Dipping the strip in the sample • Swishing the strip back and forth in the sample • Holding the reagent area in a stream of the sample
29	Different test strips require different times that you must wait before you compare the strip to the colour chart. What happens when you use a wrong activation method?	Using the wrong activation method or reading your results too early or late for that test strip may lead to incorrect results.
30	Colour discs are available for a range of chemical parameters. Mention those chemical parameters.	Chlorine, fluoride, nitrate, iron and manganese
31	What is a colorimeter and photometer	Colorimeters and photometers are digital instruments that use a light source to measure the chemical concentration in a water sample. Compared to test strips, they offer more accurate and repeatable results since the concentration is given as a digital reading.
32	State an advantage and disadvantage of colorimeter and photometer.	Colorimeters and photometers can read a large variety of chemicals in a water sample, as well as a wider numerical range within each parameter. However, they are more expensive, need a power source and require training to ensure they are being used properly.
33	What is a digital meter?	Some portable test kits include various digital meters to measure parameters like pH and electrical conductivity (EC).
34	State an advantage and disadvantage of digital meters.	They are relatively easy to use and can provide more accurate measurements than other methods, such as test strips. The main disadvantages are the need to calibrate the meters and replace batteries as required, and the general fragility of electronic equipment.
35	What is a buffer solution?	The buffer solution is really a “buffer.” It neutralizes any possible acid or alkaline influences present in the water in which it is dissolved, and the pH should reside very stably at its designated value.
36	What are some factors that should be taken into consideration when choosing an	• Available resources • Required level of accuracy and precision • Technical skills of staff

	appropriate microbiological test method?	• Geographical location • Objective of the results
37	What are the three main test methods to determine the presence of indicator bacteria in drinking water?	• Presence/absence (P-A) • Most probable number (MPN) • Membrane filtration
38	What is Presence-Absence?	Presence-absence (P-A) is a qualitative test that depends on a colour change to indicate the presence of contamination. If the test turns out to be positive, meaning that the indicator bacteria is present, the water sample will change to a specific colour. P-A tests will not tell you the quantity of indicator bacteria in the water sample.
39	What is different P-A products that can test for three types of indicator bacteria?	1. H_2S producing bacteria 2. Total coliform bacteria 3. Total coliform bacteria and *E. coli*
40	There are also different P-A tests that use total coliform and/or *E. coli* as the indicators. What is a general process for these tests?	1. A powdered reagent is added to the water sample 2. The sample is incubated for 24-48 hours at 35oC 3. The results are read: Colourless = negative, Colour = total coliforms present, Fluorescent = *E. coli* present (seen using a UV lamp)
41	What is a filter paper?	Filter paper, also called a membrane filter, is used to trap the bacteria from the water sample. A pore size of 0.45 µm is most commonly used since it filters out all coliform bacteria. The filter paper usually has a grid printed on it so that you can more easily count the bacteria colonies. There are various types of filter papers with different grid colours available from manufacturers.
42	What is a culture media?	Culture media are substances which contain nutrients to help the bacteria grow. Culture media in liquid form is called a broth and the semi-solid form (gel) is called an agar. Different culture media are used to grow different indicator bacteria.
43	Describe what is an incubator	The incubator is another important piece of equipment needed for membrane filtration, and sometimes for P-A and MPN tests. There are different types of incubators made by different manufacturers. Some incubators are portable and use a battery for power supply, while others need to stay in one location and use the main power supply.
44	What is the purpose of incubation temperature with an example?	The incubation temperature is critical to ensure that microbiological test results are accurate. Different culture media require different temperatures to grow the specific indicator bacteria. For example, thermotolerant coliforms grow at 44oC.

2. PT=Practical Test

#	Practical Activity	Additional details related to the activity
1	Student Assignments	Students need to undertake assignments related to preparing samples and perform tests and measurements using standard methods, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Interpret test requirements ✓ Prepare sample ✓ Check equipment before use ✓ Perform tests on samples ✓ Maintain a safe work environment
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Interpret test requirements ✓ Prepare sample ✓ Check equipment before use ✓ Perform tests on samples ✓ Maintain a safe work environment
4	Demonstrate the procedure of sampling a surface water source.	The student is expected to follow the correct step-by step process to take sampling from a surface water source. The elements which should be assessed are: 1. Carefully remove the cap from the container and put it facing up in a clean place or ask somebody to hold it. Take care to prevent dust from entering the container or anything else that may contaminate the sample. 2. Hold the sample container firmly and dip the open mouth of the container into the water. 3. Lower the container about 20 cm below the surface of the water and scoop up the water sample. This scooping action ensures that no external contamination enters the sample container. In areas where the water is moving (e.g., rivers), the sample should be taken against the direction of the flow of water. Lift the sample container carefully and place on a clean surface where it cannot be knocked over. If the container is completely full, pour out a little water to leave an air space in the container. This allows space for mixing the water sample before analysis. Put the cap back on the container.

3. OW =Observation at work Place

#	Activity to observe	Additional details
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated

		within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Interpret test requirements ✓ Prepare sample ✓ Check equipment before use ✓ Perform tests on samples ✓ Maintain a safe work environment
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to preparing samples and perform tests and measurements using standard methods. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to clean and sterilize sample containers.	As the students attend the practical test to demonstrate cleaning and sterilization of sample containers, make sure the student uses the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Interpret test requirements	Make sure the students answer questions related to the following areas ✓ Review test request to identify samples to be tested, test method and equipment involved ✓ Identify hazards and workplace controls associated with the sample, preparation methods, reagents and/or equipment

2	Prepare sample	Make sure the students answer questions related to the following areas ✓ Record sample description, compare with specification, record and report discrepancies ✓ Prepare sample in accordance with appropriate standard methods
3	Check equipment before use	Make sure the students answer questions related to the following areas ✓ Set up test equipment in accordance with test method ✓ Perform pre-use and safety checks in accordance with workplace procedures and manufacturer instructions ✓ Identify faulty or unsafe equipment and report to appropriate personnel ✓ Check calibration status of equipment and report any out-of-calibration items to appropriate personnel
4	Perform tests on samples	Make sure the students answer questions related to the following areas ✓ Identify, prepare and weigh or measure sample and standards to be tested ✓ Conduct tests in accordance with workplace procedures ✓ Record data in accordance with workplace procedures
5	Maintain a safe work environment	Make sure the students answer questions related to the following areas ✓ Use established safe work practices and personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel ✓ Minimise the generation of wastes and environmental impacts ✓ Ensure safe disposal of laboratory and hazardous wastes ✓ Clean, care for and store equipment and reagents as required

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to

		entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-14: Control stock

Unit No	14
Unit Title	Control stock
Unit Code	**CONS07CR10V1/21**

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Maintain and control stocks of materials or equipment							
Label, document and store stocks in accordance with relevant standards and specific safety requirements	✓	✓	✓	✓		✓	✓
Follow stock rotation procedures to maximise use of stocks within permitted shelf life	✓		✓	✓	✓		✓
Identify stock discrepancies and replace redundant or outdated stocks to maintain stocks at prescribed level	✓	✓	✓	✓		✓	✓
Identify and replace damaged/worn equipment or arrange for repairs or disposal as appropriate	✓		✓	✓	✓		✓
Initiate quality control sampling and testing procedures when appropriate	✓	✓	✓	✓		✓	✓
Report stock problems outside own knowledge and authority limitations to relevant personnel	✓		✓	✓	✓		✓
2. Order and receive materials and equipment							
Determine requirements of customers and suppliers using appropriate communication and interpersonal skills	✓	✓	✓	✓		✓	✓
Determine demand for stock, taking into account peak and seasonal variations in stock usage and production conditions	✓		✓	✓	✓		✓
Place and/or follow up approved orders using workplace systems and procedures	✓	✓	✓	✓		✓	✓
Check condition of received goods and take appropriate action	✓		✓	✓	✓		✓
3. Maintain stock records							
Record all relevant details accurately using the specified forms/computer system	✓	✓	✓	✓		✓	✓
Ensure that written information is legible and indelible	✓		✓	✓	✓		✓
File all records in the designated place	✓	✓	✓	✓		✓	✓

4. Maintain a safe work environment							
Use established safe work practices and personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel	✓	✓	✓	✓		✓	✓
Minimise the generation of wastes and environmental impacts	✓		✓	✓	✓		✓
Ensure the safe collection of redundant/outdated stocks for subsequent disposal	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = CertificatesT=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What is the purpose of labelling?	Identify the contents of the container Warn of hazards.
2	Chemical suppliers and employers have the primary responsibility to ensure that in the workplace, hazardous substances are correctly labelled. What are those responsibilities?	• Chemicals are appropriately and correctly labelled • Labelling is not removed or modified • Decanted substances are labelled • There are prescribed measures for lost labels and unknown substances.
3	If a label is lost and the contents are unknown what should be done?	• Marked CAUTION DO NOT USE: UNKNOWN SUBSTANCE • Stored in isolation until the contents can be identified • If contents cannot be identified, the contents should be suitably disposed of (with advice from relevant authorities).
4	How can you do a replacement to a label of a container?	• The substance changes (including new ingredients) • New information becomes available that affects the information provided on the label (often instigated through a change of MSDS) • A new expiry date (if used) is required.
5	What are general rules for label requirements on its physical?	• On outside face of container • Firmly secured • Colouring to contrast with background colour. • English language • Durable print • Legible, through size and style.

		• Variations through removal, defacing, modifications or other alterations are not permitted.
6	Explain the procedure of labelling chemicals and solutions.	• Mark bottles and jars clearly with the: • Product name • Prescribed risk and safety information • First aid details, emergency procedures • Reference to the MSDS • Name of the owner (initials) and date.
7	Where are large quantities of chemicals located at?	Large quantities of chemicals are a hazard and some chemicals have a limited shelf life.
8	What are some glassware and consumable items stored in simulab?	Simulab stores glassware and consumables such as paper towel, tissues, plastic disposable pipettes in the high cupboards with glass doors.
9	An enzyme has been stored on the shelf in the Chemical Store. The storage requirements are not being properly met. Find out what the storage requirements for enzymes are and what quality control checks you can perform to find out if the enzyme is still active and able to be used?	Shelf life and storage conditions for enzymes depend on their physical form. Liquids usually have the shortest shelf life and should be stored under refrigeration. Powders and tablets are usually stable for short periods (3 months) at room temperature, however should be stored under refrigeration for longer periods. Some enzymes should be stored at –20°C or –80°C for any period, as they are very unstable. Enzymes can normally survive three freeze and thaw cycles. All enzymes should be stored away from direct sunlight.
10	What are general characteristics of enzyme?	Enzymes are large proteins that act as catalysts to speed up reactions without themselves being changed or consumed. They are produced by plants, animals and microorganisms but are not living organisms themselves, but chemical compounds. Enzymes are highly active so that only small quantities are required and highly specific so that a single enzyme usually catalyses only a single reaction. Each enzyme has its own ph and temperature range, and the process of its reaction depends on those conditions along with time and concentration.
11	What are the factors that can affect chemical stocks and stock control?	There are many factors that can affect chemical stocks and stock control. The factors range from dangerous incompatibilities, short use-by-dates, inaccurate recording of supply or usage to problems with supply or deletion of specialty chemicals from a laboratory suppliers product range.
12	What is inventory control?	Inventory control requires finding the right balance between ensuring that there are adequate supplies on hand, keeping the

<table>
<tr><td></td><td></td><td>quantity of hazardous substances to a minimum and ensuring chemicals are used before their expiry date.</td></tr>
<tr><td>13</td><td>What are factors that are based on the inventory control?</td><td>• Stock usage - based on historical data and experience.
• Stock control - including security of stocks against pilfering, leakage etc.
• Record keeping - computer-based with timely data input.
• Shelf Life - needs to be managed to avoid wastage.
• Stock on hand - rule of thumb for how much stock to have on hand at any time (often one month's supply).
• Hazardous chemicals - keeping these to a minimum consistent with effective running of assays.
• Ordering system - must be simple to use and manage, and relies on the laboratory staff informing. Someone of stocks running low or placing the order themselves.
• Supplier capability - long or short are the delivery times.</td></tr>
<tr><td>14</td><td>Imagine the disruption to the efficient running of simulab if an essential reagent runs out and a high throughput assay is delayed by two days.
What are the possible consequences?</td><td>• Delayed turnaround time (TAT) and angry customers
• Patient health and treatment compromised
• Loss of reputation for simulab
• Loss of customers
• Laboratory staff under utilised
• Loss of morale in the laboratory and friction between staff
• Finger pointing and 'blame' for the 'culprit' who failed to order the reagent
• Loss of profits</td></tr>
<tr><td>15</td><td>Who are the internal and external customers in an inventory system of a laboratory?</td><td>Customers are anyone who relies on the inventory system and include internal customers (laboratory and other simulab staff) and external customers (doctors, patients and other customers, for example).</td></tr>
<tr><td>16</td><td>What few expectations required by internal and external customers?
Compare in a table.</td><td><table>
<tr><th>Internal Customers</th><th>External Customers</th></tr>
<tr><td>An inventory that never runs out.</td><td>Accurate and precise results.</td></tr>
<tr><td>A system that takes account of shelf life.</td><td>Timely results within specified tats.</td></tr>
<tr><td>A user friendly and automated system.</td><td>An economical service.</td></tr>
<tr><td>A system that saves time and money.</td><td>Ability to have priority testing done faster.</td></tr>
<tr><td>A system that reduces wastage.</td><td>Belief in the reputation and reliability of simulab.</td></tr>
<tr><td>A system that minimises storage of hazardous chemicals.</td><td>Never having results delayed because of inventory shortages.</td></tr>
<tr><td>A system that alerts future stock shortages.</td><td>Ability to specify methods and reagents for specific testing.</td></tr>
</table></td></tr>
<tr><td>17</td><td>Who are supplies and contrast internal and external suppliers?</td><td>Suppliers are anyone who supplies inventory to the laboratory and again there may be internal suppliers (laboratory technicians who make up reagents for other laboratory users are an example) and external suppliers (commercial chemical, equipment and consumable suppliers).</td></tr>
</table>

18	What are the number of requirements that needs to be fulfilled by the simulab inventory system for external suppliers?	• Orders filled out in an appropriate manner with all details including catalogue numbers. • Timely filing of orders and reduction of 'urgent' or 'rush' orders to a minimum. • Standing orders wherever possible. • Recipient to check all receipts and advise of discrepancies ASAP. • Payment of delivery fees. • One person to be responsible for all enquiries regarding orders. • All regulatory paperwork, permits etc. To accompany orders (eg drugs of addiction, radioactive substances). • Simulab to pay its account promptly according to the terms of supply.
19	Describe unusual patterns of demand/usage of reagents.	• Holiday periods - for example, if the supplier closes down over New Year then you may need to have enough stocks on hand to cover analyses until say 15 January. • Periods of increased demand - for example, if simulab provides blood alcohol testing for motorists then we need to be aware of police blitz times such as Easter and the summer holiday season. • Fast turnaround time (TAT) for results - for example, simulab may be contracted to provide testing for a new clinical trial that requires very rapid tats.
20	What is the procedure for ordering chemicals and equipment?	• Selecting Reagents and Materials • Purchasing and Ordering Reagents and Materials • Assessment of Suppliers • Checking of Deliveries.
21	An effective and efficient ordering system does not stop once the order has been placed. What are the number of follow up actions that must be undertaken?	• Ensure that the ordered goods arrive • Ensure that the ordered goods arrive on time • Ensure that all of the ordered goods arrive • Ensure that the correct amounts of ordered goods arrive • Ensure that unordered goods are rejected • Ensure that the correct prices are charged • Follow up on back ordered stock.

<table>
<tr><td>22</td><td>There are a number of situations when follow up activity is required on an order. There are many ways for mistakes and confusion to arise during the ordering process. List number of common order-related situations and follow up activity for each required problem.</td><td>
<table>
<tr><th>Common Order-Related Situations</th><th>Follow Up Activity Required</th></tr>
<tr><td>Order late in arriving</td><td>Check with the supplier, may need to advise laboratory staff.</td></tr>
<tr><td>Order missing items with no indication of back order</td><td>Check with the supplier, may need to advise office and laboratory staff.</td></tr>
<tr><td>Order missing items with indication of back order</td><td>Check with the supplier and determine delivery date, may need to advise office and laboratory staff.</td></tr>
<tr><td>Incorrect or missing paperwork</td><td>Check with the supplier, may need to advise office staff.</td></tr>
<tr><td>Incorrect pack sizes</td><td>Check with the supplier, may need to advise office and laboratory staff.</td></tr>
<tr><td>Incorrect number</td><td>Check with the supplier, may need to advise office and laboratory staff.</td></tr>
<tr><td>Incorrect grade</td><td>Check with the supplier to arrange return, may need to advise office and laboratory staff.</td></tr>
<tr><td>Goods damaged, faulty or unsuitable</td><td>Check with the supplier to arrange return, may need to advise office and laboratory staff.</td></tr>
</table>
</td></tr>
<tr><td>23</td><td>There are many factors that relate to the quality of goods received. Explain what factors should be checked.</td><td>
• Outer Packaging:
Intact and undamaged
No evidence of stains
Seals intact
Not leaking
No evidence of tampering
No evidence of contamination.
• Individual Containers:
Intact and undamaged
Glassware intact
No evidence of stains
Seals intact
Not leaking
No evidence of tampering
No evidence of contamination
Labels intact.
• Transport:
Correct temperature
Correct time
Correct pressure (if appropriate)
Correct transport containers, especially protective measures
Correct paperwork.
• Equipment:
Intact and undamaged
No evidence of tampering
No evidence of contamination
All parts present
All documentation present
Operational.
</td></tr>
<tr><td>24</td><td>What is the reason for ensuring written information?</td><td>
• To ensure inventory levels stay within required storage limits
• To allow a current chemical manifest, showing inventory levels and storage locations, to be produced for the emergency services. In case of fire the manifest will assist fire fighters in choosing appropriate fire-fighting methods. Depending on the
</td></tr>
</table>

		size of the organisation it may also be a legal requirement to maintain an up-to-date manifest • To ensure that msdss for every chemical in the laboratory are readily accessible • To ensure the availability of supplier details to facilitate the ordering process • To ensure orders are placed when stock levels fall below a 'trigger point' • To ensure that chemicals are used, or otherwise disposed of, on or before their expiry date.
25	What kind of information are recorded kept on laboratory?	• Stock usage • Orders and the progress of orders • Equipment servicing and repairs • Current inventories • QC sampling, testing and stock rotation.
26	What are the reasons for record keeping of chemical stocks?	• Safety - to have a database of msdss for all chemicals in stock. • Safety - to ensure that stocks of particularly hazardous chemicals are kept to a minimum. • Efficiency - to ensure that chemicals do not run out. • Efficiency - to take advantage of economies of scale when purchasing bulk supplies. • Efficiency - to make it simple to purchase more stock. • Efficiency - to make stocktaking of chemicals as simple as possible. • Efficiency - to reduce the amount of old stock discarded. • Quality - to ensure rotation of stocks. • Quality - to manage expiry dates and discard old stock. • Quality - often required by quality accreditation bodies. • Legislation - to comply with government legislation, eg for drugs of addiction.
27	How can you file all the records to the designated place?	Make sure all the records are duly filed and the filing system need to be kept in the appropriate place with labels. Information in the form of documents can be categorized as records and no records. Records are official documents valuable enough to be retained and stored in a format for future use. Non-records are of temporary use and eventually disposed of.
28	Why should you classify records?	Records are either active or inactive and classified according to use. Active records are accessed and utilized in the current administration of business functions. Inactive records are no longer referred to on a regular basis but still of limited importance.
29	Define records cycle.	A record's life cycle extends from the moment the record is created until its final disposition. Records retention schedules are developed and the value of specific records is determined. A schedule specifies the period of time a record should be stored.
30	To help established a records retention	Primary value o Administrative value

	schedule, records are evaluated in terms of their primary and secondary value. The value of each record depends on the utilization of those records in ongoing operations. List or categorize the records of primary and secondary value.	○ Legal value ○ Fiscal value ○ Research value Secondary value ○ Information value ○ Evidence value

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to ordering, maintaining and controlling the use of laboratory materials and/or equipment in the work area, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. ✓ Maintain and control stocks of materials or equipment ✓ Order and receive materials and equipment ✓ Maintain stock records ✓ Maintain a safe work environment
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Maintain and control stocks of materials or equipment ✓ Order and receive materials and equipment ✓ Maintain stock records ✓ Maintain a safe work environment
4	Demonstrate the procedure for ordering chemicals and equipment?	The student is expected to follow the correct step-by step procedure for ordering chemicals and equipment. The elements which should be assessed are: ✓ Selecting Reagents and Materials ✓ Purchasing and Ordering Reagents and Materials ✓ Assessment of Suppliers ✓ Checking of Deliveries. (follow-up)

3. OW =Observation at work Place

#	Questions	Answers
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. ✓ Maintain and control stocks of materials or equipment ✓ Order and receive materials and equipment ✓ Maintain stock records ✓ Maintain a safe work environment
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to ordering, maintaining and controlling the use of laboratory materials and/or equipment in the work area. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate the procedure of labelling chemicals and solutions.	As the students attend the practical test on demonstration of labelling chemicals and solutions, make sure the student uses the proper techniques and the information he shared is accurate.
5	Demonstrate the enzyme storage conditions	As the students attend the practical test on demonstration of labelling chemicals and solutions, make sure the student measures the enzyme activity using assay procedures that are specific for each particular enzyme the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Maintain and control stocks of materials or equipment	Make sure the students answer questions related to the following areas ✓ Label, document and store stocks in accordance with relevant standards and specific safety requirements ✓ Follow stock rotation procedures to maximise use of stocks within permitted shelf life ✓ Identify stock discrepancies and replace redundant or outdated stocks to maintain stocks at prescribed level ✓ Identify and replace damaged/worn equipment or arrange for repairs or disposal as appropriate ✓ Initiate quality control sampling and testing procedures when appropriate

		✓ Report stock problems outside own knowledge and authority limitations to relevant personnel
2	Order and receive materials and equipment	Make sure the students answer questions related to the following areas ✓ Determine requirements of customers and suppliers using appropriate communication and interpersonal skills ✓ Determine demand for stock, taking into account peak and seasonal variations in stock usage and production conditions ✓ Place and/or follow up approved orders using workplace systems and procedures ✓ Check condition of received goods and take appropriate action
3	Maintain stock records	Make sure the students answer questions related to the following areas ✓ Record all relevant details accurately using the specified forms/computer system ✓ Ensure that written information is legible and indelible ✓ File all records in the designated place
	Maintain a safe work environment	Make sure the students answer questions related to the following areas ✓ Use established safe work practices and personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel ✓ Minimize the generation of wastes and environmental impacts ✓ Ensure the safe collection of redundant/outdated stocks for subsequent disposal

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	**TRB/LB =Trainee's Record/Log Book**	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	**TR=Trainer Report**	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	**Other Sources**	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of

		evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.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