ASSESSMENT RESOURCES BOOK

WATER SUPPLY SYSTEM OPERATION & MAINTENANCE 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 plan and conduct research, to evaluate information and findings, and to develop, document and present 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

#	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. ✓ 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 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	Presenting the report	✓ 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.

1. 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.

2. 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 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

3. OQ=Oral Questioning

#	Questions	Answers
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 ✓ Minimise 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 behaviour 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 analyse 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 ✓ 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

4. 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	**Oher 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	**Oher 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	✓	✓	✓	✓		✓	✓

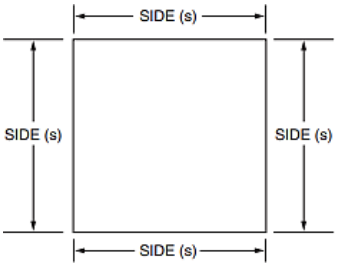
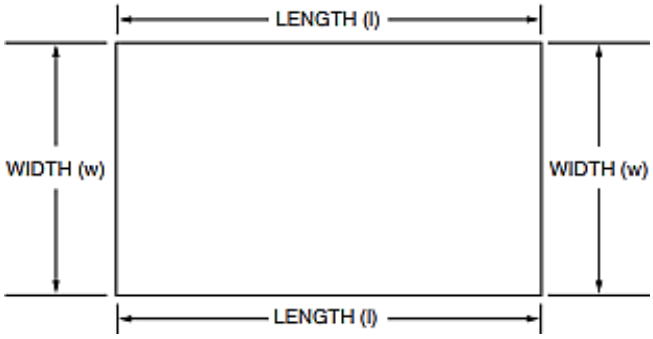
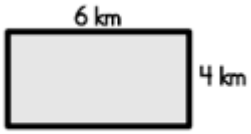
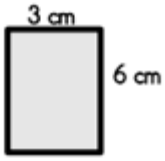
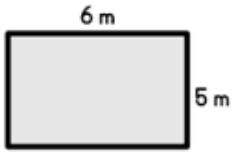
Perform mathematical calculations on Moles and Molarity, Normality, Settleability (Activated Biosolids Solids), Settleable Solids, Biosolids Total Solids, Fixed Solids, and Volatile Solids	✓		✓	✓	✓		✓
Calculate Biosolids Volume Index (BVI) and Biosolids Density Index (BDI)	✓	✓	✓	✓		✓	✓

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

#	Oral questioning activities	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	**Oher 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: Prepare basic technical drawing

Unit No	05
Unit Title	Prepare basic technical drawing
Unit Code	**CONS05CR01V1/21**

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 drawing requirements							
Requirements and purpose of drawing are determined from customer and/or work specification and associated documents	✓	✓	✓	✓		✓	✓
All data necessary to produce the drawing is identified and collected	✓		✓	✓	✓		✓
Drawing requirements are confirmed with relevant personnel and timeframes for completion are established	✓	✓	✓	✓		✓	✓
2. Develop knowledge and proper techniques in preparing drawings and sketches							
Drafting equipment is selected appropriate to the drawing method chosen	✓	✓	✓	✓		✓	✓
Drafting principles are applied to produce a drawing that is consistent with standard operating procedures within the enterprise	✓		✓	✓	✓		✓
All work is undertaken safely and to prescribed procedure	✓	✓	✓	✓		✓	✓
Completed drawing is approved in accordance with standard operating procedures	✓		✓	✓	✓		✓
3. Perform drawing and sketches to workplace requirements							
Drawings and or parts lists records are completed in accordance with standard operating procedures	✓		✓	✓	✓		✓
Approved drawings and or parts lists are copied and issued to relevant personnel in accordance with standard operating procedures	✓	✓	✓	✓		✓	✓
Approved drawings and or parts lists are stored and catalogued in accordance with standard operating 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	Briefly explain the first step of requirements gathering.	Often the first step for that should be to determine what the roles and responsibilities should be during this phase of the project. While the project manager would normally be responsible for the requirements of the project, it should typically be the customer, or an analyst, who is responsible for the requirements of the product. Even though the same person may play both roles, their overall responsibilities are different and it is important to be aware of which role is involved in what steps.
2	What is the project scope?	The project scope defines how the product (or service) will be developed while the product scope defines the actual functions and features of that same product.
3	What has the traditional focus in project management been on?	The traditional focus in project management has been on developing a product faster, cheaper, and better.
4	Why has the traditional focus in project management been changing?	This is changing through the popularity of agile approaches where it is assumed that the customer does not have a clear understanding of what they want up front, but rather that requirements gathering is a discovery process, where the customer gradually discovers the product requirements through iterations, prototyping and modelling.
5	Identify four techniques that are considered when determining the right approach.	✓ One-on-one interviews ✓ Surveys ✓ Job shadowing or observation ✓ Facilitated sessions/JAD (Joint Application Development) sessions
6	What does JAD sessions stand for?	Joint application design sessions.
7	What are JAD sessions?	JAD is a techniques largely focused on group dynamics and team synergy, it is important to get the right people involved.
8	What key people are required for a JAD session?	✓ Facilitator ✓ Scribe ✓ Analyst ✓ Customer
9	Explain the role of the facilitator in a JAD session.	The facilitator should be selected based on their ability to work with and lead a group of people in consensus building. They should be neutral to the outcome of the session, meaning that they should not have a vested impact in steering the discussion in a certain direction. This normally means that the project manager or the developers do not make good facilitators. Ideally, it should be a person that has a general understanding of the customer's business areas, who is comfortable with modeling

		techniques that are to be used in the session and who can deal with a group of disagreeing people and move them along in the decision process. While the facilitator is not the most important person for the project, they are the one with the most influence on the success of the JAD session itself. They need to be able to sense how the JAD team is functioning, to deal with conflicts, and to make sure that the goals of the session are being met.
10	Explain the role of the scribe in a JAD session.	The scribe, or scribes, will capture the key decisions, and the rational behind those decisions. If a 3-day JAD session is being held and at the end there is no documentation of the outcome, then everyone has just wasted 3 days. Have one scribe focus on conversations and one on models. This will improve the odds of catching everything important. The scribe must have good listening skills and must understand the business that is being discussed. You don't want constant interruptions from the scribe, requesting clarifications of items that are well understood by the rest of the room.
11	Explain the role of the facilitator in a JAD session.	The analyst is the person focusing on capturing the right information. Often the analyst will also be the facilitator, but when that happens they are playing two different roles. The facilitator is focusing on getting the group to consensus and to meet the session goals while the analyst is there to make sure that the right questions are asked and that the models correctly identifies the business. The analyst is really more of a subject matter expert on the customer's business.
12	Explain the role of the facilitator in a JAD session.	Obviously you cannot hold a JAD session without a customer. While it is true that you may not be able to select your customer, there are ways to influence the selection of them. Identify the criteria that you are looking for and meet with management ahead of time and explain the importance of the role and the characteristics of the person that is needed.
13	Identify four ground rules established for a JAD session.	✓ Breaks and how to handle late comers ✓ Decision process and how consensus is defined ✓ What to do when a topic goes longer than the agenda ✓ Rules to deal with participants monopolizing the conversation
14	Explain the Parking Lot concept.	A parking lot serves two main purposes, first, it allows the team to capture important information that should be addressed, but not by this team at this time. The second benefit is for the facilitator. It allows moving a person off a topic which is not in line with the goals of the session. There may not be intent to ever re-visit the topic again, but by putting it in writing and making it visible, it may allow the team to put the topic aside.
15	Explain the forming stage.	In the forming stage, the team is insecure and need a lot of guidance. Team building and clear assignments are important for this stage.
16	Explain the storming stage.	In the storming stage the team is now trying to assess the competency of other team members and figure out where they fit. The facilitator needs to let the team storm, while making sure that the ground rules are being followed.

17	Explain the norming stage.	In the norming stage the team is falling in to natural roles and responsibilities and the team starts to find its purposes.
18	Explain the performing stage.	When that has been sorted out the team is in the performing stage. In real life the team will move back and forth between these stages and the facilitator should adjust their facilitation style based on that.
19	List the key steps of implementing a JAD approach.	1. Sell it to your management to the customer. If you don't get buy-in this will fail, so make sure you put together a good sales presentation. 2. Train your core team on the techniques you'll be using (could be Process Modeling, Data Modeling, Prototyping, etc.) 3. Train some facilitators (select people that can lead a discussion, not necessarily the ones that want to do the most talking) 4. Pick a pilot project. Pick something not too large, something that you can afford to learn one and work through. 5. Train all participants (the users in the sessions have to understand the technique) 6. Schedule and run the pilot session. 7. Do an extensive lessons and learned session.
20	Identify the different types of views in basic engineering drawing.	✓ Isometric view ✓ Orthographic view ✓ Orthographic projection (ISO standard) ✓ Flat pattern ✓ Section view ✓ Cutout view ✓ Detail view ✓ Auxiliary view
21	Explain isometric view.	Isometric drawings show parts as three-dimensional. All the vertical lines stay vertical (compared to front view) and otherwise parallel lines are shown on a 30-degree angle. The lines that are vertical and parallel are in their true length. Which means you can use a ruler and the scaling of the drawing to easily measure the length straight from a paper drawing, for example. The same does not apply to angled lines. It is important to distinguish the isometric view from a perspective view. A perspective view is an artistic one that represents an object as it seems to the eye. Engineers stay true to the dimensions rather than optical illusions.
22	Explain orthographic projection (ISO standard).	The most common way to communicate all the information is by using three different views in a multiview drawing: ✓ Front view ✓ Top view ✓ Side view It may be possible that some additional views are necessary to show all the info. But again, less is more.

		The positioning of the views differs a bit regionally. For example, look at the image below to compare the US and ISO layouts.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to preparing basic technical drawing, 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 drawing requirements ✓ Develop knowledge and proper techniques in preparing drawings and sketches ✓ Perform drawing and sketches to workplace requirements
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Identify drawing requirements ✓ Develop knowledge and proper techniques in preparing drawings and sketches ✓ Perform drawing and sketches to workplace requirements
4	Demonstrate four methods by which you can identify drawing requirements	The student is expected to follow the correct step-by step processes of methods to identify drawing requirements. The elements which should be assessed are: ✓ One-on-one interviews ✓ Surveys ✓ Job shadowing or observation ✓ JAD (Joint Application Development) sessions

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. ✓ Identify drawing requirements ✓ Develop knowledge and proper techniques in preparing drawings and sketches ✓ Perform drawing and sketches to workplace requirements
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 the drawing requirements, preparing or making changes to engineering drawings, preparing an engineering parts list and issuing the drawings. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to implement a JAD approach	As the students attend the practical test to assess their skill in implementing a JAD approach, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Identify drawing requirements	Make sure the students answer questions related to the following areas ✓ Requirements and purpose of drawing are determined from customer and/or work specification and associated documents. ✓ All data necessary to produce the drawing is identified and collected. ✓ Drawing requirements are confirmed with relevant personnel and timeframes for completion are established.
2	Develop knowledge and proper techniques in preparing drawings and sketches	Make sure the students answer questions related to the following areas ✓ Drafting equipment is selected appropriate to the drawing method chosen. ✓ Drafting principles are applied to produce a drawing that is consistent with standard operating procedures within the enterprise. ✓ All work is undertaken safely and to prescribed procedure. ✓ Completed drawing is approved in accordance with standard operating procedures.
3	Perform drawing and sketches to workplace requirements	Make sure the students answer questions related to the following areas ✓ Drawings and or parts lists records are completed in accordance with standard operating procedures. ✓ Approved drawings and or parts lists are copied and issued to relevant personnel in accordance with standard operating procedures. ✓ Approved drawings and or parts lists are stored and catalogued in accordance with standard operating 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	**Oher 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: Plan to undertake a routine task

Unit No	07
Unit Title	Plan to undertake a routine task
Unit Code	**CONS05CR03V1/21**

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 task requirements							
Instructions and procedures are obtained, understood and where necessary clarified	✓	✓	✓	✓	✓	✓	✓
Relevant specifications for task outcomes are obtained, understood and where necessary clarified		✓	✓	✓		✓	
Task outcomes are identified	✓		✓	✓	✓		✓
Task requirements such as completion time and quality measures are identified	✓	✓	✓	✓	✓	✓	✓
2. Plan steps required to complete task							
Based on instructions and specifications provided, the individual steps or activities required to undertake the task are understood and where necessary clarified	✓	✓		✓	✓	✓	✓
Sequence of activities is identified		✓	✓	✓		✓	
Plan is checked to ensure it complies with specifications and task requirements	✓		✓	✓	✓		✓
3. Review plan							
Effectiveness of plan is reviewed against specifications and task requirements	✓	✓	✓	✓	✓	✓	✓
If necessary, plan is revised to better meet specifications and task requirements		✓	✓	✓		✓	

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 task analysis.	It is a structured framework that dissects a job and arrives at a reliable method of describing it across time and people by composing a detailed listing of all the tasks.
2	What does a task analysis contain?	✓ Task frequency ✓ Difficulty of learning ✓ Importance to train ✓ Task criticality ✓ Task difficulty ✓ Overall task importance
3	Define task statement.	A task statement is composed of an action and a result (product).
4	What are task steps?	Task steps (also known as performance steps) are the step-by-step instructions for performing the process.
5	Demonstrate how to order manufacturing parts when the system flags a part as being low in stock	✓ Look up usage for the item for the previous 12 month period. ✓ Calculate the average monthly use. ✓ Add the planned growth rate for the product line. ✓ Check parts catalogs or call the source for best buy rates. ✓ Check with planned usage tables or the business unit to ensure that the part will not go out of specifications for the best calculated buy period. ✓ Place purchase order.
6	List the four main methods for determining steps in a task analysis.	✓ Hierarchical Task Analysis - arranging by order of actions ✓ IF and THEN Analysis - If and then relationship ✓ Model Based Analysis - possible actions listed ✓ Cognitive Task Analysis - critical decision based
7	IF text is a word, THEN?	✓ move cursor to middle of word ✓ double-click mouse button
8	IF text is a section of words or letters, THEN?	✓ move cursor to beginning of text ✓ press mouse button down ✓ move cursor to end of text ✓ release mouse button
9	What is the Model Based Analysis method used for?	This method is often used for professional tasks as the steps for performing certain tasks can be extremely vague to define.
10	List some acceptable techniques used in model-based analysis.	✓ use examples of others ✓ have them form a picture in their minds of what they are trying to learn ✓ help them gain and understand necessary information ✓ apply the task to their job ✓ present information using visual, auditory, and kinesthetic methods ✓ practice the task
12	Define cognitive task analysis.	A Cognitive Task Analysis is directed at the psychological processes underlying the performance and the subtle cues that may depend on context and experience.

13	What is the main goal of a cognitive task analysis?	To define the actual decision requirements of the task.
14	How can the actual decision requirements of the task be defined?	✓ Mapping out the task using task analysis (traditional task analysis). ✓ Identifying the critical decision points. ✓ Clustering and linking the decision points. ✓ Prioritizing the decision points. ✓ Diagnosing and characterizing the decisions as to the strategies used, cues signaling the decision points, and the inferences made regarding cues and decision points.
15	Explain the difference between task analysis and cognitive task analysis.	Task analysis focuses mainly on observable behavior and does not offer information on overall organization of knowledge. A cognitive task analysis is directed at the psychological processes underlying the behavior. Cognitive task analysis concentrates on the critical decisions and cognitive processes that separate the expert from the novice.
16	Define duties.	Duties are a combination of related or like tasks.
17	What is the purpose of team task analysis?	The purpose of the team task analysis will dictate if the focus is to be upon team tasks, team processes, individual task-work, or some combination of the three.
18	Identify the basic criteria incorporated into task management plans.	✓ Time management, ✓ Scheduling efficiency, ✓ Data consolidation, and ✓ Fluid communication
19	List four ways task management can help you stay organized at work.	✓ They help restructure big picture goals into smaller picture objectives. ✓ They break those objectives into individual tasks and subtasks. ✓ They lay out start dates, end dates, milestones, and timelines in a way that's easy to see and coordinate. ✓ They make use of efficiency and productivity tools.
20	Identify the steps in a task management plan.	1. Rework big goals into small objectives 2. Clarify objectives by converting them into a series of tasks 3. Lay out and manage task timelines visually 4. Take advantage of visual task management tools
21	List some benefits of reviewing your plans.	✓ Reviewing your plans helps limit decision fatigue ✓ Reviewing your plans helps reveal assumptions that need to be adjusted ✓ Reviewing your plans helps you proactively problem-solve and coordinate ✓ Reviewing your plans helps you keep momentum on Big Projects ✓ Reviewing your plans ultimately helps you save time

2.PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to planning to undertake a routine task, 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 task requirements ✓ Plan steps required to complete task ✓ Review plan
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Identify task requirements ✓ Plan steps required to complete task ✓ Review plan
4	Demonstrate how to order manufacturing parts when the system flags a part as being low in stock	The student is expected to follow the correct step-by step process to measuring with a pressure gauge. The elements which should be assessed are: ✓ Look up usage for the item for the previous 12 month period. ✓ Calculate the average monthly use. ✓ Add the planned growth rate for the product line. ✓ Check parts catalogs or call the source for best buy rates. ✓ Check with planned usage tables or the business unit to ensure that the part will not go out of specifications for the best calculated buy period. ✓ Place purchase order.

1. 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. ✓ Identify task requirements ✓ Plan steps required to complete task ✓ Review plan
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	Demonstrate how to use If/Then Analysis	As the students attend the practical test to assess their knowledge regarding If/Then Analysis, make sure the student use the proper techniques and the information he shared is accurate.

2. OQ=Oral Questioning

#	Questions	Answers
1	Identify task requirements	Make sure the students answer questions related to the following areas ✓ Instructions and procedures are obtained, understood and where necessary clarified. ✓ Relevant specifications for task outcomes are obtained, understood and where necessary clarified. ✓ Task outcomes are identified. ✓ Task requirements such as completion time and quality measures are identified.
2	Plan steps required to complete task	Make sure the students answer questions related to the following areas ✓ Based on instructions and specifications provided, the individual steps or activities required to undertake the task are understood and where necessary clarified. ✓ Sequence of activities is identified. ✓ Plan is checked to ensure it complies with specifications and task requirements.
3	Review plan	Make sure the students answer questions related to the following areas ✓ Effectiveness of plan is reviewed against specifications and task requirements. ✓ If necessary, plan is revised to better meet specifications and task requirements.

3. 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	Oher 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: Apply science for Water Operations

Unit No	06
Unit Title	Apply science for Water Operations
Unit Code	**CONS05CR02V1/21**

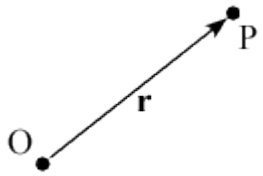
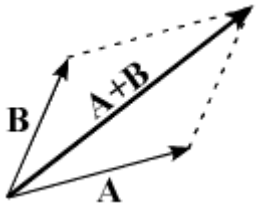
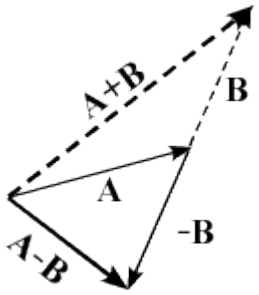
Evidence Matrix

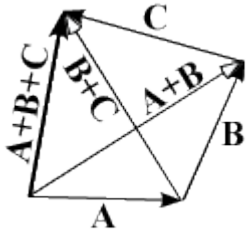
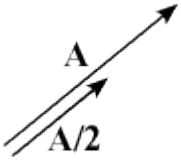
Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Apply principals and theories of physics in real world							
Perform scalars and vector arithmetic	✓	✓	✓	✓		✓	✓
Understand kinetics and perform simple calculations	✓		✓	✓	✓		✓
Understandcirculationmotion,and governing laws	✓	✓	✓	✓		✓	✓
Understand and apply the laws of Forces in real world examples	✓		✓	✓	✓		✓
Understand the Conservation of Energy principals and apply in real world	✓	✓	✓	✓		✓	✓
Understand the momentum and impulse	✓		✓	✓	✓		✓
Understand kinematics	✓	✓	✓	✓		✓	✓
Understand wave principals	✓		✓	✓	✓		✓
2. Apply principals and theories of chemistry in real world examples							
Understanding matter: • States of matter, and properties related to it • Pure substances and mixtures	✓	✓	✓	✓		✓	✓
Understanding atoms, molecules, elements and compounds, and basic understanding of chemical reactions	✓		✓	✓	✓		✓
Understanding solvents, solutions, saturation facts, and concentration limits	✓	✓	✓	✓		✓	✓
Observing properties of acids and bases, and understanding strong and weak acids	✓		✓	✓	✓		✓

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 scalars.	Scalars are mathematical entities which have only a magnitude- (and no direction).
2	List two examples of scalar quantities.	Physical examples include mass and energy.
3	Define vectors.	Vectors are mathematical entities which have both a magnitude and a direction.
4	List two examples of vector quantities.	Physical examples include forces, velocities, momenta and locations.
5	What is the notation of a scalar unit?	Plain (or often italicized) letters: *a, k*, etc.
6	What is the notation of a vector unit?	Either bold letters: ***x,v*** (often used in books), or a small vector sign: $\vec{x}$
7	What is the magnitude of a vector?	A≡|A|
8	Show the position vector of a given location P.	
9	How do you add vectors? Explain with a diagram.	The sum of two vectors is defined as the diagonal of the parallelogram formed when the two vectors AA and BB are placed at the same point, as is described in the diagram. Evidently, we see that the addition is commutative, that is, the order is not important: A+B=B+A. 
10	How do you subtract vectors? Explain with a diagram.	Vector subtraction A−B is defined as: A+(−B), that is, adding the negative of the subtracted vector BB, as is apparent in the figure. 
11	Explain the concept of vector distributivity with a diagram.	The graphical definition of vector addition also implies a very important characteristic: Vector addition is distributive, that is A+(B+C)=(A+B)+C. In other words, when we add three vectors, it does not matter whether we add the first pair first, or

		the second pair first. This is demonstrated in the following figure. 
12	Explain how to multiply by a scaler with a diagram.	Multiplying a vector by a scalar gives a new vector with the same direction but with a magnitude which is multiplied by the scaler. A negative scalar would yield a vector in the opposite direction as the original vector. For example: (−1)A=−A. 
13	Define distance.	Distance is a scalar quantity that refers to "how much ground an object has covered" during its motion.
14	Define displacement.	Displacement is a vector quantity that refers to "how far out of place an object is"; it is the object's overall change in position.
15	Define speed.	Speed can be thought of as the rate at which an object covers distance.
16	Define velocity.	Velocity is a vector quantity that refers to the rate at which an object changes its position.
17	What is the equation used to calculate average speed?	$\text{Average Speed} = \frac{\text{Distance Traveled}}{\text{Time of Travel}}$
18	What is the equation used to calculate average velocity?	$\text{Average Velocity} = \frac{\Delta \text{position}}{\text{time}} = \frac{\text{displacement}}{\text{time}}$
19	Define instantaneous speed.	The speed at any given instant in time.
20	Define average speed.	The average of all instantaneous speeds; found simply by a distance/time ratio.
21	Define acceleration.	Acceleration is a vector quantity that is defined as the rate at which an object changes its velocity.
22	Define constant acceleration.	This is referred to as a constant acceleration since the velocity is changing by a constant amount each second.
23	What is the equation used to find average acceleration?	$\text{Ave. acceleration} = \frac{\Delta \text{velocity}}{\text{time}} = \frac{v_f - v_i}{t}$
24	Identify the three types of matter and explain their properties.	✓ Solid: a substance that retains its size and shape without a container; a substance whose molecules cannot move freely except to vibrate. ✓ Gas: a substance that can only be contained if it is fully surrounded by a container (or held together by gravitational pull); a substance whose molecules have negligible intermolecular interactions and can move freely.

		✓ Liquid: a substance that flows and keeps no definite shape because its molecules are loosely packed and constantly moving. It takes the shape of its container but maintains constant volume.
25	Define chemical element.	A chemical element is a pure substance that consists of one type of atom.
26	Describe properties of metals.	✓ Often conductive to electricity ✓ Malleable ✓ Shiny ✓ Sometimes magnetic.
27	Describe properties of non-metals.	✓ Typically not conductive ✓ Not malleable ✓ Dull (not shiny) ✓ Not magnetic.
28	Define chemical compound.	When two distinct elements are chemically combined—i.e., chemical bonds form between their atoms—the result is called a chemical compound.
29	Describe properties of chemical compounds.	✓ Molecular compounds held together by covalent bonds ✓ Salts held together by ionic bonds ✓ Intermetallic compounds held together by metallic bonds ✓ Complexes held together by coordinate covalent bonds.
30	Define solution.	A solution in chemistry is a homogenous mixture of two or more substances.
31	Define solvent.	The substance which is dissolved is called a solute
32	Define solute.	The substance in which the solute is dissolved is called a solvent.

1. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to applying science for water operations, 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 principals and theories of physics in real world ✓ Apply principals and theories of chemistry in real world examples
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Apply principals and theories of physics in real world ✓ Apply principals and theories of chemistry in real world examples
4	Demonstrate Newton's Third Law can be proved with examples	The student is expected to follow the correct step-by step process to proving Newton's Third Law. The elements which should be assessed are:

		Consider the flying motion of birds. A bird flies by use of its wings. The wings of a bird push air downwards. Since forces result from mutual interactions, the air must also be pushing the bird upwards. The size of the force on the air equals the size of the force on the bird; the direction of the force on the air (downwards) is opposite the direction of the force on the bird (upwards). For every action, there is an equal (in size) and opposite (in direction) reaction. Action-reaction force pairs make it possible for birds to fly.

2. 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 principals and theories of physics in real world ✓ Apply principals and theories of chemistry in real world examples
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 fundamental laws of science with routine tasks and work environment. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Presentation on states of matter	As the students attend the practical test to assess their knowledge in differentiating between the states of matter, make sure the student use the proper techniques and the information he shared is accurate.

3. OQ=Oral Questioning

#	Questions	Answers
1	Apply principals and theories of physics in real world	Make sure the students answer questions related to the following areas ✓ Perform scalars and vector arithmetic ✓ Understand kinetics and perform simple calculations ✓ Understandcirculationmotion,and governing laws ✓ Understand and apply the laws of Forces in real world examples

		✓ Understand the Conservation of Energy principals and apply in real world ✓ Understand the momentum and impulse ✓ Understand kinematics ✓ Understand wave principals
2	Apply principals and theories of chemistry in real world examples	Make sure the students answer questions related to the following areas ✓ Understanding matter: ✓ States of matter, and properties related to it ✓ Pure substances and mixtures ✓ Understanding atoms, molecules, elements and compounds, and basic understanding of chemical reactions ✓ Understanding solvents, solutions, saturation facts, and concentration limits ✓ Observing properties of acids and bases, and ✓ understanding strong and weak acids

4. 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	Oher 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: Store fluids in bulk

Unit No	08
Unit Title	Store fluids in bulk
Unit Code	**CONS03CR04V1/21**

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. Prepare for work							
Identify work requirements	✓	✓	✓		✓	✓	✓
Identify and control hazards	✓		✓	✓	✓		✓
Coordinate with appropriate personnel	✓	✓	✓	✓	✓	✓	✓
2. Prepare storage/ loading facilities							
Ensure that products are being stored in the tank area to procedures	✓	✓	✓		✓	✓	✓
Inspect storage facilities for leaks or damage	✓		✓	✓	✓		✓
Check and test safety equipment and systems to verify their operational condition and status, and report all equipment faults	✓	✓	✓	✓	✓	✓	✓
Confirm quantities and specifications of stored liquids in the tank area	✓	✓	✓		✓	✓	✓
Identify all equipment requiring maintenance	✓		✓	✓	✓		✓
Take appropriate action	✓	✓	✓	✓	✓	✓	✓
3. Transfer fluids to and from tanks							
Confirm tank capacities and identification and quality of current contents, and determine if these are being maintained within the agreed product requirements prior to transfer	✓	✓	✓		✓	✓	✓
Ensure all areas involved in the transfer are safe to allow transfer of liquids to occur	✓		✓	✓	✓		✓
Inspect all transfer equipment before transfer, including lines, hoses, pumps, fittings, instruments and controls	✓	✓	✓	✓	✓	✓	✓
Confirm that transfer destination has sufficient capacity for the transfer	✓	✓	✓		✓	✓	✓
Take appropriate action	✓		✓	✓	✓		✓
Transfer liquids safely to procedures	✓	✓	✓	✓	✓	✓	✓
Conduct cleaning, purging or draining as required	✓	✓	✓		✓	✓	✓
Record transfer as required	✓		✓	✓	✓		✓

4. Isolate and de-isolate plant							
Isolate plant	✓	✓	✓		✓	✓	✓
Make safe for required work	✓		✓	✓	✓		✓
Check plant is ready to be returned to service	✓	✓	✓	✓	✓	✓	✓
Prepare plant for return to service	✓	✓	✓		✓	✓	✓

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	Identify three ways in which employers and workers can identify and assess hazards.	✓ Collect and review information about the hazards present or likely to be present in the workplace. ✓ Conduct initial and periodic workplace inspections of the workplace to identify new or recurring hazards. ✓ Investigate injuries, illnesses, incidents, and close calls/near misses to determine the underlying hazards, their causes, and safety and health program shortcomings. ✓ Group similar incidents and identify trends in injuries, illnesses, and hazards reported. ✓ Consider hazards associated with emergency or nonroutine situations. ✓ Determine the severity and likelihood of incidents that could result for each hazard identified, and use this information to prioritize corrective actions.
2	Identify the six steps that can be taken to identify and assess hazards in the workplace.	1. Collect existing information about workplace hazards 2. Inspect the workplace for safety hazards 3. Identify health hazards 4. Conduct incident investigations 5. Identify hazards associated with emergency and non-routine situations ✓ Characterize the nature of identified hazards, identify interim control measures, and prioritize the hazards for control
3	Explain in detail how you can collect existing information about workplace hazards.	✓ Equipment and machinery operating manuals. ✓ Safety Data Sheets (SDS) provided by chemical manufacturers. ✓ Self-inspection reports and inspection reports from insurance carriers, government agencies, and consultants. ✓ Records of previous injuries and illnesses, such as OSHA 300 and 301 logs and reports of incident investigations. ✓ Workers' compensation records and reports. ✓ Patterns of frequently-occurring injuries and illnesses.

		✓ Exposure monitoring results, industrial hygiene assessments, and medical records (appropriately redacted to ensure patient/worker privacy). ✓ Existing safety and health programs (lockout/tagout, confined spaces, process safety management, personal protective equipment, etc.). ✓ Input from workers, including surveys or minutes from safety and health committee meetings. ✓ Results of job hazard analyses, also known as job safety analyses.
4	Explain in detail how you can inspect the workplace for safety hazards.	✓ Conduct regular inspections of all operations, equipment, work areas and facilities. Have workers participate on the inspection team and talk to them about hazards that they see or report. ✓ Be sure to document inspections so you can later verify that hazardous conditions are corrected. Take photos or video of problem areas to facilitate later discussion and brainstorming about how to control them, and for use as learning aids. ✓ Include all areas and activities in these inspections, such as storage and warehousing, facility and equipment maintenance, purchasing and office functions, and the activities of on-site contractors, subcontractors, and temporary employees. ✓ Regularly inspect both plant vehicles (e.g., forklifts, powered industrial trucks) and transportation vehicles (e.g., cars, trucks). ✓ Use checklists that highlight things to look for. Typical hazards fall into several major categories, such as those listed below; each workplace will have its own list: o General housekeeping o Slip, trip, and fall hazards o Electrical hazards o Equipment operation o Equipment maintenance o Fire protection o Work organization and process flow (including staffing and scheduling) o Work practices o Workplace violence o Ergonomic problems o Lack of emergency procedures ✓ Before changing operations, workstations, or workflow; making major organizational changes; or introducing new equipment, materials, or processes, seek the input of

		workers and evaluate the planned changes for potential hazards and related risks
5	Explain in detail how you can identify health hazards.	✓ Identify chemical hazards –review SDS and product labels to identify chemicals in your workplace that have low exposure limits, are highly volatile, or are used in large quantities or in unventilated spaces. Identify activities that may result in skin exposure to chemicals. ✓ Identify physical hazards –identify any exposures to excessive noise (areas where you must raise your voice to be heard by others), elevated heat (indoor and outdoor), or sources of radiation (radioactive materials, X-rays, or radiofrequency radiation). ✓ Identify biological hazards –determine whether workers may be exposed to sources of infectious diseases, molds, toxic or poisonous plants, or animal materials (fur or scat) capable of causing allergic reactions or occupational asthma. ✓ Identify ergonomic risk factors –examine work activities that require heavy lifting, work above shoulder height, repetitive motions, or tasks with significant vibration. ✓ Conduct quantitative exposure assessments –when possible, using air sampling or direct reading instruments. ✓ Review medical records –to identify cases of musculoskeletal injuries, skin irritation or dermatitis, hearing loss, or lung disease that may be related to workplace exposures.
6	Explain in detail how you can conduct incident investigations.	✓ Develop a clear plan and procedure for conducting incident investigations, so that an investigation can begin immediately when an incident occurs. The plan should cover items such as: o Who will be involved? o Lines of communication o Materials, equipment, and supplies needed o Reporting forms and templates ✓ Train investigative teams on incident investigation techniques, emphasizing objectivity and open-mindedness throughout the investigation process. ✓ Conduct investigations with a trained team that includes representatives of both management and workers. ✓ Investigate close calls/near misses. ✓ Identify and analyze root causes to address underlying program shortcomings that allowed the incidents to happen. ✓ Communicate the results of the investigation to managers, supervisors, and workers to prevent recurrence.
7	Explain in detail how you can identify	✓ Identify foreseeable emergency scenarios and non-routine tasks, taking into account the types of material and

	hazards associated with emergency and non-routine situations.	equipment in use and the location within the facility. Scenarios such as the following may be foreseeable: o Fires and explosions o Chemical releases o Hazardous material spills o Startups after planned or unplanned equipment shutdowns o Non-routine tasks, such as infrequently performed maintenance activities o Structural collapse o Disease outbreaks o Weather emergencies and natural disasters o Medical emergencies ✓ Workplace violence
8	Explain in detail how you can characterize the nature of identified hazards, identify interim control measures, and prioritize the hazards for control.	✓ Evaluate each hazard by considering the severity of potential outcomes, the likelihood that an event or exposure will occur, and the number of workers who might be exposed. ✓ Use interim control measures to protect workers until more permanent solutions can be implemented. ✓ Prioritize the hazards so that those presenting the greatest risk are addressed first. Note, however, that employers have an ongoing obligation to control all serious recognized hazards and to protect workers.
9	List three things that cannot be stored inside your storage unit.	✓ Gasoline ✓ Fertilizers ✓ Paint ✓ Chemicals ✓ Fireworks ✓ Explosives ✓ Narcotics ✓ Propane tanks ✓ Perishable food ✓ Medicine ✓ Plants
10	Under what condition is an object not allowed to be placed in a storage tank?	If its flammable.
11	What steps are included in preparing storage/loading activities?	✓ Research storage restrictions ✓ Decide which personal items to put in storage ✓ Create an inventory list of all items ✓ Clean and vacuum belongings ✓ Use clear plastic bins instead of boxes ✓ If using boxes, label them clearly ✓ Safeguard items from outside conditions ✓ Disassemble large items ✓ Prepare appliances ✓ Place items inside a storage unit strategically

12	Briefly describe how you can decide which personal items to put in storage.	Next, consider whether or not you need to store something before putting it inside your storage unit. Why? Well, for starters, the more you store, the bigger the storage unit you'll need; And, of course, the bigger the storage unit, the more it will cost you. To save money, carefully consider each item before storing it. If it's not sentimental, valuable or useful, try donating or selling it instead.
13	Briefly describe how you can create an inventory list of all items.	In the midst of a chaotic move, it's easy to forget what you put into storage. So before packing belongings, be sure to create an inventory list of all of the items you plan to store. From paintings and pictures to furniture and smaller knick-knacks, you'll be able to keep up with everything in an organized way. I recommend keeping a copy for yourself and leaving one inside the storage unit. This way when you go to pull things out, you'll have your inventory list right in front of you.
14	Briefly describe how you can clean and vacuum belongings.	There's nothing worse than retrieving a furnishing or appliance from a storage unit, only to have it stink up your house with its musty, mildewy scent. To avoid this from happening, it's absolutely critical that you thoroughly clean all items before placing them in a storage unit. After all, If they're clean to begin with, they'll be much less likely to smell bad later. I recommend wiping down all surfaces with an all-purpose cleaning spray, vacuuming couch and chair cushions, as well as cleaning appliances with disinfectant wipes.
15	Briefly describe how you can use clear plastic bins instead of boxes for storage.	Ready to begin the packing process? If possible, I recommend placing items inside airtight, clear plastic bins. This way, you can see what's inside when you visit the storage unit. You won't have to frantically hunt around for a certain book or miscellaneous item. Instead, you'll be able to spot what you're looking for almost immediately.
16	Briefly describe how you can safeguard items from outside conditions during storage.	If your storage unit isn't climate controlled, you'll need to take matters into your own hands to prevent damage to your belongings. Over time, dust, moisture, mildew and even mold can develop if you fail to take proper precautions. First, I recommend making sure all of your items are dry to begin with. Then apply protective spray on furniture and leather goods. Seal boxes tightly to keep moisture out. For electronics and cords, I suggest storing them in plastic baggies to prevent moisture damage as well. Sweaters and clothing should be packed in wardrobe boxes or zipped inside a hanging garment bag. Mattresses should be placed in a special mattress storage bag. Furniture should also be covered in a cotton sheet to prevent damage from pests and bad weather.
17	Briefly describe how you can disassemble large items for storage.	Large items, such as beds and dining tables should be disassembled before placed into storage. Not only will you be able to save space by taking these items apart, but you'll also be able to better protect these belongings from potential wear and tear. Tip: Box springs and mattresses should be stored flat inside the storage unit to prevent damage.
18	Briefly describe how you can prepare appliances for storage.	Putting small kitchen appliances in storage? I recommend wrapping them (and the cords) in bubble wrap or foam to prevent them from breaking. Also, make sure to thoroughly clean the appliances and secure any loose parts with rope or

		tape. If the appliance is a washer, fridge or dishwasher, leave the appliance doors slightly open to prevent mildew and moisture from building up.
19	Briefly describe how to place items inside a storage unit strategically.	Finally, when placing your items in storage, be strategic about how and where you decide to store them in the unit. If you're looking to save space, try storing belongings in a vertical position. Also, all large and heavy items should be placed on the bottom. If laying your mattress flat, avoid putting it at the very bottom of the storage unit, as belongings on top are sure to put pressure on the padding and springs. You'll also want to consider which items you're going to need more often. For instance, if you're planning to store seasonal clothing, I suggest placing these items in an easy-to-reach spot near the door.
20	List five things you can do to maintain the cleanliness of fluids that are being transferred.	✓ Use only hoses and piping that are specifically designed to be used with respective fluid. ✓ Check the pumps that enable the movement of the luid for damage, as they are an easy gateway for particles to enter. ✓ Routinely ensure that the nozzle that enters the tank of the equipment seals and is properly maintained and cleaned ✓ Perform preventative maintenance on all transfer equipment ✓ Routinely inspect and replace any and all worn or aged parts including caps, seals, gaskets and filters ✓ Handle correct fluid for the environment that it will be stored in and store according to the environment ✓ Completely empty and clean the tanks periodically(to reduce contamination)
21	Briefly describe the aim of an isolation procedure.	✓ isolate all forms of potentially hazardous energy to ensure that an accidental release of hazardous energy does not occur ✓ control all other hazards to those doing the work ✓ ensure that entry to a restricted area is tightly controlled
22	Briefly describe the steps of an isolation procedure.	✓ shut down the machinery and equipment ✓ identify all energy sources and other hazards ✓ identify all isolation points ✓ isolate all energy sources ✓ in the case of electrical equipment 'whole current isolation', such as the main isolator, should be used instead of 'control isolation' by way of the stop button on a control panel ✓ control or de-energise all stored energy ✓ lock-out all isolation points, using padlocks, multi- padlock hasps and danger tags ✓ 'danger tag' machinery controls, energy sources and other hazards.
23	What should you consider when using locks or danger tags?	✓ tags should be dated and signed ✓ locks should be accompanied by a corresponding tag to identify who has locked out the plant ✓ tags and locks should only be removed by the person who applied them or by the supervisor after consultation with the signatory of the danger tag. In the event ✓ that the person who applied the danger tag is unavailable, their tag or lock may only be removed in accordance with a management approved procedure

		✓ danger Tags and/or locks should be fitted to all isolation points
24	What are out-of-service tags?	Out-of-service tags are used to identify equipment or machinery that has been taken out of service due to a fault, damage or malfunction.
25	How can an out-of-service tag be removed?	✓ the person who attached it ✓ the supervisor responsible for the operation or repair of the equipment ✓ the maintenance person who carried out the repairs

2.PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to storing fluids in bulk, 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. ✓ Prepare for work ✓ Prepare storage/loading facilities ✓ Transfer fluids to and from tanks ✓ Isolate and de-isolation plant
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Prepare for work ✓ Prepare storage/loading facilities ✓ Transfer fluids to and from tanks ✓ Isolate and de-isolation plant
4	Demonstrate how to maintain the cleanliness of fluids that are transferred	The student is expected to follow the correct step-by step process to maintaining cleanliness of stored liquids. The elements which should be assessed are: ✓ Use only hoses and piping that are specifically designed to be used with respective fluid. ✓ Check the pumps that enable the movement of the lid for damage, as they are an easy gateway for particles to enter. ✓ Routinely ensure that the nozzle that enters the tank of the equipment seals and is properly maintained and cleaned ✓ Perform preventative maintenance on all transfer equipment ✓ Routinely inspect and replace any and all worn or aged parts including caps, seals, gaskets and filters ✓ Handle correct fluid for the environment that it will be stored in and store according to the environment

		✓ Completely empty and clean the tanks periodically (to reduce contamination).

1. 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. ✓ Prepare for work ✓ Prepare storage/loading facilities ✓ Transfer fluids to and from tanks ✓ Isolate and de-isolation plant
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 storing and transferring of fluids to and from tanks. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to use locks or danger tags	As the students attend the practical test to assess their skill in using locks or danger tags, make sure the student use the proper techniques and the information he shared is accurate.

2. OQ=Oral Questioning

#	Questions	Answers
1	Prepare for work	Make sure the students answer questions related to the following areas ✓ Identify work requirements ✓ Identify and control hazards ✓ Coordinate with appropriate personnel
2	Prepare storage/loading facilities	Make sure the students answer questions related to the following areas ✓ Ensure that products are being stored in the tank area to procedures ✓ Inspect storage facilities for leaks or damage ✓ Check and test safety equipment and systems to verify their operational condition and status, and report all equipment faults ✓ Confirm quantities and specifications of stored liquids in the tank area ✓ Identify all equipment requiring maintenance ✓ Take appropriate action

3	Transfer fluids to and from tanks	Make sure the students answer questions related to the following areas ✓ Confirm tank capacities and identification and quality of current contents, and determine if these are being maintained within the agreed product requirements prior to transfer ✓ Ensure all areas involved in the transfer are safe to allow transfer of liquids to occur ✓ Inspect all transfer equipment before transfer, including lines, hoses, pumps, fittings, instruments and controls ✓ Confirm that transfer destination has sufficient capacity for the transfer ✓ Take appropriate action ✓ Transfer liquids safely to procedures ✓ Conduct cleaning, purging or draining as required ✓ Record transfer as required
4	Isolate and de-isolation plant	Make sure the students answer questions related to the following areas ✓ Isolate plant ✓ Make safe for required work ✓ Check plant is ready to be returned to service ✓ Prepare plant for return to service

3. 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	**Oher 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: Operate and monitor pneumatic systems and equipment

Unit No	09
Unit Title	Operate and monitor pneumatic systems and equipment
Unit Code	**CONS03CR05V1/21**

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. Prepare for work							
Identify work requirements	✓		✓	✓	✓		✓
Identify and control hazards	✓		✓	✓	✓		✓
Coordinate with appropriate personnel	✓	✓	✓		✓	✓	✓
2. Startup compressor systems/ equipment							
Perform pre-start-up checks	✓		✓	✓	✓	✓	✓
Check the status of the system/equipment prior to commencing start-up process	✓	✓	✓	✓	✓		✓
Check all required auxiliary systems, including oil and water, to confirm their operational condition		✓	✓		✓	✓	✓
Startup individual items of equipment and the entire compressor system as required	✓		✓	✓	✓		
Bring the system to required operating conditions	✓	✓	✓	✓	✓	✓	✓
3. Control and monitor the compressor system							
Initiate load-up through the selection of appropriate speed or cycle	✓		✓	✓	✓	✓	✓
Monitor and adjust downstream equipment as required	✓	✓	✓	✓	✓		✓
Monitor the operational condition and safety status of the unit/system and take appropriate action		✓	✓		✓	✓	✓
Adjust operational speeds and operating cycles as required	✓		✓	✓	✓		
Monitor or activate safety systems to ensure that any system shutdowns are controlled and conducted safely and effectively	✓	✓		✓	✓	✓	✓
4. Shut down compressor systems/equipment							
Confirm shutdown cause with other personnel and plant operators before commencing to isolate or shut down the equipment/system	✓		✓	✓	✓	✓	✓
Implement control measures to minimise damage and hazards	✓	✓	✓	✓	✓		✓

Shut down system according to procedures		✓	✓		✓	✓	✓
Inspect the system/equipment as required by procedures	✓		✓	✓	✓		
Isolate and purge systems/equipment and prepare plant for maintenance as required	✓	✓		✓	✓	✓	✓
5. Prepare, handle and store food according to hygiene standards							
Frequently and critically monitor all plant throughout shift	✓		✓	✓	✓	✓	✓
Use measured/indicated data and smell, sight, sound and feel as appropriate to monitor plant	✓	✓	✓	✓	✓		✓
Identify critical equipment/processes and tune their performance		✓	✓		✓	✓	✓
Identify issues likely to impact on plant performance and take appropriate action	✓		✓	✓	✓		
Predict impact of a change in one unit/area on other plant units/areas and communicate this to relevant people	✓	✓		✓	✓	✓	✓
Test trips and alarms 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	Identify three ways in which employers and workers can identify and assess hazards.	✓ Collect and review information about the hazards present or likely to be present in the workplace. ✓ Conduct initial and periodic workplace inspections of the workplace to identify new or recurring hazards. ✓ Investigate injuries, illnesses, incidents, and close calls/near misses to determine the underlying hazards, their causes, and safety and health program shortcomings. ✓ Group similar incidents and identify trends in injuries, illnesses, and hazards reported. ✓ Consider hazards associated with emergency or nonroutine situations. ✓ Determine the severity and likelihood of incidents that could result for each hazard identified, and use this information to prioritize corrective actions.
2	Identify the six steps that can be taken to identify and assess hazards in the workplace.	6. Collect existing information about workplace hazards 7. Inspect the workplace for safety hazards 8. Identify health hazards 9. Conduct incident investigations 10. Identify hazards associated with emergency and non-routine situations

		✓ Characterize the nature of identified hazards, identify interim control measures, and prioritize the hazards for control
3	Explain in detail how you can collect existing information about workplace hazards.	✓ Equipment and machinery operating manuals. ✓ Safety Data Sheets (SDS) provided by chemical manufacturers. ✓ Self-inspection reports and inspection reports from insurance carriers, government agencies, and consultants. ✓ Records of previous injuries and illnesses, such as OSHA 300 and 301 logs and reports of incident investigations. ✓ Workers' compensation records and reports. ✓ Patterns of frequently-occurring injuries and illnesses. ✓ Exposure monitoring results, industrial hygiene assessments, and medical records (appropriately redacted to ensure patient/worker privacy). ✓ Existing safety and health programs (lockout/tagout, confined spaces, process safety management, personal protective equipment, etc.). ✓ Input from workers, including surveys or minutes from safety and health committee meetings. ✓ Results of job hazard analyses, also known as job safety analyses.
4	Explain in detail how you can inspect the workplace for safety hazards.	✓ Conduct regular inspections of all operations, equipment, work areas and facilities. Have workers participate on the inspection team and talk to them about hazards that they see or report. ✓ Be sure to document inspections so you can later verify that hazardous conditions are corrected. Take photos or video of problem areas to facilitate later discussion and brainstorming about how to control them, and for use as learning aids. ✓ Include all areas and activities in these inspections, such as storage and warehousing, facility and equipment maintenance, purchasing and office functions, and the activities of on-site contractors, subcontractors, and temporary employees. ✓ Regularly inspect both plant vehicles (e.g., forklifts, powered industrial trucks) and transportation vehicles (e.g., cars, trucks). ✓ Use checklists that highlight things to look for. Typical hazards fall into several major categories, such as those listed below; each workplace will have its own list: o General housekeeping o Slip, trip, and fall hazards o Electrical hazards

		○ Equipment operation ○ Equipment maintenance ○ Fire protection ○ Work organization and process flow (including staffing and scheduling) ○ Work practices ○ Workplace violence ○ Ergonomic problems ○ Lack of emergency procedures ✓ Before changing operations, workstations, or workflow; making major organizational changes; or introducing new equipment, materials, or processes, seek the input of workers and evaluate the planned changes for potential hazards and related risks
5	Explain in detail how you can identify health hazards.	✓ Identify chemical hazards –review SDS and product labels to identify chemicals in your workplace that have low exposure limits, are highly volatile, or are used in large quantities or in unventilated spaces. Identify activities that may result in skin exposure to chemicals. ✓ Identify physical hazards –identify any exposures to excessive noise (areas where you must raise your voice to be heard by others), elevated heat (indoor and outdoor), or sources of radiation (radioactive materials, X-rays, or radiofrequency radiation). ✓ Identify biological hazards –determine whether workers may be exposed to sources of infectious diseases, molds, toxic or poisonous plants, or animal materials (fur or scat) capable of causing allergic reactions or occupational asthma. ✓ Identify ergonomic risk factors –examine work activities that require heavy lifting, work above shoulder height, repetitive motions, or tasks with significant vibration. ✓ Conduct quantitative exposure assessments –when possible, using air sampling or direct reading instruments. ✓ Review medical records –to identify cases of musculoskeletal injuries, skin irritation or dermatitis, hearing loss, or lung disease that may be related to workplace exposures.
6	Explain in detail how you can conduct incident investigations.	✓ Develop a clear plan and procedure for conducting incident investigations, so that an investigation can begin immediately when an incident occurs. The plan should cover items such as: ○ Who will be involved ○ Lines of communication ○ Materials, equipment, and supplies needed

		○ Reporting forms and templates ✓ Train investigative teams on incident investigation techniques, emphasizing objectivity and open-mindedness throughout the investigation process. ✓ Conduct investigations with a trained team that includes representatives of both management and workers. ✓ Investigate close calls/near misses. ✓ Identify and analyze root causes to address underlying program shortcomings that allowed the incidents to happen. ✓ Communicate the results of the investigation to managers, supervisors, and workers to prevent recurrence.
7	Explain in detail how you can identify hazards associated with emergency and non-routine situations.	✓ Identify foreseeable emergency scenarios and non-routine tasks, taking into account the types of material and equipment in use and the location within the facility. Scenarios such as the following may be foreseeable: ○ Fires and explosions ○ Chemical releases ○ Hazardous material spills ○ Startups after planned or unplanned equipment shutdowns ○ Non-routine tasks, such as infrequently performed maintenance activities ○ Structural collapse ○ Disease outbreaks ○ Weather emergencies and natural disasters ○ Medical emergencies ✓ Workplace violence
8	Explain in detail how you can characterize the nature of identified hazards, identify interim control measures, and prioritize the hazards for control.	✓ Evaluate each hazard by considering the severity of potential outcomes, the likelihood that an event or exposure will occur, and the number of workers who might be exposed. ✓ Use interim control measures to protect workers until more permanent solutions can be implemented. ✓ Prioritize the hazards so that those presenting the greatest risk are addressed first. Note, however, that employers have an ongoing obligation to control all serious recognized hazards and to protect workers.
9	Risk is the product of what two components?	✓ Hazard ✓ Exposure
10	List 5 steps to maximize safety at your plant.	✓ Ongoing safety-focused training ✓ High-performing asset ✓ Keeping facility tidy and organized ✓ Reviewing facility's layout for possible dangers ✓ Routine machinery and building safety checks

11	Briefly explain ongoing safety-focused training.	All new machine operators and maintenance technicians should have a mandatory training process so they can be eased into using and maintaining complex assets. This requires each employee to go through the same safety training exercises using each machine at the facility. Even if one has been working at the plant for a long time, machines are constantly changing as technology evolves. Schedule a few days each year with your employees and conduct the necessary training to ensure everyone stays up to date with the safest way to use the equipment.
12	Briefly explain why a high-performing asset is a safe asset.	New machines work with ease and can get the job done fast. However, after enough wear and tear, every machine comes to a breaking point. If you are running the equipment past its recommended limits and don't pay close attention to its performance and condition, you are asking for trouble. This situation can result in an endless list of problems that create hazards for both the user and those around the machine as well.
13	Why is using proper lubricants important when it comes to maximizing safety of machines?	Using proper lubricants will help keep machines functioning at their highest level for longer periods of time. On the contrary, one of the quickest ways to run down a machine is to not oil it or grease it regularly. This not only leads to a machine that functions in unpredictable ways but also one that can break down unexpectedly and even put an operator in danger in the process.
14	Briefly explain why it is important to keep your facility tidy and organized.	It is common to race the clock throughout the day. In a plant where many people are operating large machines and each individual is trying to work at the quickest possible speed to make progress on the busy schedule, accidents can occur that otherwise could have been prevented. This might involve empty boxes obstructing a lane, spilled liquid that will be cleaned later, wires and tape that will be put away as soon as the next order is filled, etc. During the pressure of the day, it's understandable that organizing and cleaning tasks may get pushed back to whenever one has time. In the end, though, this can be a big safety concern.
15	Explain why it is important to review the layout of the facility for possible dangers.	When there is a damaged pipe, repair or replace it before the damage increases. Always expect the worst and prepare accordingly. If there are chemicals in your facility, each worker must have sufficient understanding of the hazards and risks involved in the unfortunate event of a chemical leak. This would include what steps must occur, how to deal with an accident and what to do if you have been exposed to the chemical. Floor markings provide another great way to stay on top of possible dangers. These types of markings are used to alert facility personnel of dangerous chemicals. They can notify anyone in the area about which places are not safe to walk and can alert personnel of hazardous zones in a facility that are normally safe.
16	What parts of the layout of your facility should you	✓ Pipes ✓ Chemicals ✓ Floor markings

	check for possible dangers?	
17	List five things that should be evaluated during safety checks.	✓ Employees are using protective equipment at all times. ✓ Daily proactive maintenance checks are being performed. ✓ Walkways and stairwells are free of debris. ✓ Emergency exits are unlocked and easily accessible. ✓ Stray cords are put away. ✓ Liquids are dried and cleaned from all surfaces. ✓ All chipped concrete or holes have been covered or smoothed out.
18	List the three steps of a pre-start check of your machines.	Step 1 - Visual inspections of important features prior to starting the machine Step 2 - Visual & function tests while the machine is turned on but stationary Step 3 - Testing the machine's functions during a short drive
19	List three important features of the machine that should be checked before turning it on.	✓ Inspect Hydraulic Lifts & Tilt Rams (if applicable) - are these lubricated and carry no damage? ✓ Battery - are the bracket terminals secure and clean? ✓ Are the battery electrolyte levels correct and caps in place? ✓ Is the battery charge sufficient for a day's work?
20	List three safety fittings and features that should be checked.	✓ Seat and Seatbelt - working and no damage? ✓ Data Plate - is it readable? ✓ Warning Decals - are they readable? ✓ FOPS & ROPS - are they secure and in good condition?
21	What parts of coolant, oil and fuel level should be checked?	✓ Engine Oil Level - correct? ✓ Fuel - enough for the day? ✓ Transmission Oil Level - correct? ✓ Hydraulic Oil Level - correct? ✓ Coolant Level Correct for temperature? ✓ Fluid Leaks - ensure there are no fluid leaks under the machine
22	List what parts of attachment security should be checked before turning your machine on.	✓ Attachments like Buckets, Brooms, Spreader Bars etc - are they secure and the pins secure? ✓ Is there any damage to attachments that is visible? Make a note ✓ Ground Engaging Tools and surface (such as tracks, buckets etc) - is the cutting edge loose or worn?
23	List three general functions of machines that should be checked after turning the machine on.	✓ Foot Pedals - are they clean and do they operate correctly? ✓ Control Panel - are there any issues with warning indicators, lights and gauges? ✓ Reversing Beeper - does the machine operate in reverse? And do the beepers work? ✓ Lights - do they work? Can they operate on spot or drive mode?

		✓ Rotating Warning Light - is it operational? ✓ Park Break - does it hold the machine on an incline?
24	List three things that should be checked while driving the machine.	✓ Is the steering working well with no undue noise/stress? ✓ Steering clutches - is there no excessive play? ✓ Creep - the machine doesn't creep when controls are neutralized
25	List the five phases of planning for plant maintenance shut down.	Phase I: Define and Implement Strategies for Plant Maintenance Shut-Down Phase II: Plant Maintenance Shut-Down Preparation Phase III: Execution of the Project Phase IV: Start Up & Turn Over Phase V: Evaluation

2.PT=Practical Test

#	Activity to be performed	Activity to be evaluated and assessed
1	Student Assignments	Students need to undertake assignments related to operating and monitoring pneumatic systems and equipment, 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. ✓ Prepare for work ✓ Startup compressor systems/equipment ✓ Control and monitor the compressor system ✓ Shut down compressor systems/equipment ✓ Maintain plant effectiveness
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Prepare for work ✓ Startup compressor systems/equipment ✓ Control and monitor the compressor system ✓ Shut down compressor systems/equipment ✓ Maintain plant effectiveness
4	Conduct a safety check	The student is expected to follow the correct step-by step procedures on a safety check. The elements which should be assessed are: ✓ Employees are using protective equipment at all times. ✓ Daily proactive maintenance checks are being performed. ✓ Walkways and stairwells are free of debris. ✓ Emergency exits are unlocked and easily accessible. ✓ Stray cords are put away. ✓ Liquids are dried and cleaned from all surfaces. ✓ All chipped concrete or holes have been covered or smoothed out.

1. 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. ✓ Prepare for work ✓ Startup compressor systems/equipment ✓ Control and monitor the compressor system ✓ Shut down compressor systems/equipment ✓ Maintain plant effectiveness
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 operating and monitoring of a complex compressor system and associated equipment. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate proper knowledge of inspection of general functions of the machine	As the students attend the practical test to assess their skill in inspecting the general functions of the machine, make sure the student use the proper techniques and the information he shared is accurate.

2. OQ=Oral Questioning

#	Questions	Answers
1	Prepare for work	Make sure the students answer questions related to the following areas ✓ Identify work requirements ✓ Identify and control hazards ✓ Coordinate with appropriate personnel
2	Startup compressor systems/equipment	Make sure the students answer questions related to the following areas ✓ Perform pre-start-up checks ✓ Check the status of the system/equipment prior to commencing start-up process ✓ Check all required auxiliary systems, including oil and water, to confirm their operational condition ✓ Startup individual items of equipment and the entire compressor system as required ✓ Bring the system to required operating conditions

3	Control and monitor the compressor system	Make sure the students answer questions related to the following areas ✓ Initiate load-up through the selection of appropriate speed or cycle ✓ Monitor and adjust downstream equipment as required ✓ Monitor the operational condition and safety status of the unit/system and take appropriate action ✓ Adjust operational speeds and operating cycles as required ✓ Monitor or activate safety systems to ensure that any system shutdowns are controlled and conducted safely and effectively
4	Shut down compressor systems/equipment	Make sure the students answer questions related to the following areas ✓ Confirm shutdown cause with other personnel and plant operators before commencing to isolate or shut down the equipment/system ✓ Implement control measures to minimise damage and hazards ✓ Shut down system according to procedures ✓ Inspect the system/equipment as required by procedures ✓ Isolate and purge systems/equipment and prepare plant for maintenance as required
5	Maintain plant effectiveness	Make sure the students answer questions related to the following areas ✓ Frequently and critically monitor all plant throughout shift ✓ Use measured/indicated data and smell, sight, sound and feel as appropriate to monitor plant ✓ Identify critical equipment/processes and tune their performance ✓ Identify issues likely to impact on plant performance and take appropriate action ✓ Predict impact of a change in one unit/area on other plant units/areas and communicate this to relevant people ✓ Test trips and alarms as required

3. 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	**Oher 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: Operate process control systems

Unit No	10
Unit Title	Operate process control systems
Unit Code	**CONS03CR06V1/21**

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. Prepare for work							
Identify work requirements		✓	✓	✓		✓	✓
Identify and control hazards	✓		✓	✓	✓		✓
Coordinate with appropriate personnel	✓	✓	✓		✓	✓	✓
2. Use operator interface							
Use keyboards, track ball and monitor and/or standalone controllers to access control system/panel		✓	✓	✓		✓	✓
Monitor the process using the operator interfaces	✓		✓	✓	✓		✓
Select appropriate controller modes	✓	✓	✓		✓	✓	✓
Access historical data and information		✓	✓	✓		✓	✓
Acknowledge messages and alarms	✓		✓	✓	✓		✓
3. Access control information							
Obtain relevant data and information from the control system by applying systems knowledge		✓	✓	✓		✓	✓
Identify the status of individual pieces of equipment from the control panel and use information to identify potential faults	✓		✓	✓	✓		✓
Minimise fluctuations and variations in process through the interpretation of existing trends and control schematics	✓	✓	✓		✓	✓	✓
Record process variations/irregularities to procedures		✓	✓	✓		✓	✓
4. Control process variations and monitor operations							
Use historical data to assist the identification of problems		✓	✓	✓		✓	✓
Process available information to identify potential faults	✓		✓	✓	✓		✓
Undertake required set point/output changes to meet plant and process requirements	✓	✓	✓		✓	✓	✓

Optimize plant operating conditions in accordance with guidelines		✓	✓	✓		✓	✓
Adjust production in response to test results and control panel information	✓		✓	✓	✓		✓
Monitor key process and environmental variables and take appropriate action	✓	✓	✓		✓	✓	✓
Adjust controller settings in accordance with procedures		✓	✓	✓		✓	✓
Use fine tuning software as appropriate	✓		✓	✓	✓		✓
Coordinate with upstream and downstream units as appropriate	✓	✓	✓		✓	✓	✓
Record adjustments and variations to specifications/schedules		✓	✓	✓		✓	✓
Communicate to appropriate personnel as required	✓		✓	✓	✓		✓
5. Facilitate planned and unplanned process start-ups and shut-downs							
Select and apply procedures to planned startup and shutdown processes		✓	✓	✓		✓	✓
Select and apply procedures to unplanned shutdown processes	✓		✓	✓	✓		✓
Implement all required emergency responses	✓	✓	✓		✓	✓	✓
Communicate necessary information to all personnel affected by events		✓	✓	✓		✓	✓
Log all required information	✓		✓	✓	✓		✓
6. Respond to alarms or out of specification conditions							
Identify system(s) affected by the alarm or condition		✓	✓	✓		✓	✓
Interpret alarms and prioritize actions to be taken	✓		✓	✓	✓		✓
Take appropriate action to respond to the alarm or incident	✓	✓	✓		✓	✓	✓
Deal with any out of specification material in accordance with procedures		✓	✓	✓		✓	✓
Communicate the problem/solution to appropriate personnel	✓		✓	✓	✓		✓
Record the information as required	✓	✓	✓		✓	✓	✓
Provide details of the alarm and action taken to the next shift at change over		✓	✓	✓		✓	✓

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	Identify three ways in which employers and workers can identify and assess hazards.	✓ Collect and review information about the hazards present or likely to be present in the workplace. ✓ Conduct initial and periodic workplace inspections of the workplace to identify new or recurring hazards. ✓ Investigate injuries, illnesses, incidents, and close calls/near misses to determine the underlying hazards, their causes, and safety and health program shortcomings. ✓ Group similar incidents and identify trends in injuries, illnesses, and hazards reported. ✓ Consider hazards associated with emergency or nonroutine situations. ✓ Determine the severity and likelihood of incidents that could result for each hazard identified, and use this information to prioritize corrective actions.
2	Identify the six steps that can be taken to identify and assess hazards in the workplace.	11. Collect existing information about workplace hazards 12. Inspect the workplace for safety hazards 13. Identify health hazards 14. Conduct incident investigations 15. Identify hazards associated with emergency and non-routine situations ✓ Characterize the nature of identified hazards, identify interim control measures, and prioritize the hazards for control
3	Explain in detail how you can collect existing information about workplace hazards.	✓ Equipment and machinery operating manuals. ✓ Safety Data Sheets (SDS) provided by chemical manufacturers. ✓ Self-inspection reports and inspection reports from insurance carriers, government agencies, and consultants. ✓ Records of previous injuries and illnesses, such as OSHA 300 and 301 logs and reports of incident investigations. ✓ Workers' compensation records and reports. ✓ Patterns of frequently-occurring injuries and illnesses. ✓ Exposure monitoring results, industrial hygiene assessments, and medical records (appropriately redacted to ensure patient/worker privacy). ✓ Existing safety and health programs (lockout/tagout, confined spaces, process safety management, personal protective equipment, etc.). ✓ Input from workers, including surveys or minutes from safety and health committee meetings. ✓ Results of job hazard analyses, also known as job safety analyses.
4	Explain in detail how you can inspect the	✓ Conduct regular inspections of all operations, equipment, work areas and facilities. Have workers participate on the

	workplace for safety hazards.	inspection team and talk to them about hazards that they see or report. ✓ Be sure to document inspections so you can later verify that hazardous conditions are corrected. Take photos or video of problem areas to facilitate later discussion and brainstorming about how to control them, and for use as learning aids. ✓ Include all areas and activities in these inspections, such as storage and warehousing, facility and equipment maintenance, purchasing and office functions, and the activities of on-site contractors, subcontractors, and temporary employees. ✓ Regularly inspect both plant vehicles (e.g., forklifts, powered industrial trucks) and transportation vehicles (e.g., cars, trucks). ✓ Use checklists that highlight things to look for. Typical hazards fall into several major categories, such as those listed below; each workplace will have its own list: o General housekeeping o Slip, trip, and fall hazards o Electrical hazards o Equipment operation o Equipment maintenance o Fire protection o Work organization and process flow (including staffing and scheduling) o Work practices o Workplace violence o Ergonomic problems o Lack of emergency procedures ✓ Before changing operations, workstations, or workflow; making major organizational changes; or introducing new equipment, materials, or processes, seek the input of workers and evaluate the planned changes for potential hazards and related risks
5	Explain in detail how you can identify health hazards.	✓ Identify chemical hazards –review SDS and product labels to identify chemicals in your workplace that have low exposure limits, are highly volatile, or are used in large quantities or in unventilated spaces. Identify activities that may result in skin exposure to chemicals. ✓ Identify physical hazards –identify any exposures to excessive noise (areas where you must raise your voice to be heard by others), elevated heat (indoor and outdoor), or sources of radiation (radioactive materials, X-rays, or radiofrequency radiation).

		✓ Identify biological hazards –determine whether workers may be exposed to sources of infectious diseases, molds, toxic or poisonous plants, or animal materials (fur or scat) capable of causing allergic reactions or occupational asthma. ✓ Identify ergonomic risk factors –examine work activities that require heavy lifting, work above shoulder height, repetitive motions, or tasks with significant vibration. ✓ Conduct quantitative exposure assessments –when possible, using air sampling or direct reading instruments. ✓ Review medical records –to identify cases of musculoskeletal injuries, skin irritation or dermatitis, hearing loss, or lung disease that may be related to workplace exposures.
6	Explain in detail how you can conduct incident investigations.	✓ Develop a clear plan and procedure for conducting incident investigations, so that an investigation can begin immediately when an incident occurs. The plan should cover items such as: o Who will be involved o Lines of communication o Materials, equipment, and supplies needed o Reporting forms and templates ✓ Train investigative teams on incident investigation techniques, emphasizing objectivity and open-mindedness throughout the investigation process. ✓ Conduct investigations with a trained team that includes representatives of both management and workers. ✓ Investigate close calls/near misses. ✓ Identify and analyze root causes to address underlying program shortcomings that allowed the incidents to happen. ✓ Communicate the results of the investigation to managers, supervisors, and workers to prevent recurrence.
7	Explain in detail how you can identify hazards associated with emergency and non-routine situations.	✓ Identify foreseeable emergency scenarios and non-routine tasks, taking into account the types of material and equipment in use and the location within the facility. Scenarios such as the following may be foreseeable: o Fires and explosions o Chemical releases o Hazardous material spills o Startups after planned or unplanned equipment shutdowns o Non-routine tasks, such as infrequently performed maintenance activities o Structural collapse o Disease outbreaks o Weather emergencies and natural disasters o Medical emergencies

		✓ Workplace violence
8	Explain in detail how you can characterize the nature of identified hazards, identify interim control measures, and prioritize the hazards for control.	✓ Evaluate each hazard by considering the severity of potential outcomes, the likelihood that an event or exposure will occur, and the number of workers who might be exposed. ✓ Use interim control measures to protect workers until more permanent solutions can be implemented. ✓ Prioritize the hazards so that those presenting the greatest risk are addressed first. Note, however, that employers have an ongoing obligation to control all serious recognized hazards and to protect workers.
9	Briefly explain how to turn a computer on.	The very first step is to turn on the computer. To do this, locate and press the power button. It's in a different place on every computer, but it will have the universal power button symbol (shown below). Once turned on, your computer takes time before it's ready to use. You may see a few different displays flash on the screen. This process is called booting up, and it can take anywhere from 15 seconds to several minutes. Once the computer has booted up, it may be ready to use, or it may require you to log in. This means identifying yourself by typing your user name or selecting your profile, then typing your password. If you've never logged in to your computer before, you may need to create an account.
10	What does the mouse control?	The pointer on the screen.
11	What is a menu?	Organized collections of commands and shortcuts.
12	What does SCADA stand for?	Supervisory control and data acquisition.
13	Define SCADA.	A SCADA (supervisory control and data acquisition) is an automation control system that is used in industries such as energy, oil and gas, water, power, and many more.
14	Explain the purpose of a SCADA system.	The system has a centralized system that monitors and controls entire sites, ranging from an industrial plant to a complex of plants across the country. A SCADA system works by operating with signals that communicate via channels to provide the user with remote controls of any equipment in a given system. It also implements a distributed database, or tag database, that contains tags or points throughout the plant. These points represent a single input or output value that is monitored or controlled by the SCADA system in the centralized control room. The points are stored in the distributed database as value-timestamp pairs. It's very common to set up the SCADA systems to also acquire metadata, such as programmable logic controller (PLC) register paths and alarm statistics.
15	What are the five essential composing parts of a SCADA system?	✓ Human Machine Interface (HMI) ✓ supervisory system ✓ Remote Terminal Units (RTUs) ✓ Programmable Logic Controllers (PLCs) ✓ communication infrastructures

16	What does the HMI do?	The HMI processes data from each tag and sends it to a human operator, where he or she then can monitor or control the system.
17	What does the supervisory system do?	The supervisory system gathers the data sent from each tag and sends commands or operations to the process.
18	What do RTUs do?	The RTUs connect sensors and convert their signals to digital data and send it to the supervisory system, where it can be stored in a distributed database.
19	What do PLCs do?	PLCs are used as field devices because they are much more versatile and economical than process-specific RTUs.
20	Explain in detail the importance of the communication infrastructure.	The communication infrastructure delivers connectivity to the supervisory system and then to the RTUs and PLCs for the user to command. The communication infrastructure is necessary to relay data from remote RTU/PLCs, which run along electric grids, water supplies, and pipelines. Communication is the absolute most essential link for a SCADA system to operate properly; however, how well the system manages communication from HMI to RTUs and PLCs fundamentally determines how successful a SCADA system can be.
21	Describe the benefits gained by the SCADA system.	The system provides numerous benefits over manual labor such as redundancy adjustments, stable backups of time stamped data, and a secure alarm system. Instead of using humans to check for errors throughout the plant, grid, or pipeline, SCADA uses scripts that detect problems in the system, and quickly adjusts the system from creating an outage. If an outage were to occur that slipped past, a SCADA system's distributed database would help workers instantly identify the location of failure. Also, the automation system significantly increases the time of power restoration that comes with an outage; from the control room, at the press of a button, a worker can enable switches and help reroute power to unaffected sections
22	List 7 steps to effectively manage process variations.	✓ 1.Agree on the standard process ✓ 2.Establish local variations based on the standard process ✓ 3.Compare and review all process variations ✓ 4.Ensure easy access to process variations ✓ 5.Notifications on process changes ✓ 6.Enable global reporting ✓ 7.Analyze cost and time data
23	Briefly explain how to agree on the standard process.	The standard process becomes the foundation to which any process variation can be reviewed and measured against. All process owners involved should agree to what the standard process looks like and use it to govern the implementation and evolution of the process as variations are factored in. Creating your value stream map will help you visualize what your standard process looks like.
24	Briefly explain how to compare and review all process variations.	Compare all process variations for each standard process and assess which are legitimately needed. We need to ensure that all process variations are visible so that all process owners know what activities have been changed, added, or removed. This also facilitates streamlining activities to further rationalize the process. Comparing and reviewing processes should be an

		ongoing thing as we can expect both standard processes and local process variants to evolve.
25	Describe the procedure for back-washing a filter.	✓ Close filter influent valve (V-1). ✓ Open drain valve (V-4). ✓ Close filter effluent valve (V-5). ✓ Start surface wash system (Open V-2). ✓ Slowly start back- wash system (Open V3). Observe filter during washing process. ✓ When wash water from filter becomes clear (filter media is clean), close surface wash system valve (V-2). ✓ Slowly turn off back-wash system (closeV-3). Close drain valve (V-4). Log length of wash and the quantity of water used to clean filter ✓ Filter Startup Procedures ✓ Start filter slowly open influent valve. ✓ When proper elevation of water is reached on top of filter, filter effluent valve should be gradually opened. This effluent control valve should be adjusted itself to maintain a constant level of water over the filter media. ✓ Waste some of the initial filtered water if such a provision exists. ✓ Perform turbidity analysis of filtered water and make process adjustments as necessary.

2. PT=Practical Test

#	Practical Activity	Additional Details
1	Student Assignments	Students need to undertake assignments related to operating process control systems, 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. ✓ Prepare for work ✓ Use operator interface ✓ Access control information ✓ Control process variations and monitor operations ✓ Facilitate planned and unplanned process start-ups and shut-downs ✓ Respond to alarms or out of specification conditions
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Prepare for work ✓ Use operator interface ✓ Access control information ✓ Control process variations and monitor operations

		✓ Facilitate planned and unplanned process start-ups and shut-downs ✓ Respond to alarms or out of specification conditions
4	Demonstrate how to effectively manage process variations	The student is expected to follow the correct step-by step process to managing process variations effectively. The elements which should be assessed are: ✓ Agree on the standard process ✓ Establish local variations based on the standard process ✓ Compare and review all process variations ✓ Ensure easy access to process variations ✓ Notifications on process changes ✓ Enable global reporting ✓ Analyze cost and time data

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. ✓ Prepare for work ✓ Use operator interface ✓ Access control information ✓ Control process variations and monitor operations ✓ Facilitate planned and unplanned process start-ups and shut-downs ✓ Respond to alarms or out of specification conditions
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 the operation of a centralized control panel. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate proper implementation of start-up and shut-down procedures	As the students attend the practical test to assess their skill in implementing proper start-up and shut-down procedures of the plant, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Assess and evaluating parameters
1	Prepare for work	Make sure the students answer questions related to the following areas ✓ Identify work requirements ✓ Identify and control hazards ✓ Coordinate with appropriate personnel
2	Use operator interface	Make sure the students answer questions related to the following areas ✓ Use keyboards, track ball and monitor and/or standalone controllers to access control system/panel ✓ Monitor the process using the operator interfaces ✓ Select appropriate controller modes ✓ Access historical data and information ✓ Acknowledge messages and alarms
3	Access control information	Make sure the students answer questions related to the following areas ✓ Obtain relevant data and information from the control system by applying systems knowledge ✓ Identify the status of individual pieces of equipment from the control panel and use information to identify potential faults ✓ Minimise fluctuations and variations in process through the interpretation of existing trends and control schematics ✓ Record process variations/irregularities to procedures
4	Control process variations and monitor operations	Make sure the students answer questions related to the following areas ✓ Use historical data to assist the identification of problems ✓ Process available information to identify potential faults ✓ Undertake required set point/output changes to meet plant and process requirements ✓ Optimize plant operating conditions in accordance with guidelines ✓ Adjust production in response to test results and control panel information ✓ Monitor key process and environmental variables and take appropriate action ✓ Adjust controller settings in accordance with procedures ✓ Use fine tuning software as appropriate

		✓ Coordinate with upstream and downstream units as appropriate ✓ Record adjustments and variations to specifications/schedules ✓ Communicate to appropriate personnel as required
5	Facilitate planned and unplanned process start-ups and shut-downs	Make sure the students answer questions related to the following areas ✓ Select and apply procedures to planned startup and shutdown processes ✓ Select and apply procedures to unplanned shutdown processes ✓ Implement all required emergency responses ✓ Communicate necessary information to all personnel affected by events ✓ Log all required information
6	Respond to alarms or out of specification conditions	Make sure the students answer questions related to the following areas ✓ Identify system(s) affected by the alarm or condition ✓ Interpret alarms and prioritize actions to be taken ✓ Take appropriate action to respond to the alarm or incident ✓ Deal with any out of specification material in accordance with procedures ✓ Communicate the problem/solution to appropriate personnel ✓ Record the information as required ✓ Provide details of the alarm and action taken to the next shift at change over

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	**Oher 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: Monitor and operate water distribution systems

Unit No	11
Unit Title	Monitor and operate water distribution systems
Unit Code	**CONS03CR07V1/21**

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. Gather information about network operation needs							
Respond to and record messages and information received from field operations and pipeline system stations	✓	✓		✓	✓	✓	
Interpret and acknowledge alarm codes correctly to ensure the correct response strategy is selected and applied to the situation	✓		✓	✓	✓		✓
Clarify additional information needs and select an appropriate communication medium to deliver the information required		✓	✓	✓		✓	✓
Improve operational efficiency through adequate and timely application of information provided	✓	✓	✓		✓	✓	✓
Interpret and action customer/shipper gas forecasts to ensure correct gas flow rates into the pipeline system are achieved		✓	✓	✓		✓	✓
2. Communicate network information							
Monitor activities of pipeline personnel in the field and data from the control Centre	✓	✓		✓	✓	✓	
Evaluate internal messages and response communications concerning system alarms/incidents to establish the scope and severity of the alarm/ incident	✓		✓	✓	✓		✓
Convey pipeline system operation information to relevant personnel in other work areas to ensure safe and efficient operation of the pipeline system		✓	✓	✓		✓	✓
Relay information to technicians and other services/parties so that fault finding or safety checks can be conducted to identify risks to product supply, pipeline equipment, environment and personnel	✓	✓	✓		✓	✓	✓

Authorize, record and monitor permits to work to allow operational activities to be undertaken or cancelled	✓	✓	✓	✓	✓	✓	
3. Coordinate network systems operations							
Monitor field and pipeline station operations data	✓	✓		✓	✓	✓	
Monitor and observe equipment operating conditions, pressures and temperatures, and maintain correct equipment operating parameters	✓		✓	✓	✓		✓
Identify faults and initiate the required repair or reporting of the fault		✓	✓	✓		✓	✓
Isolate identified faults in the pipeline as appropriate	✓	✓	✓		✓	✓	✓
Respond to system alarms and emergencies		✓	✓	✓		✓	✓
Determine the required course of action or emergency response to the identified system condition/ emergency	✓	✓		✓	✓	✓	
Complete and document pre-shutdown checks	✓		✓	✓	✓		✓
Shut down the pipeline system under either normal or emergency conditions in accordance with operating procedures		✓	✓	✓		✓	✓
Confirm all identified maintenance is in compliance with the permit to work system and administer to ensure that all work complies with all issued permits	✓	✓	✓		✓	✓	✓
4. Record and report							
Record and monitor field personnel movements to ensure the safety of all personnel in the field	✓	✓		✓	✓	✓	
Report safety and environmental risks or faulty equipment to designated personnel for further action or advice concerning the selection of the appropriate response or course of action	✓		✓	✓	✓		✓
Interpret and maintain field inspection records and reports		✓	✓	✓		✓	✓
Complete operations and production reports	✓	✓	✓		✓	✓	✓
Perform shift handover 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	List the steps taken to identify vulnerable areas in your inspection processes.	✓ Consider the kind of data you need to collect ✓ Set goals for your data ✓ Standardize your process ✓ Omptimize your tools ✓ Make data actionable

2	Briefly describe how to consider the data you have to collect.	Most manufacturers already gather massive quantities of data on a regular basis. Prioritizing information is the first step in better data collection. Begin by classifying what kind of data you're collecting. This will help you define the most significant data. For example, if you're collecting safety inspections, your key data will involve the number of violations per quarter, the number of accidents in a year, and so on.
3	Briefly describe how to set goals for your data.	Establish goals for your data. In the above example, the goal of collecting safety data would be to prevent accidents. The purpose of collecting customer surveys would be to improve satisfaction and enhance sales. Likewise, gathering performance metrics would strive to improve your manufacturing processes. Once you've defined your goals, determine how you will measure your success.
4	Briefly describe how to standardize your process.	In manufacturing, consistent processes are at the core of most operations, and data collection should be no different. Define a consistent, reliable process for collecting data. Your data collectors should all do the job in the same way. Variance in practice can lead to erroneous numbers, and volatility makes data unreliable or unactionable. It's critical to ensure that everyone collecting data on your behalf knows the procedure and is familiar with the organization's standards.
5	List three ways in which you can design forms that will help your data collectors make better choices.	✓ Simpler is better ✓ Make forms self-explanatory ✓ Break up complex questions
6	Explain three ways in which you can design forms that will help your data collectors make better choices.	✓ Simpler is better. Whenever possible, keep forms short and to the point. Save reference information for other sections. Don't cram dozens of questions on a single page. Single-column layouts are best because they show a clear, unmistakable trajectory to the finish line. ✓ Make forms self-explanatory. For an experienced worker in the field, the content of your forms should provide all the information they need to get the job done. Try to refrain from referencing external sources. When in doubt, include examples of the standard within the form. If you're using a mobile forms app, be sure to clearly label where help sections can be accessed. ✓ Break up complex questions. If you have conditional questions, or questions that should only be answered based on a previous question's response, keep them separate and clear. If you're working with digital forms, this is a great place to exercise conditional logic.

7	Briefly describe how to make data actionable.	One of the most significant parts of data collection is also one of the most overlooked—where data goes once it's gathered. Workflows help you ensure that data is actionable right away. When you route data directly into the next logical step, you can dramatically improve productivity. If a regular inspection uncovers a maintenance issue, that should trigger an automated chain of events. Built-in workflows can initiate a repair order, send an email to the relevant supervisor, and assign a task to the right person, all without any added human-to-computer interaction. Instead of sending countless emails to get everyone on the same page, a workflow will automatically engage stakeholders. Automated workflows get straight to the point and forgo any unnecessary clarifications. Approvals, escalations, and follow-up tasks automatically trigger based on predefined conditions.
8	Explain why every industrial plant must have an alarm system.	In industrial plants and installations, control systems are used to monitor and control processes. Control Systems, whether a conventional Control Desk or a Computer/PLCs System with SCADA or a Distributed Control System (DCS), provides a human-machine-interface to monitor and control the plant equipment and processes.
9	Explain what an alarm system consists of.	An alarm system consists of both hardware and software including: field signal sensors, transmitters, alarm generators and handlers, alarm processors, alarm displays, annunciator window panels, alarm recorders and printers.
10	What do alarm systems indicate?	Alarm systems indicate the abnormal conditions and problems of the plant and equipment to the operators, enabling them to take corrective action and bring the plant/equipment back to normal conditions.
11	How do alarm systems give signals?	Alarm systems give signals to the operators in the form of audible sound, visual indications in different colors and/or continuous blinking, text messages, etc.
12	List the things that an alarm system brings notice to.	✓ Problems that need operator attention ✓ Process changes that require corrective action ✓ Unsafe operating conditions before Emergency Shut-down of the plant ✓ Hazardous conditions ✓ Deviations from desired/normal conditions
13	List four functions of a plant operator.	✓ Safe and normal operation of plant/equipment ✓ Production at optimum levels ✓ Identification of abnormal, hazardous and unsafe plant/equipment conditions and taking corrective action ✓ Fault identification and communication of faults to maintenance.

14	List a few conditions that affect the task priorities of a plant operator.	✓ During start-up ✓ When the plant is being stabilized ✓ When the plant is running under normal conditions ✓ When the plant is running in abnormal conditions ✓ When the plant is in emergency shut-down ✓ When the plant is in planned shut-down, ✓ When the plant, or sub-section of plant, is in manual mode of operation ✓ During automatic mode of operation
15	What is the main function of an alarm system?	The main function of an alarm system is to direct the attention of an operator towards the plant abnormal conditions that need timely assessment and/or timely corrective action(s).
16	What should be taken into consideration when designing an effective alarm system?	✓ Present only relevant and useful alarms to the operator ✓ Each alarm should have a defined response from the operator ✓ Configure and present only a good alarm ✓ Allow adequate time for an operator to respond to an alarm
17	What are the two ways in which protection is provided by an alarm system?	The operator is warned by the alarm and he/she takes corrective action before the protection operates, or the operator is warned that the protection has failed to operate and he/she takes corrective action.
18	List seven things about an alarm system that should be taken into consideration.	✓ 1.It is important to know what the purpose is of the proposed alarm and for what hazards or risks it will provide a warning or an alert to the operator ✓ 2.Assessment of the severity of the risk in terms of potential loss of life or an injury, economic losses, environmental impact and plant damages must be done ✓ 3.Expected frequency of the risk occurrence should be estimated ✓ 4.Are there any other protection systems in the plant to provide protection against the risk? ✓ 5.Are any reliability claims made in the plant, in terms of safety and protection, provided by the alarm? ✓ 6.It is important to know the implications of alarm failure due to alarm sensor/instrument failure ✓ 7.How effective will the operator response to the alarm be?
19	Explain how to assess the severity of the risk.	2.Assessment of the severity of the risk in terms of potential loss of life or an injury, economic losses, environmental impact and plant damages must be done. Any hazard to people should be in the form of formal risk assessment for the plant. Economic risks,

		potential plant damages or losses should be expressed in terms of financial losses.
20	Explain the relationship between flow measurement and optimal operation in gas and steam turbines.	Flow measurement, along with measuring temperature and pressure, are critical for optimal operation in gas and steam turbines. If these parameters do not stay within appropriate ranges, a power plant will suffer from issues with safety, performance, and efficiency. WIKA USA has the ability to provide instrumentation to monitor barometric pressure, temperature and flow of exhaust gas, and much more. In power plants, safe operations and efficiency are directly linked to business sustainability, financial performance, and long-term feasibility.
21	Explain the relationship between temperature and turbine safety and efficiency.	Temperature is a determining factor in turbine safety and efficiency. Increases in the turbine inlet improve the engine's efficiency: the turbine can produce the same amount of power with less fuel, or produce more power with the same amount of fuel. Components, however, face very demanding temperature conditions, in particular at the high pressure compressor exit and at the high pressure turbine inlet. If temperatures get too hot, chances of compressor blade failure and serious component damage increase dramatically.
22	Explain the important of nozzle measurement.	Another important element is flow nozzle measurement. Measurements at the flow nozzle are critical because readings are plugged directly into efficiency calculations in the turbine's control system. During plant commissioning and routine operations, operators rely on flow nozzle measurements to validate performance and verify the efficiency of the turbine.
23	List three things that information collected at specific measuring points can be used for.	✓ Avoid metallurgical failures ✓ Determine efficiency and performance ✓ Detect inefficiencies ✓ Calculate residual life
24	What are the parameters of the distribution system that should be checked?	✓ Pressure of the network ✓ Flow of water ✓ Conductivity and other chemical properties of water ✓ Temperature of the pumps and motors ✓ Energy consumption of the pumps
25	List some benefits of recording and reporting.	✓ Forms basis for measurable business value ✓ Provides mutual agreement of value delivered ✓ Allows tracking and implementation of Best Standard Operation procedures ✓ Fulfilling regulatory requirements ✓ Identifies opportunities for improvement and expansion

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to monitoring and operating water distribution systems, 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. ✓ Gather information about network operation needs ✓ Communicate network information ✓ Coordinate network systems operations ✓ Record and report
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Gather information about network operation needs ✓ Communicate network information ✓ Coordinate network systems operations ✓ Record and report
4	Carry out the general functions of a plant operator	The student is expected to follow the correct step-by step process to carrying out the general functions of a plant operator. The elements which should be assessed are: ✓ Safe and normal operation of plant/equipment ✓ Production at optimum levels ✓ Identification of abnormal, hazardous and unsafe plant/equipment conditions and taking corrective action ✓ Fault identification and communication of faults to maintenance

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. ✓ Gather information about network operation needs ✓ Communicate network information ✓ Coordinate network systems operations ✓ Record and 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 maintaining a watching brief over the network from the control Centre. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to monitor for safety and efficiency	As the students attend the practical test to assess their skill in monitoring for safety and efficiency, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Gather information about network operation needs	Make sure the students answer questions related to the following areas ✓ Respond to and record messages and information received from field operations and pipeline system stations ✓ Interpret and acknowledge alarm codes correctly to ensure the correct response strategy is selected and applied to the situation ✓ Clarify additional information needs and select an appropriate communication medium to deliver the information required ✓ Improve operational efficiency through adequate and timely application of information provided ✓ Interpret and action customer/shipper gas forecasts to ensure correct gas flow rates into the pipeline system are achieved
2	Communicate network information	Make sure the students answer questions related to the following areas ✓ Monitor activities of pipeline personnel in the field and data from the control Centre ✓ Evaluate internal messages and response communications concerning system alarms/incidents to establish the scope and severity of the alarm/ incident ✓ Convey pipeline system operation information to relevant personnel in other work areas to ensure safe and efficient operation of the pipeline system ✓ Relay information to technicians and other services/parties so that fault finding or safety checks

		can be conducted to identify risks to product supply, pipeline equipment, environment and personnel ✓ Authorize, record and monitor permits to work to allow operational activities to be undertaken or cancelled
3	Coordinate network systems operations	Make sure the students answer questions related to the following areas ✓ Monitor field and pipeline station operations data ✓ Monitor and observe equipment operating conditions, pressures and temperatures, and maintain correct equipment operating parameters ✓ Identify faults and initiate the required repair or reporting of the fault ✓ Isolate identified faults in the pipeline as appropriate ✓ Respond to system alarms and emergencies ✓ Determine the required course of action or emergency response to the identified system condition/ emergency ✓ Complete and document pre-shutdown checks ✓ Shut down the pipeline system under either normal or emergency conditions in accordance with operating procedures ✓ Confirm all identified maintenance is in compliance with the permit to work system and administer to ensure that all work complies with all issued permits
4	Record and report	Make sure the students answer questions related to the following areas ✓ Record and monitor field personnel movements to ensure the safety of all personnel in the field ✓ Report safety and environmental risks or faulty equipment to designated personnel for further action or advice concerning the selection of the appropriate response or course of action ✓ Interpret and maintain field inspection records and reports ✓ Complete operations and production reports ✓ Perform shift handover 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	**Oher 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: Conduct chlorine dosing of water at the point of supply

Unit No	12
Unit Title	Conduct chlorine dosing of water at the point of supply
Unit Code	**CONS03CR08V1/21**

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. Prepare for chlorine dosing							
Chlorines are used, handled and stored in accordance with organisational policies and procedures	✓	✓		✓	✓	✓	
Chlorine residue level is established via field water testing	✓		✓	✓	✓		✓
Chlorine residue level is compared with national drinking water guidelines and information related to chlorine concentration to determine chlorine demand		✓	✓	✓		✓	✓
2. Perform chlorine dosing							
Chlorine dosing is conducted in accordance with organisational policies and procedures	✓	✓		✓	✓	✓	
Personal protective equipment is selected, fitted and used correctly	✓		✓	✓	✓		✓
Dosing is monitored to maintain parameters of dosing to achieve desired chlorine residue level		✓	✓	✓		✓	✓
Dosing faults are identified and acted on, in accordance with organisational policies and procedures	✓	✓	✓		✓	✓	✓
3. Monitor chlorine dosing performance							
Dosing samples are collected and field tested to confirm chlorine residue level and water quality	✓	✓		✓	✓	✓	
Dosing data is collected, recorded and reported according to organisational policies and procedures	✓		✓	✓	✓		✓
Observations outside defined parameters are reported for further action		✓	✓	✓		✓	✓

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	List five things you can do to prepare for chlorine dosing.	✓ Work in a well-ventilated room or, better still, outside in the shade but protected from the wind. ✓ Wear personal protective equipment ✓ Prepare solutions with clean, cold (or room temperature) water, in plastic containers only (corrosion of metal, inactivation of chlorine). ✓ Respect the recommended dilutions (an over-diluted product is less active; an over-concentrated product can cause irritation and corrosion). ✓ Use a clean, dry, plastic or glass receptacle to measure the dose of product or the measurer (e.g. measuring spoon) provided by the manufacturer. ✓ Pour the amount of water required into a container then add the product (and not the other way round) without splashing. Mix well using a clean stirrer used only for this purpose. ✓ Do not add any other product (e.g. a detergent) to chlorine solutions.
2	List three ways in which chlorine can be used.	✓ Chlorine solutions are inactivated by the presence of organic matter (such as blood and other biological liquids, secretions or excreta, or dirt). ✓ The WHO and CDC recommend cleaning objects, floors, surfaces, laundry with detergent and water before applying chlorine solution. This helps prevent the inactivation of chlorine. ✓ Chlorine is also a bleaching agent. Use 0.05% chlorine solution to disinfect laundry and not a 0.2% solution which discolours it. ✓ The disinfection of objects, floors and surfaces requires 15 minutes of contact time. Laundry must also be soaked for 15 minutes, but not longer. ✓ Do not rinse afterwards objects, floors and surfaces disinfected with chlorine solutions, except stainless steel surfaces that must be imperatively rinsed (risk of corrosion).
3	List three things that should be taken into consideration when storing solid products.	✓ Store in air-tight non-metallic containers, away from heat, light and humidity in a ventilated area. ✓ Carefully close containers after use.

		✓ Never place them in contact with water, acid, fuel, detergents, organic or inflammable materials (e.g. food, paper or cigarettes). ✓ Never mix NaDCC with calcium hypochlorite (risk of toxic gas or explosion). ✓ NaDCC is more stable than calcium hypochlorite.
4	Briefly describe the process of chlorine treatment during chlorine dosing.	Chlorine readily combines with chemicals dissolved in water, microorganisms, small animals, plant material, tastes, odors, and colors. These components "use up" chlorine and comprise the chlorine demand of the treatment system. It is important to add sufficient chlorine to the water to meet the chlorine demand and provide residual disinfection. The chlorine that does not combine with other components in the water is free (residual) chlorine, and the breakpoint is the point at which free chlorine is available for continuous disinfection.
5	Define contact (retention) time.	The contact (retention) time (Table 1) in chlorination is that period between the introduction of the disinfectant and when the water is used.
6	What factors affect the contact time?	✓ Chlorine concentration ✓ Type of pathogens present ✓ pH ✓ Temperature of water
7	In what conditions does contact time increase?	✓ Low water temperature ✓ High pH (alkalinity)
8	What is an alternative to the holding tank?	An alternative to the holding tank is a long length of coiled pipe to increase contact between water and chlorine. Scaling and sediment build-up inside the pipe make this method inferior to the holding tank.
9	How do you calculate contact time?	To calculate contact time, one should use the highest pH and lowest water temperature expected.
10	What happens when a system does not allow adequate contact time with normal dosages of chlorine?	If a system does not allow adequate contact time with normal dosages of chlorine, super chlorination followed by dichlorination (chlorine removal) may be necessary.
11	What is the retention time for super chlorination?	Approximately 5 minutes.
12	What does active carbon filtration remove?	High chlorine residual.
13	What does shock chlorination do?	Shock chlorination is recommended whenever a well is new, repaired, or found to be contaminated. This treatment introduces high levels of chlorine to the water. Unlike super chlorination, shock chlorination is a "one time only" occurrence, and chlorine is depleted as water flows through the system; activated carbon treatment is not required

14	List five chlorination guidelines.	✓ Chlorine solutions lose strength while standing or when exposed to air or sunlight. Make fresh solutions frequently to maintain the necessary residual. ✓ Maintain a free chlorine residual of 0.3-0.5 mg/l after a 10-minute contact time. Measure the residual frequently. ✓ Once the chlorine dosage is increased to meet greater demand, do not decrease it. ✓ Locate and eliminate the source of contamination to avoid continuous chlorination. If a water source is available that does not require disinfection, use it. ✓ Keep records of pertinent information concerning the chlorination system and we recommend that you monitor the ORP of the water. ✓ Types of chlorine used in disinfection
15	Public water systems use chlorine in what form?	Gaseous form.
16	Private systems chlorine in what form?	Liquid.
17	List the features of liquid chlorine.	✓ household bleach most common form ✓ available chlorine range: ✓ 5.25% (domestic laundry bleach) ✓ 18% (commercial laundry bleach) ✓ slightly more stable than solutions from dry chlorine ✓ protect from sun, air, and heat
18	List the features of dry chlorine,	✓ powder dissolved in water ✓ available chlorine: 4% ✓ produces heavy sediment that clogs equipment; filtration required ✓ dry powder stable when stored properly ✓ dry powder fire hazard near flammable materials ✓ solution maintains strength for 1 week ✓ protect from sun and heat
19	Define pathogens.	Microorgasnisms that can cause diseases in humans.
20	List three types of water treatment processes.	✓ Coagulations ✓ Sedimentation ✓ Filtration
21	What is the most popular method of disinfection and water treatment today?	Chlorination.
22	Why do people chlorinate water?	A large amount of research and many studies have been conducted to ensure success in new treatment plants using chlorine as a disinfectant. A leading advantage of chlorination is that it has proven effective against bacteria and viruses; however, it cannot inactivate all microbes. Some protozoan cysts are resistant to the effects of chlorine. In cases where protozoan cysts are not a major concern, chlorination is a good disinfection method to use because it is

		inexpensive yet effective in disinfecting many other possibly present contaminants. The chlorination process is also fairly easy to implement, when compared to other water treatment methods. It is an effective method in water emergency situations as it can eliminate an overload of pathogens relatively quickly. An emergency water situation can be anything from a filter breakdown to a mixing of treated and raw water.
23	How does chlorine inactivate microorganisms?	Chlorine inactivates a microorganism by damaging its cell membrane. Once the cell membrane is weakened, the chlorine can enter the cell and disrupt cell respiration and DNA activity (two processes that are necessary for cell survival).
24	When/how do we chlorinate our waters?	Chlorination can be done at any time/point throughout the water treatment process - there is not one specific time when chlorine must be added. Each point of chlorine application will subsequently control a different water contaminant concern, thus offering a complete spectrum of treatment from the time the water enters the treatment facility to the time it leaves.
25	What is combined chlorine?	Combined chlorine is the combination of organic nitrogen compounds and chloramines, which are produced as a result of the reaction between chlorine and ammonia.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to conducting chlorine dosing of water at the point of supply, 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. ✓ Prepare for chlorine dosing ✓ Perform chlorine dosing ✓ Monitor chlorine dosing performance
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Prepare for chlorine dosing ✓ Perform chlorine dosing ✓ Monitor chlorine dosing performance
4	Demonstrate how to prepare for chlorine dosing	The student is expected to follow the correct step-by step process to identifying health hazards. The elements which should be assessed are: ✓ Work in a well ventilated room or, better still, outside in the shade but protected from the wind. ✓ Wear personal protective equipment ✓ Prepare solutions with clean, cold (or room temperature) water, in plastic containers only (corrosion of metal, inactivation of chlorine).

		✓ Respect the recommended dilutions (an over-diluted product is less active; an over-concentrated product can cause irritation and corrosion). ✓ Use a clean, dry, plastic or glass receptacle to measure the dose of product or the measurer (e.g. measuring spoon) provided by the manufacturer ✓ Etc.

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. ✓ Prepare for chlorine dosing ✓ Perform chlorine dosing ✓ Monitor chlorine dosing performance
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 conducting chlorine dosing of water at the point of supply and appropriately monitor the collected samples and manage to keep a record of the dosing data. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to accurately store solid products	As the students attend the practical test to assess their skills in storing solid products, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Prepare for chlorine dosing	Make sure the students answer questions related to the following areas ✓ Chlorines are used, handled and stored in accordance with organisational policies and procedures. ✓ Chlorine residue level is established via field water testing. ✓ Chlorine residue level is compared with national drinking water guidelines and information related to chlorine concentration to determine chlorine demand.

2	Perform chlorine dosing	Make sure the students answer questions related to the following areas ✓ Chlorine dosing is conducted in accordance with organisational policies and procedures. ✓ Personal protective equipment is selected, fitted and used correctly. ✓ Dosing is monitored to maintain parameters of dosing to achieve desired chlorine residue level. ✓ Dosing faults are identified and acted on, in accordance with organisational policies and procedures.
3	Monitor chlorine dosing performance	Make sure the students answer questions related to the following areas ✓ Dosing samples are collected and field tested to confirm chlorine residue level and water quality. ✓ Dosing data is collected, recorded and reported according to organisational policies and procedures. ✓ Observations outside defined parameters are reported for further action.

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	**Oher 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 sampling and testing of water

Unit No	13
Unit Title	Perform sampling and testing of water
Unit Code	**CONS03CR09V1/21**

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. Confirm sampling and testing requirements							
Confirm the sampling location, number and type of samples, and timing and frequency of sampling from the enterprise or client's sampling plan	✓	✓		✓	✓	✓	
Check that all sampling and testing procedures are in accordance with client or enterprise requirements, relevant standards and codes	✓		✓	✓	✓		✓
2. Prepare for water sampling							
Identify site and sampling hazards and review enterprise safety procedures	✓	✓		✓	✓	✓	
Liaise with relevant personnel to arrange site access and, if appropriate, all necessary clearances and/or permits	✓		✓	✓	✓		✓
Select sampling equipment and conditions to achieve representative samples and preserve sample integrity during collection, storage and transit		✓	✓	✓		✓	✓
Ensure all reagents, solutions, standards and blanks (as appropriate) are obtained and/or prepared ready for field use	✓	✓	✓		✓	✓	✓
Select field test equipment/instruments and check operation and calibration, as required, in accordance with procedures and manufacturer instructions		✓	✓	✓		✓	✓
Assemble and check all sampling equipment, field test equipment, materials, containers and safety equipment	✓	✓		✓	✓	✓	
Arrange suitable transport to, from and/or around site as required	✓		✓	✓	✓		✓
3. Conduct sampling of water							
Locate sampling sites and, if required, services at the site	✓	✓		✓	✓	✓	

Conduct representative sampling in accordance with sampling plan and defined procedures for field and/or laboratory testing, as required	✓		✓	✓	✓		✓
Ensure all controls, blanks and replicate samples are properly integrated into the sampling process		✓	✓	✓		✓	✓
Record all information and label samples in accordance with traceability requirements	✓	✓	✓		✓	✓	✓
Record environmental conditions and any atypical observations made during sampling that may impact on sample representativeness or integrity		✓	✓	✓		✓	✓
Transport all samples back to base according to enterprise procedures and relevant codes	✓	✓		✓	✓	✓	
Distribute samples/sub-samples to required destinations for testing, maintaining sample integrity, traceability and chain of custody requirements, as necessary	✓		✓	✓	✓		✓
4. Conduct field testing of water							
Obtain sample or sub-sample for designated field test, or locate testing location for in-situ testing	✓	✓		✓	✓	✓	
Check equipment/instruments set-up and reagents and calibrate, as necessary, to ensure safe operation and valid results	✓		✓	✓	✓		✓
Run quality control (QC) samples to check method validity		✓	✓	✓		✓	✓
Operate equipment/instruments in accordance with test method requirements	✓	✓	✓		✓	✓	✓
Perform tests/procedures/observations on all samples, and standards, if appropriate, in accordance with specified methods		✓	✓	✓		✓	✓
Record all field observations and results and ensure that they are accurately transferred to enterprise information database	✓	✓		✓	✓	✓	
5. Clean up							
Use defined safe work practices and personal protective equipment to ensure personal safety and that of others	✓	✓		✓	✓	✓	
Minimise the generation of waste	✓		✓	✓	✓		✓
Rehabilitate sampling site to render it safe and minimise environmental impacts		✓	✓	✓		✓	✓
Clean all equipment, containers, work area and vehicles according to enterprise procedures	✓	✓	✓		✓	✓	✓
Check serviceability of all equipment before storage		✓	✓	✓		✓	✓
Ensure the safe collection of all hazardous wastes for appropriate 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 objective of sampling?	The objective of sampling is to collect a small portion of water which can be easily transported to laboratory, without contamination or deterioration and which should accurately represent the water being supplied.
2	List five of the general criteria that can be considered when selecting sampling points?	✓ Sampling points should be selected such that the samples taken are representative of the different sources from which water is obtained by the public or enters the system. ✓ These points should include those that yield samples representative of the conditions at the most unfavorable sources or places in the supply system, particularly points of possible contamination such as unprotected sources, loops, reservoirs, low-pressure zones, ends of the system, etc. ✓ Sampling points should be uniformly distributed throughout a piped distribution system, taking population distribution into account; the number of sampling points should be proportional to the number of links or branches. ✓ The points chosen should generally yield samples that are representative of the system as a whole and of its main components. ✓ Sampling points should be located in such a way that water can be sampled from reserve tanks and reservoirs, etc. ✓ In systems with more than one water source, the locations of the sampling points should take account of the number of inhabitants served by each source.
3	What is an objective of surveillance?	To assess the quality of the water supplied by the supply agency and of that at the point of use, so that samples of both should be taken
4	Sampling sites can in a piped distribution network may be classified into what?	✓ fixed and agreed with the supply agency; ✓ fixed, but not agreed with the supply agency; or ✓ Random or variable
5	List an advantage of fixed sampling sites.	They are especially useful when results have to be compared over time.
6	List a disadvantage of fixed sampling points.	They limit the possibility of identifying local problems such as cross-connections and contamination from leaking distribution networks.
7	List an advantage of sampling regimes using variable or random sites.	Sampling regimes using variable or random sites have the advantage of being more likely to detect local problems but are less useful for analyzing changes over time.
8	What are the most important tests used in water-quality surveillance or quality	The most important tests used in water-quality surveillance or quality control in small communities are those for microbiological quality (by the measurement of indicator bacteria) and turbidity, and for free chlorine residual and pH where chlorination is used.

	control in small communities?	
9	What is a representative water sample?	A representative water sample is a sample that typifies ("represents") in time and space that part of the aqueous system to be studied and is delineated by the objectives and scope of the study.
10	What are two considerations that are looked at when to representative water samples?	✓ Be alert to sample representativeness. The data are no better than the confidence that can be placed in how well the sample represents the aqueous system ✓ Plan to collect quality-control samples. Quality-control checks applied during laboratory analyses of the samples cannot compensate for data that are biased because samples were not representative of the aqueous system or because samples were improperly collected and processed.
11	List some things that should be taken into consideration before selecting sites.	✓ Understand the purpose for which the various types of data will be collected and the aqueous system that each sample should represent. ✓ Review the study work plan, especially types of measurements and samples needed. ✓ Make field reconnaissance trips before selecting sampling sites, if possible. o Note conditions that could affect sampling operations (such as the seasonal high or low streamflow, flowing wells, or site access peculiarities) o Evaluate potential sources of contamination at the site, based on target analytes1 to be collected. ✓ Review site files and field folders. (Note site location, description and access, and review any previously collected physical, chemical, and biological data.) ✓ Obtain and keep current with training and the laboratory requirements associated with your data-collection activities
12	List some things that should be taken into consideration before starting field work.	✓ Review site files and update and review the field folder for each site from which samples and ancillary data will be collected ✓ Review the safety plan. Be sure that you have the training needed if you will be working at sites designated as hazardous
13	What does the selection of equipment for collecting or processing water-quality samples depend on?	The selection of equipment for collecting or processing water-quality samples depends on the physical constraints and safe operation of the equipment and on its suitability with respect to achievement of study objectives.
14	What is the criteria for selecting equipment for water sampling?	✓ The mechanical constraints of the equipment to perform adequately under given environmental conditions,

		✓ The adequacy of equipment operation to obtain water-quality samples that represent the environmental conditions of the sample source, and ✓ The adequacy of the equipment materials and construction to maintain sample integrity and not to be a source of leaching and sorption of target analytes
15	List some things that should be taken into consideration when using equipment for water sampling.	✓ Always operate equipment safely. ✓ Be thoroughly familiar with requirements for equipment operation and maintenance. ✓ Be aware of the limitations as well as applications of the equipment with respect to your field site. ✓ Maintain and test equipment on a regular schedule
16	Why should field personnel wear gloves?	To minimize potential contamination.
17	Why should you use a clean set of equipment for each sampling site?	Using a clean set of equipment for each sampling site can lessen the chance of cross contamination between sites and eliminate the need for time-consuming equipment cleaning in the field.
18	How do plastics and metals in general react?	✓ The softer or more flexible forms of any plastic or metal are more reactive than the rigid forms. ✓ The more polished the surface, the less reactive the material tends to be.
19	Why is using disposable, powderless gloves required when handling equipment?	Wearing disposable, powderless gloves is required when handling equipment used to collect and process water-quality samples. Gloves protect field personnel from contact with pathogens and chemical contaminants and preservatives. Wearing gloves also helps to avoid sample contamination that could result from improper sample handling.
20	Briefly describe the types of glove you should wear in different situations.	✓ Wear powderless nitrile gloves when handling equipment and chemical solutions. Do not allow the water that enters the sample bottle to contact gloved (or bare) hands. ✓ When working in a sampling chamber, wearing elbow-length gloves is recommended if sampling for pharmaceutical or personal-care analytes—this will minimize exposure of the sample to chemicals (such as DEET (n,n-Diethyl-meta-toluamide)) that have been applied to skin. ✓ Check the manufacturer's chemical resistance chart for any compound, such as acid, base, or organic solvent, to which the glove might be exposed.
21	List the physical properties to consider when selecting disposable gloves.	✓ Glove length ✓ Slip protection ✓ Puncture resistance ✓ Heat and flame resistance ✓ Cold protection ✓ Comfort
22	What is considered when determining	✓ Study objectives ✓ Flow conditions

	which equipment to use?	✓ Structures ✓ Sample collection equipment
23	What are the primary types of surface water samplers?	✓ Isokinetic depth-integrating samplers ✓ Non-isokinetic samplers
24	Explain isokinetic depth-integrating samplers.	An isokinetic depth-integrating sampler is designed to accumulate a representative water sample continuously and isokinetically (that is, stream water approaching and entering the sampler intake does not change in velocity) from a vertical section of a stream while transiting the vertical at a uniform rate.
25	Explain non-isokinetic samplers.	Nonisokinetic samplers are sampling devices in which the sample enters the device at a velocity that differs from ambient stream velocity. All of the isokinetic samplers can be used to collect depth-integrated, although Nonisokinetic, samples, when used beyond the minimum and maximum ranges of velocity and depth When collecting a Nonisokinetic sample, the sampler intake should not enter the unsampled zone. As with all samplers, the materials that contact the sample must not bias concentrations of target analytes by sorbing or leaching target analytes.

2. PT=Practical Test

#	Practical Activity	Additional details related to the activity
1	Student Assignments	Students need to undertake assignments related to performing sampling and testing of water, 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. ✓ Confirm sampling and testing requirements ✓ Prepare for water sampling ✓ Conduct sampling of water ✓ Conduct field testing of water ✓ 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. ✓ Confirm sampling and testing requirements ✓ Prepare for water sampling ✓ Conduct sampling of water ✓ Conduct field testing of water ✓ Maintain a safe work environment
4	Carry out field personnel responsibilities during	The student is expected to follow the correct step-by step procedures to carrying out field responsibilities. The elements which should be assessed are:

	preparation for water sampling	✓ Be alert to sample representativeness. The data are no better than the confidence that can be placed in how well the sample represents the aqueous system ✓ Plan to collect quality-control samples. Quality-control checks applied during laboratory analyses of the samples cannot compensate for data that are biased because samples were not representative of the aqueous system or because samples were improperly collected and processed.

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. ✓ Confirm sampling and testing requirements ✓ Prepare for water sampling ✓ Conduct sampling of water ✓ Conduct field testing of water ✓ 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 and performing sampling along with understanding of the testing requirements and conducting according to a specific standard while maintaining a safer environment. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate pre-site selection preparations	As the students attend the practical test to assess their knowledge on how to prepare for water sampling before selecting a site, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Confirm sampling and testing requirements	Make sure the students answer questions related to the following areas

		✓ Confirm the sampling location, number and type of samples, and timing and frequency of sampling from the enterprise or client's sampling plan ✓ Check that all sampling and testing procedures are in accordance with client or enterprise requirements, relevant standards and codes
2	Prepare for water sampling	Make sure the students answer questions related to the following areas ✓ Identify site and sampling hazards and review enterprise safety procedures ✓ Liaise with relevant personnel to arrange site access and, if appropriate, all necessary clearances and/or permits ✓ Select sampling equipment and conditions to achieve representative samples and preserve sample integrity during collection, storage and transit ✓ Ensure all reagents, solutions, standards and blanks (as appropriate) are obtained and/or prepared ready for field use ✓ Select field test equipment/instruments and check operation and calibration, as required, in accordance with procedures and manufacturer instructions ✓ Assemble and check all sampling equipment, field test equipment, materials, containers and safety equipment ✓ Arrange suitable transport to, from and/or around site as required
3	Conduct sampling of water	Make sure the students answer questions related to the following areas ✓ Locate sampling sites and, if required, services at the site ✓ Conduct representative sampling in accordance with sampling plan and defined procedures for field and/or laboratory testing, as required ✓ Ensure all controls, blanks and replicate samples are properly integrated into the sampling process ✓ Record all information and label samples in accordance with traceability requirements ✓ Record environmental conditions and any atypical observations made during sampling that may impact on sample representativeness or integrity ✓ Transport all samples back to base according to enterprise procedures and relevant codes ✓ Distribute samples/sub-samples to required destinations for testing, maintaining sample

		integrity, traceability and chain of custody requirements, as necessary
4	Conduct field testing of water	Make sure the students answer questions related to the following areas ✓ Obtain sample or sub-sample for designated field test, or locate testing location for in-situ testing ✓ Check equipment/instruments set-up and reagents and calibrate, as necessary, to ensure safe operation and valid results ✓ Run quality control (QC) samples to check method validity ✓ Operate equipment/instruments in accordance with test method requirements ✓ Perform tests/procedures/observations on all samples, and standards, if appropriate, in accordance with specified methods ✓ Record all field observations and results and ensure that they are accurately transferred to enterprise information database
5	Maintain a safe work environment	Make sure the students answer questions related to the following areas ✓ Use defined safe work practices and personal protective equipment to ensure personal safety and that of others ✓ Minimise the generation of waste ✓ Rehabilitate sampling site to render it safe and minimise environmental impacts ✓ Clean all equipment, containers, work area and vehicles according to enterprise procedures ✓ Check serviceability of all equipment before storage ✓ Ensure the safe collection of all hazardous wastes for appropriate 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	**Oher 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: Operate and Maintain water production systems

Unit No	14
Unit Title	Operate and Maintain water production systems
Unit Code	**CONS03CR10V1/21**

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. Conduct local inspections and preoperational safety checks							
Local inspections and pre-operational safety checks are conducted within Occupational Health and Safety (OHS) regulations, environmental and safe working requirements/practices	✓		✓	✓	✓		✓
Isolations are removed		✓	✓	✓		✓	✓
Availability of supplies for water system is confirmed	✓	✓		✓	✓	✓	
Plant status and requirements are determined		✓	✓	✓		✓	✓
Sequencing for plant startup is confirmed	✓	✓	✓		✓	✓	✓
2. Startup water systems							
Water systems are started up within OHS, housekeeping, SOP, environmental and safe working requirements and practices	✓		✓	✓	✓		✓
Water system is started up		✓	✓	✓		✓	✓
Water system is observed for correct startup operational response	✓	✓		✓	✓	✓	
Startup variation conditions are detected and corrective action taken		✓	✓	✓		✓	✓
3. Operate and control water treatment processes							
Carry out routine plant inspections according to organisational and plant requirements	✓		✓	✓	✓		✓
Conduct and analyse process tests and compare performance to plant operational requirements		✓	✓	✓		✓	✓
Make integrated process adjustments to optimize system performance according to organisational and statutory requirements	✓	✓		✓	✓	✓	

Collect, interpret and record process according to organisational and plant requirements		✓	✓	✓		✓	✓
Correctly select, fit and use required safety equipment, including personal protective equipment	✓	✓	✓		✓	✓	✓
4. Monitor and control water systems							
Water systems are monitored and controlled within OHS, housekeeping, SOP, environmental and safe working requirements and practices	✓		✓	✓	✓		✓
Water system operation is monitored		✓	✓	✓		✓	✓
Water samples are taken and tested to maintain quality as required	✓	✓		✓	✓	✓	
Routine checks of water systems are conducted as required		✓	✓	✓		✓	✓
Variations from operational parameters are identified	✓	✓	✓		✓	✓	✓
Action is taken to restore water system to standard operational parameters	✓		✓	✓	✓		✓
Operator level maintenance is conducted as required		✓	✓	✓		✓	✓
5. Conduct a water system shutdown							
Water system shutdown is conducted within OHS, housekeeping, SOP, environmental and safe working requirements and practices	✓		✓	✓	✓		✓
Shutdown plan is confirmed and communicated to relevant personnel		✓	✓	✓		✓	✓
Shutdown procedures are implemented	✓	✓		✓	✓	✓	
Plant is left in a safe condition for isolation as required		✓	✓	✓		✓	✓
6. Respond to an unplanned shutdown							
Unplanned shutdown is responded to within OHS, housekeeping, SOP, environmental and safe working requirements and practices	✓		✓	✓	✓		✓
Cause of shutdown is identified and actioned as required		✓	✓	✓		✓	✓
Sequence for systems shutdown of plant is completed	✓	✓		✓	✓	✓	
Action taken is communicated to relevant personnel		✓	✓	✓		✓	✓
Plant is left in a safe condition for isolation as required	✓	✓	✓		✓	✓	✓
7. Maintain items of equipment used in water treatment processes							
Identify maintenance requirements and schedules according to standard operating procedures	✓		✓	✓	✓		✓
Complete maintenance and cleaning requirements of equipment		✓	✓	✓		✓	✓
8. Record and report water systems information							
Water systems information is recorded and reported within OHS, housekeeping, SOP, environmental and safe working requirements and practices	✓		✓	✓	✓		✓
Water systems information is recorded as required		✓	✓	✓		✓	✓
Problems and related action are recorded and communicated 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.

6. Written questions

#	Question	Answer
1	What does an inspection help you identify?	An inspection helps you identify hazards or processes that are not working efficiently and decide what measures to take before they lead to an accident or incident
2	Briefly explain how to carry out an inspection of the water plant and the installation site.	✓ Inspection parameters need to be consulted with the team prior to the inspection ✓ You should agree in advance what needs to be inspected (e.g. specific areas, equipment) and to what standard (locally or legally set). ✓ Reading past inspection reports can be useful to check for any issues identified before and whether these have been fixed. ✓ Inspections can be carried out by simply walking around water plant and the premises where the plant is installed and operated to monitor any issues there and then. You may record your findings in a notebook or use a checklist to remind you what to look for
3	List some formal ways of carrying out inspections.	✓ Walk around the power plant ✓ inspecting the site where power plant is installed ✓ safety sampling – thoroughly examining specific dangerous activities, processes or areas ✓ safety surveys – generally inspecting specific dangerous activities, processes or areas ✓ Incident inspections – looking at the cause of accidents, incidents and events that could have resulted in an injury or ill health. ✓ The findings of formal inspections should be recorded, and it is important these records are kept.
4	List the three steps of a pre-start check of your machines.	Step 1 - Visual inspections of important features prior to starting the machine Step 2 - Visual & function tests while the machine is turned on but stationary ✓ Step 3 - Testing the machine's functions during a short drive

5	List three important features of the machine that should be checked before turning it on.	✓ Inspect Hydraulic Lifts & Tilt Rams (if applicable) - are these lubricated and carry no damage? ✓ Battery - are the bracket terminals secure and clean? ✓ Are the battery electrolyte levels correct and caps in place? ✓ Is the battery charge sufficient for a day's work?
6	List three safety fittings and features that should be checked.	✓ Seat and Seatbelt - working and no damage? ✓ Data Plate - is it readable? ✓ Warning Decals - are they readable? ✓ FOPS & ROPS - are they secure and in good condition?
7	What parts of coolant, oil and fuel level should be checked?	✓ Engine Oil Level - correct? ✓ Fuel - enough for the day? ✓ Transmission Oil Level - correct? ✓ Hydraulic Oil Level - correct? ✓ Coolant Level Correct for temperature? ✓ Fluid Leaks - ensure there are no fluid leaks under the machine
8	List what parts of attachment security should be checked before turning your machine on.	✓ Attachments like Buckets, Brooms, Spreader Bars etc - are they secure and the pins secure? ✓ Is there any damage to attachments that is visible? Make a note ✓ Ground Engaging Tools and surface (such as tracks, buckets etc) - is the cutting edge loose or worn?
9	List three general functions of machines that should be checked after turning the machine on.	✓ Foot Pedals - are they clean and do they operate correctly? ✓ Control Panel - are there any issues with warning indicators, lights and gauges? ✓ Reversing Beeper - does the machine operate in reverse? And do the beepers work? ✓ Lights - do they work? Can they operate on spot or drive mode? ✓ Rotating Warning Light - is it operational? ✓ Park Break - does it hold the machine on an incline?
10	List three things that should be checked while driving the machine.	✓ Is the steering working well with no undue noise/stress? ✓ Steering clutches - is there no excessive play? ✓ Creep - the machine doesn't creep when controls are neutralized
11	Define desalination.	Desalination is a separation process used to reduce the dissolved salt content of saline water to a usable level.
12	All desalination processes include how many liquid streams?	Three.

13	All desalination processes include which three liquid streams?	✓ the saline feedwater (brackish water or seawater) ✓ low-salinity product water ✓ very saline concentrate (brine or reject water)
14	Saline feedwater is drawn from where?	The saline feedwater is drawn from oceanic or underground sources.
15	How is saline feedwater desalinated?	It is separated by the desalination process into the two output streams: the low-salinity product water and very saline concentrate streams.
16	What is brine?	Brine is a concentrated salt solution (with more than 35 000 mg/1 dissolved solids) that must be disposed of, generally by discharge into deep saline aquifers or surface waters with a higher salt content
17	What are the two types of membrane process used for desalination?	✓ Reverse osmosis (RO) ✓ Electrodialysis (ED)
18	What does the RO process consist of?	The permeate (the liquid flowing through the membrane) is encouraged to flow through the membrane by the pressure differential created between the pressurized feedwater and the product water, which is at near-atmospheric pressure. The remaining feedwater continues through the pressurized side of the reactor as brine. No heating or phase change takes place. The major energy requirement is for the initial pressurization of the feedwater. For brackish water desalination the operating pressures range from 250 to 400 psi, and for seawater desalination from 800 to 1 000 psi.
19	How many major components/processes are there in the reverse osmosis system?	Four.
20	List the four major components/processes in the reverse osmosis system.	✓ (1) pretreatment ✓ (2) pressurization ✓ (3) membrane separation ✓ (4) post-treatment stabilization
21	Explain pretreatment.	The incoming feedwater is pretreated to be compatible with the membranes by removing suspended solids, adjusting the pH, and adding a threshold inhibitor to control scaling caused by constituents such as calcium sulphate.
22	Explain pressurization.	The pump raises the pressure of the pretreated feedwater to an operating pressure appropriate for the membrane and the salinity of the feedwater.
23	Explain separation.	The permeable membranes inhibit the passage of dissolved salts while permitting the desalinated product water to pass through. Applying feedwater to the membrane assembly results in a freshwater product stream and a concentrated brine reject stream. Because no membrane is perfect in its rejection of dissolved salts, a small percentage of salt passes through the membrane and remains in the product water. Reverse osmosis membranes come in a

		variety of configurations. Two of the most popular are spiral wound and hollow fine fiber membranes (see Figure 17). They are generally made of cellulose acetate, aromatic polyamides, or, nowadays, thin film polymer composites. Both types are used for brackish water and seawater desalination, although the specific membrane and the construction of the pressure vessel vary according to the different operating pressures used for the two types of feedwater.
24	Explain stabilization.	The product water from the membrane assembly usually requires pH adjustment and degasification before being transferred to the distribution system for use as drinking water. The product passes through an aeration column in which the pH is elevated from a value of approximately 5 to a value close to 7. In many cases, this water is discharged to a storage cistern for later use.
25	List the benefits gained from using an RO system.	✓ The processing system is simple; the only complicating factor is finding or producing a clean supply of feedwater to minimize the need for frequent cleaning of the membrane. ✓ Systems may be assembled from prepackaged modules to produce a supply of product water ranging from a few liters per day to 750 000 l/day for brackish water, and to 400 000 l/day for seawater; the modular system allows for high mobility, making RO plants ideal for emergency water supply use. ✓ Installation costs are low. ✓ RO plants have a very high space/production capacity ratio, ranging from 25 000 to 60 000 l/day/m2. ✓ Low maintenance, nonmetallic materials are used in construction. ✓ Energy use to process brackish water ranges from 1 to 3 kWh per 1 0001 of product water. ✓ RO technologies can make use of use an almost unlimited and reliable water source, the sea. ✓ RO technologies can be used to remove organic and inorganic contaminants. ✓ Aside from the need to dispose of the brine, RO has a negligible environmental impact. ✓ The technology makes minimal use of chemicals.

7. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to operating and maintaining water production systems, 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. ✓ Conduct local inspections and preoperational safety checks ✓ Startup water systems ✓ Operate and control water treatment processes ✓ Monitor and control water systems ✓ Conduct a water system shutdown ✓ Respond to an unplanned shutdown ✓ Maintain items of equipment used in water treatment processes ✓ Record and report water systems information
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Conduct local inspections and preoperational safety checks ✓ Startup water systems ✓ Operate and control water treatment processes ✓ Monitor and control water systems ✓ Conduct a water system shutdown ✓ Respond to an unplanned shutdown ✓ Maintain items of equipment used in water treatment processes ✓ Record and report water systems information
4	Demonstrate formal ways of carrying out inspections	The student is expected to follow the correct step-by step process to formal inspections. The elements which should be assessed are: ✓ Walk around the power plant ✓ inspecting the site where power plant is installed ✓ safety sampling – thoroughly examining specific dangerous activities, processes or areas ✓ safety surveys – generally inspecting specific dangerous activities, processes or areas ✓ Incident inspections – looking at the cause of accidents, incidents and events that could have resulted in an injury or ill health. ✓ The findings of formal inspections should be recorded, and it is important these records are kept.

8. 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. ✓ Conduct local inspections and preoperational safety checks ✓ Startup water systems ✓ Operate and control water treatment processes ✓ Monitor and control water systems ✓ Conduct a water system shutdown ✓ Respond to an unplanned shutdown ✓ Maintain items of equipment used in water treatment processes ✓ Record and report water systems information
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 operating, monitoring and maintaining water production systems across the water plants installed. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate operation and maintenance with reverse osmosis technology	As the students attend the practical test to assess their skill in operation and maintenance with reverse osmosis technology, make sure the student use the proper techniques and the information he shared is accurate.

9. OQ=Oral Questioning

#	Questions	Answers
1	Conduct local inspections and preoperational safety checks	Make sure the students answer questions related to the following areas ✓ Local inspections and pre-operational safety checks are conducted within Occupational Health and Safety (OHS) regulations, environmental and safe working requirements/practices. ✓ Isolations are removed ✓ Availability of supplies for water system is confirmed

		✓ Plant status and requirements are determined ✓ Sequencing for plant startup is confirmed
2	Startup water systems	Make sure the students answer questions related to the following areas ✓ Water systems are started up within OHS, housekeeping, SOP, environmental and safe working requirements and practices ✓ Water system is started up ✓ Water system is observed for correct startup operational response ✓ Startup variation conditions are detected and corrective action taken
3	Operate and control water treatment processes	Make sure the students answer questions related to the following areas ✓ Carry out routine plant inspections according to organisational and plant requirements. ✓ Conduct and analyse process tests and compare performance to plant operational requirements. ✓ Make integrated process adjustments to optimize system performance according to organisational and statutory requirements. ✓ Collect, interpret and record process according to organisational and plant requirements. ✓ Correctly select, fit and use required safety equipment, including personal protective equipment.
4	Monitor and control water systems	Make sure the students answer questions related to the following areas ✓ Water systems are monitored and controlled within OHS, housekeeping, SOP, environmental and safe working requirements and practices ✓ Water system operation is monitored ✓ Water samples are taken and tested to maintain quality as required ✓ Routine checks of water systems are conducted as required ✓ Variations from operational parameters are identified ✓ Action is taken to restore water system to standard operational parameters ✓ Operator level maintenance is conducted as required
5	Conduct a water system shutdown	Make sure the students answer questions related to the following areas ✓ Water system shutdown is conducted within OHS, housekeeping, SOP, environmental and safe working requirements and practices ✓ Shutdown plan is confirmed and communicated to relevant personnel ✓ Shutdown procedures are implemented

		✓ Plant is left in a safe condition for isolation as required
6	Respond to an unplanned shutdown	Make sure the students answer questions related to the following areas ✓ Unplanned shutdown is responded to within OHS, housekeeping, SOP, environmental and safe working requirements and practices ✓ Cause of shutdown is identified and actioned as required ✓ Sequence for systems shutdown of plant is completed ✓ Action taken is communicated to relevant personnel ✓ Plant is left in a safe condition for isolation as required
7	Maintain items of equipment used in water treatment processes	Make sure the students answer questions related to the following areas ✓ Identify maintenance requirements and schedules according to standard operating procedures. ✓ Complete maintenance and cleaning requirements of equipment.
8	Record and report water systems information	Make sure the students answer questions related to the following areas ✓ Water systems information is recorded and reported within OHS, housekeeping, SOP, environmental and safe working requirements and practices ✓ Water systems information is recorded as required ✓ Problems and related action are recorded and communicated to relevant personnel

10.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	Oher 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-15: Apply accident-emergency procedures

Unit No	15
Unit Title	Apply accident-emergency procedures
Unit Code	**CONS05CR10V1/21**

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. Respond to the incident							
Response to the incident or accident is in accordance with workplace emergency procedures and relevant regulatory requirements	✓		✓	✓	✓	✓	
Details of the cause(s) and effects of the incident are identified and reported	✓	✓		✓	✓	✓	✓
Assistance requirements for accidents and emergencies are clarified and reported immediately to the appropriate parties		✓	✓		✓		✓
Requests for assistance are made to relevant personnel and emergency services	✓	✓		✓		✓	✓
2. Control and assist at accident or emergency site							
Site is controlled and protected until the arrival of authorized personnel	✓		✓	✓	✓	✓	
Assistance is provided to injured persons, within the limitations of duty of care and workplace procedures	✓	✓		✓	✓	✓	✓
Relevant authorities at the site are cooperated with and assisted within workplace policies		✓	✓		✓		✓
3. Finalize accident – emergency process and complete records							
Relevant information is exchanged in accordance with state/territory law and workplace procedures	✓		✓	✓	✓	✓	
Documentation and reports are completed and processed in accordance with workplace and relevant regulatory requirements	✓	✓		✓	✓	✓	✓

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	Identify the stages of responding to an incident.	1. Preparation 2. Detection and reporting 3. Triage and analysis 4. Containment and neutralization 5. Post-incident activity
2	In order to successfully address security events, what features should be included in an incident response plan?	✓ Develop and Document IR Policies: Establish policies, procedures, and agreements for incident response management. ✓ Define Communication Guidelines: Create communication standards and guidelines to enable seamless communication during and after an incident. ✓ Incorporate Threat Intelligence Feeds: Perform ongoing collection, analysis, and synchronization of your threat intelligence feeds. ✓ Conduct Cyber Hunting Exercises: Conduct operational threat hunting exercises to find incidents occurring within your environment. This allows for more proactive incident response. ✓ Assess Your Threat Detection Capability: Assess your current threat detection capability and update risk assessment and improvement programs.
3	In order to successfully address security events, what should be done during the detection and reporting phase?	✓ Monitor: Monitor security events in your environment using firewalls, intrusion prevention systems, and data loss prevention. ✓ Detect: Detect potential security incidents by correlating alerts within a SIEM solution. ✓ Alert: Analysts create an incident ticket, document initial findings, and assign an initial incident classification. ✓ Report: Your reporting process should include accommodation for regulatory reporting escalations.
4	Briefly explain triage and analysis as a phase.	The bulk of the effort in properly scoping and understanding the security incident takes place during this step. Resources should be utilized to collect data from tools and systems for further analysis and to identify indicators of compromise. Individuals should have in-depth skills and a detailed understanding of live system responses, digital forensics, memory analysis, and malware analysis.
5	Analysts should focus on which three primary areas?	✓ Endpoint analysis ✓ Binary analysis ✓ Enterprise hunting

6	Explain endpoint analysis.	✓ Determine what tracks may have been left behind by the threat actor. ✓ Gather the artifacts needed to build a timeline of activities. ✓ Analyze a bit-for-bit copy of systems from a forensic perspective and capture RAM to parse through and identify key artifacts to determine what occurred on a device.
7	Explain binary analysis.	✓ Investigate malicious binaries or tools leveraged by the attacker and document the functionalities of those programs. This analysis is performed in two ways. o Behavioral Analysis: Execute the malicious program in a VM to monitor its behavior o Static Analysis: Reverse engineer the malicious program to scope out the entire functionality.
8	Explain enterprise hunting.	✓ Analyze existing systems and event log technologies to determine the scope of compromise. ✓ Document all compromised accounts, machines, etc. so that effective containment and neutralization can be performed.
9	Identify three points to consider during containment and neutralization.	✓ Coordinated Shutdown: Once you have identified all systems within the environment that have been compromised by a threat actor, perform a coordinated shutdown of these devices. A notification must be sent to all IR team members to ensure proper timing. ✓ Wipe and Rebuild: Wipe the infected devices and rebuild the operating system from the ground up. Change passwords of all compromised accounts. ✓ Threat Mitigation Requests: If you have identified domains or IP addresses that are known to be leveraged by threat actors for command and control, issue threat mitigation requests to block the communication from all egress channels connected to these domains.
10	Explain post-incident activity in detail.	✓ Complete an Incident Report: Documenting the incident will help to improve the incident response plan and augment additional security measures to avoid such security incidents in the future. ✓ Monitor Post-Incident: Closely monitor for activities post-incident since threat actors will re-appear again. We recommend a security log hawk analyzing SIEM data for any signs of indicators tripping that may have been associated with the prior incident. ✓ Update Threat Intelligence: Update the organization's threat intelligence feeds. ✓ Identify preventative measures: Create new security initiatives to prevent future incidents. ✓ Gain Cross-Functional Buy-In: Coordinating across the organization is critical to the proper implementation of new security initiatives.

11	Identify steps that should be taken to prevent an accident at construction site.	1. Provide safety training for all employees 2. Hold frequent crew safety meetings 3. Utilize protective clothing and gear 4. Keep the workspace clean 5. Maintain the equipment and tools 6. Prevent falls 7. Recognize the hazards and make a plan 8. Be careful with vehicles 9. Use equipment in the manner prescribed 10. Follow OSHA guidelines and report any dangerous working conditions
12	Explain how to provide safety training for all employees.	Employers should educate employees on all workplace safety standards and the hazards that they may face while on the job. Workers need to review the health and safety policies for each job they are called to do. The written safety policy should include procedure and the name and location of a trained first aid responder. Employees should not operate any equipment they are not qualified or trained to use.
13	Explain how to hold frequent crew safety meetings.	At some workplaces these meetings should be held daily, for example, if high-risk work is being done. Employees should be reminded to stay focused and relevant issues should be addressed. Real-life factual and job specific safety information tends to be more motivating for workers.
14	Explain how to utilize protective clothing and gear.	Workers should always wear the recommended safety equipment for their jobs. This may be a hard hat, high-visibility clothing, goggles, gloves, steel-toed shoes, or a protective suit. In the summer, outdoor workers need wide brim hard hats, nape protectors, and long sleeve-lightweight shirts to protect them from the sun's rays.
15	Explain how to keep the workspace clean.	Keeping work areas clean and free of debris will lessen the chances of construction worker injuries and help prevent worksite accidents such as slips, trips, and falls. Employees should store tools and materials when finished with a job. Walkways should be kept clear of debris to prevent accidents that include slips and falls.
16	Explain how to maintain the equipment and tools.	Before using a piece of equipment or machinery, workers must ensure it is in proper working order. Tools and machinery should be kept on a regular inspection schedule. Workers have been known to get trapped in or under heavy equipment that was not working properly. Broken parts and malfunctioning gear can also cause serious injuries and deaths.
17	Explain how to prevent falls.	Falls are the leading cause of fatalities in the construction industry. It is important that workers are protected from falls on the job. The installation of fall protection systems can protect construction workers. These systems should consist of such items as guardrails, toe boards, screens, canopy structures or nets. Scaffolding can prevent falls, but must be installed properly to make sure it is constructed well enough to hold the intended weight load. After it is put up, scaffolding must be inspected regularly.

18	Explain how to recognize the hazards and make a plan.	Before any project starts, the site should be inspected for any unusual hazards. A risk assessment can protect workers' health and safety. After completing the risk assessment, a list of preventive measures should be made and implemented. It is important to ensure that all workers receive appropriate information, education, and training.
19	Explain how to be careful with vehicles.	Many fatal accidents on work sites involve vehicles. Defensive driving, parking and backing should be practiced.
20	Explain how to use equipment in the manner prescribed.	If construction tools or equipment is used in ways for which it is not designed, the manufacturer's built in safety features can no longer be relied on. Misusing equipment may also damage the equipment and cause employee injuries. The equipment itself should meet OSHA standards.
21	Explain how to Follow OSHA guidelines and report any dangerous working conditions.	Employers and employees who cut corners on the procedures and rules of OSHA increase the risks for construction site injuries. Any incidents or violations of OSHA regulations should be recorded and reported for the safety of all involved.
22	What are some benefits that come from first aid in the workplace?	✓ saving lives ✓ preventing permanent disablement ✓ providing immediate support to the injured person ✓ improving safety awareness and preventing injury and illness in the workplace ✓ assist in the early return to work and rehabilitation
23	First Aid officers are responsible for what?	✓ providing first aid to people who are injured or ill in the workplace ✓ maintaining first aid kits after utilisation in a medical emergency ✓ recording treatments and reporting treatment and incidents ✓ maintaining a current first aid qualification ✓ participating in refresher training and competency development activities
24	Briefly explain the role of a first aid offier.	✓ the emergency treatment of injuries and illness ✓ arranging prompt and appropriate referral of casualties to medial aid if required ✓ coordinate emergency services response if required ✓ recording treatments and reporting incidents ✓ the maintenance of first aid equipment, and keeping clean, checking and restocking first aid kits if utili
25	What is the DRS ABCD of first aid?	✓ Danger ✓ Response ✓ Send for help after response ✓ Airway ✓ Breathing ✓ CPR (Start CPR, 30 chest compressions to 2 rescue breaths) ✓ Defibrillation

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to applying accident-emergency procedures, 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. ✓ Respond to the incident ✓ Control and assist at accident or emergency site ✓ Finalize accident – emergency process and complete records
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Respond to the incident ✓ Control and assist at accident or emergency site ✓ Finalize accident – emergency process and complete records
4	Demonstrate how to prevent an accident at a construction site	The student is expected to follow the correct step-by step process to preventing an accident at a construction site. The elements which should be assessed are: ✓ Provide safety training for all employees ✓ Hold frequent crew safety meetings ✓ Utilize protective clothing and gear ✓ Keep the workspace clean ✓ Maintain the equipment and tools ✓ Prevent falls ✓ Recognize the hazards and make a plan ✓ Be careful with vehicles ✓ Use equipment in the manner prescribed ✓ Follow OSHA guidelines and report any dangerous working conditions

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. ✓ Respond to the incident ✓ Control and assist at accident or emergency site ✓ Finalize accident – emergency process and complete 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 applying accident emergency procedures, including responding to an incident, controlling and assisting at an accident or emergency site, finalizing accident-emergency processes, and completing records, reports and other required documentation Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to assist an injured person	As the students attend the practical test to assess their skill in assisting an injured person, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Respond to the incident	Make sure the students answer questions related to the following areas ✓ Response to the incident or accident is in accordance with workplace emergency procedures and relevant regulatory requirements ✓ Details of the cause(s) and effects of the incident are identified and reported ✓ Assistance requirements for accidents and emergencies are clarified and reported immediately to the appropriate parties ✓ Requests for assistance are made to relevant personnel and emergency services
2	Control and assist at accident or emergency site	Make sure the students answer questions related to the following areas ✓ Site is controlled and protected until the arrival of authorized personnel ✓ Assistance is provided to injured persons, within the limitations of duty of care and workplace procedures ✓ Relevant authorities at the site are cooperated with and assisted within workplace policies
3	Finalize accident – emergency process and complete records	Make sure the students answer questions related to the following areas ✓ Relevant information is exchanged in accordance with state/territory law and workplace procedures ✓ Documentation and reports are completed and processed in accordance with workplace and relevant regulatory requirements

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	Oher 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-16: Perform trouble shooting of control systems

Unit No	16
Unit Title	Perform trouble shooting of control systems
Unit Code	**CONS03CR12V1/21**

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. Find faults							
Health and safety risk control measures and procedures for carrying out the work are followed	✓	✓	✓		✓		✓
Develop relevant theoretical knowledge	✓		✓	✓	✓		✓
The need to test or measure live is determined in strict accordance with health and safety requirements		✓	✓			✓	✓
Apparatus is checked as being isolated where necessary in strict accordance health and safety requirements and procedures	✓		✓	✓	✓		✓
Fault finding is approached methodically drawing on knowledge of industrial processes and control apparatus and systems using measured and calculated values of system parameters	✓	✓		✓	✓	✓	
Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage		✓	✓	✓		✓	✓
Faulty components are rechecked and their fault status confirmed	✓	✓			✓	✓	
Unexpected situations are dealt with safely and with the approval of an authorized person	✓		✓	✓	✓		✓
Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles	✓		✓	✓	✓		✓
2. Rectify fault							
Health and safety risk control measures and procedures for carrying out the work are followed	✓	✓	✓		✓		✓
Apparatus is checked as being isolated where necessary in strict accordance to standard requirements and procedures	✓		✓	✓	✓		✓

Materials required to rectify faults are sourced and obtained in accordance with established procedures		✓	✓			✓	✓
Repairs are affected efficiently without damage to other components or apparatus and using sustainable energy principles	✓		✓	✓	✓		✓
Effectiveness of the repair is tested in accordance with established procedures	✓	✓		✓	✓	✓	
Apparatus is reassembled, finally tested and prepared for return to customer		✓	✓	✓		✓	✓
3. Completion and report fault finding and rectification activities							
OHS work completion risk control measures and procedures are followed	✓	✓	✓		✓		✓
Work area is cleaned and made safe in accordance with established procedures	✓		✓	✓	✓		✓
Written justification is made for repairs to apparatus		✓	✓			✓	✓
Work completion is documented and appropriate person(s) notified in accordance with established 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.

6. Written questions

#	Question	Answer
1	Explain the principles to be applied when troubleshoot electrical equipment?	1. To expertly troubleshoot electrical equipment, problems must be solved by replacing only defective equipment or components in the least amount of time. One of the most important factors in doing this, is the approach used. An expert troubleshooter uses a system or approach that allows them to logically and systematically analyze a circuit and determine exactly what is wrong.
2	List 5-Step troubleshooting approach for electrical equipment.	2. They are as follows Preparation ✓ Step 1 Observation ✓ Step 2 Define Problem Area ✓ Step 3 Identify Possible Causes ✓ Step 4 Determine Most Probable Cause ✓ Step 5 Test and Repair ✓ Follow-up
3	Explain how you will attend to an electrical	3. Make sure you perform the following

	equipment which is not functioning properly?	✓ Be sure you understand how the equipment is designed to operate. It makes it much easier to analyze faulty operation when you know how it should operate; ✓ Note the condition of the equipment as found. You should look at the state of the relays (energized or not), which lamps are lit, which auxiliary equipment is energized or running etc. This is the best time to give the equipment a thorough inspection (using all your senses). Look for signs of mechanical damage, overheating, unusual sounds, smells etc.; ✓ Test the operation of the equipment including all of its features. Make note of any feature that is not operating properly. Make sure you observe these operations very carefully. This can give you a lot of valuable information regarding all parts of the equipment.
4	Explain the order for determining faulty component?	4. Perform the following order ✓ First look for components which burn out or have a tendency to wear out, i.e. mechanical switches, fuses , relay contacts, or light bulbs. (Remember, that in the case of fuses, they burn out for a reason. You should find out why before replacing them.) ✓ The next most likely cause of failure are coils, motors, transformers and other devices with windings. These usually generate heat and, with time, can malfunction. ✓ Connections should be your third choice, especially screw type or bolted type. Over time these can loosen and cause a high resistance. In some cases this resistance will cause overheating and eventually will burn open. Connections on equipment that is subject to vibration are especially prone to coming loose. ✓ Finally, you should look for is defective wiring. Pay particular attention to areas where the wire insulation could be damaged causing short circuits. Don't rule out incorrect wiring, especially on a new piece of equipment.
5	Write the most common instrument used for troubleshooting an electrical equipment.	5. Multimeters are more general in nature that are used for trouble shooting of electrical equipment.
6	List two types of Maintenance	6. They are as follows ✓ Breakdown maintenance. ✓ Preventive maintenance.
7	Explain what is preventive maintenance.	7. Preventive Maintenance is defined as a maintenance activity conducted on a machine as per laid down schedule or frequency by making necessary or need-based

		replacement and/or reconditioning of component(s) within the pre-fixed time period of the said work in order to reduce and avert breakdown(s). Preventive maintenance is sometimes termed as "planned maintenance" or "scheduled maintenance" or "systematic plant maintenance" etc. It is an extremely important function for the reduction of maintenance cost and to keep the good operational condition of equipment and hence increases the reliability.
8	Explain maintenance procedures?	8. Maintenance should be done considering all the different factors. Daily maintenance is done by the operators themselves. Before starting the work of their shift, cleaning, oiling and greasing should be done by the operators. For this purpose, manufacturers used to issue maintenance instructions for their machines, which should strictly be followed. Preventive maintenance of the machine depends largely on the operators. Hence, as far as possible, one operator be allotted for each machine, and when the same machine is used in more than one shift, one operator for each machine for each shift be allotted.
9	Explain the reason why heavy equipment breaks down?	9. They are due to the following. ✓ Poor maintenance: Failing to replace belts or forgetting to check oil levels, for example. ✓ Poor electrical connections: An inspector can detect electrical issues early, before equipment breaks down and causes you to lose work. ✓ Not replacing worn parts: By fixing only one broken part, you are only temporarily taking care of the issue. Other worn parts need to be inspected to prevent further damage and future costs. ✓ Ignoring warning signals: Always ask a technician to investigate a warning signal. Ignoring a warning signal can lead to major equipment damage or serious injury.
10	Explain to reduce repair cost?	10. With regular inspections performed by a trained technician, you will be able to make a repair before it leads to a much more expensive problem. Your equipment will run better, and you'll extend its lifespan significantly with inspections and maintenance. The better condition your equipment is in, the less time you'll need to spend on repairs, and the more work you can get done.

		Ultimately, you will get a greater return on your investment if you run highly efficient equipment for a longer amount of time. Consider the circumstances in which you use the equipment. What is the environment? What are the weather conditions? You may need more inspections and maintenance than you might think.
11	When it comes to heavy equipment, explain how machinery failure occurs?	11. They could be due to the following reasons. ✓ Thermally induced failure: Equipment overheats, or extreme temps cause equipment to break down. ✓ Mechanically induced failure: It is easy to prevent this with inspection and replacing parts. Mechanically induced failure often happens due to overexertion, collision and misuse or abuse. ✓ Erratic failure: Occurs randomly due to harder-to-detect reasons, such as electrical issues or software malfunction. Erratic failure can be prevented with the help of diagnostic equipment used during inspection.

12.PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to performing trouble shooting of control systems, 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. ✓ Find faults ✓ Rectify fault ✓ Completion and report fault finding and rectification activities
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Find faults ✓ Rectify fault ✓ Completion and report fault finding and rectification activities
4		The student is expected to follow the correct step-by step process to preventing an accident at a construction site. The elements which should be assessed are: ✓

13.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. ✓ Find faults ✓ Rectify fault ✓ Completion and report fault finding and rectification activities
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 finding and rectifying faults in process control apparatus and systems. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4		As the students attend the practical test to assess their skill in assisting an injured person, make sure the student use the proper techniques and the information he shared is accurate.

14.OQ=Oral Questioning

#	Questions	Answers
1	Find faults	Make sure the students answer questions related to the following areas ✓ Health and safety risk control measures and procedures for carrying out the work are followed. ✓ Develop relevant theoretical knowledge ✓ The need to test or measure live is determined in strict accordance with health and safety requirements. ✓ Apparatus is checked as being isolated where necessary in strict accordance health and safety requirements and procedures ✓ Fault finding is approached methodically drawing on knowledge of industrial processes and control apparatus and systems using measured and calculated values of system parameters. ✓ Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage

		✓ Faulty components are rechecked and their fault status confirmed. ✓ Unexpected situations are dealt with safely and with the approval of an authorized person ✓ Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
2	Rectify fault	Make sure the students answer questions related to the following areas ✓ Health and safety risk control measures and procedures for carrying out the work are followed. ✓ Apparatus is checked as being isolated where necessary in strict accordance to standard requirements and procedures ✓ Materials required to rectify faults are sourced and obtained in accordance with established procedures. ✓ Repairs are affected efficiently without damage to other components or apparatus and using sustainable energy principles. ✓ Effectiveness of the repair is tested in accordance with established procedures. ✓ Apparatus is reassembled, finally tested and prepared for return to customer.
3	Completion and report fault finding and rectification activities	Make sure the students answer questions related to the following areas ✓ OHS work completion risk control measures and procedures are followed. ✓ Work area is cleaned and made safe in accordance with established procedures. ✓ Written justification is made for repairs to apparatus. ✓ Work completion is documented and appropriate person(s) notified in accordance with established procedures

15. 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	Oher 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-17: Apply sustainable and efficient operation

Unit No	17
Unit Title	Apply sustainable and efficient operation
Unit Code	**CONS03CR13V1/21**

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. Assess and evaluate current resource utilisation							
Reliable measurable indicators of resource utilisation are identified to provide data on resource consumption	✓	✓		✓	✓	✓	✓
Measurement is undertaken accurately and comprehensively	✓		✓	✓		✓	
Comparisons are made against identified practice from a variety of sources and accepted standards of performance		✓	✓	✓	✓		✓
2. Monitor and review effectiveness of ways to reduce resource usage							
Regular data is collected and analyzed to provide accurate measures of performance	✓	✓		✓	✓	✓	✓
Comparisons are made with strategy objectives to assess effectiveness	✓		✓	✓		✓	
Changes to implementation strategy are made as required in a timely manner to ensure outcomes are achieved or alternatives are introduced		✓	✓	✓	✓		✓
Information obtained during monitoring and review is used to develop new strategies that are based on accumulated knowledge and experience	✓	✓		✓	✓	✓	✓
Information is shared on a regular basis with other councils and relevant agencies	✓		✓	✓		✓	
3. Conduct routine checks of performance efficiency							
Use appropriate hand tools and hand-held power tools to implement routine checks of machine performance and preventative maintenance strategy, in accordance with manufacturer instructions	✓	✓		✓	✓	✓	✓
Assess and perform periodic servicing, such as lubrication and greasing, in accordance with manufacturer instructions	✓		✓	✓		✓	

Clean machine in accordance with manufacturer cleaning instructions and work environment		✓	✓	✓	✓		✓
4. Perform preventative maintenance procedures							
Inspect parts according to operating procedures and manufacturer instructions	✓	✓		✓	✓	✓	✓
Maintain service and production records to assist with life cycle monitoring of parts and machine, as required	✓		✓	✓		✓	
Identify faulty parts for repair, replacement or adjustment and take necessary action		✓	✓	✓	✓		✓
Inspect, check and monitor replacement parts and consumables to ensure they comply with operational specifications	✓	✓		✓	✓	✓	✓

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.

16. Written questions

#	Question	Answer
1	How many pillars is sustainability made of?	Four.
2	What are the four pillars of sustainability?	✓ Social ✓ Human ✓ Economic ✓ environmental
3	What are the principles informally used as?	✓ Profit ✓ People ✓ Planet
4	List sustainability issues.	✓ Energy and emissions ✓ Natural resources ✓ Procurement, consumption and waste ✓ Quality of the built environment
5	Explain energy and emissions as a sustainability issue.	We reduce emissions of greenhouse gases by increasing energy efficiency and selecting cleaner and renewable energy sources. We reduce energy use by constructing only the facilities we need and by building, renovating, maintaining, and operating them to use energy efficiently throughout their life. As campus community members, we seek to reduce energy use in our daily lives, in our work, and in our travel and to be mindful of the impacts of our choices
6	Explain natural resources as a sustainability issue.	We reduce our effects on water systems by minimizing use and by managing storm-water runoff. When materials are required, we select sustainability harvested sources to preserve natural resources. We protect the local habitat by limiting the physical growth of the college. We work to develop built landscapes in

		ways that support natural ecological functions by protecting existing ecosystems and regenerating ecological capacity where it has been lost. We provide opportunities for members of the community to interact with and appreciate the environment
7	Explain procurement, consumption and waste as a sustainability issue.	We reduce, reuse, and recycle materials. We work to understand and decrease the environmental impacts of the use, production, transportation, and disposal of items we purchase. We select vendors committed to sustainable practices throughout the life cycle of their products, and we prefer to buy locally.
8	Explain quality of the built environment as a sustainability issue.	We build and maintain buildings that provide safe, comfortable, and healthy environments for students, faculty, and staff through effective use of day-lighting, ventilation, and connections with the natural environment. We work to improve our understanding of toxic materials used on campus and to reduce their presence in labs, art studios, and building and maintenance materials as well as in cleaning, landscaping, and pest-control.
9	How many capabilities should every resource management software include?	Three.
10	What are the thre capabilities should every resource management software include?	✓ Capacity and Demand Management: Optimize resource utilization by prioritizing high value work with available resource capacity ✓ Resource Utilization: Ensure that the right resources are available to support your strategic goals ✓ Progress and Time Tracking: Ensure that progress can be tracked, which can be especially valuable when using time tracking. Compare planned effort vs. actual effort to improve estimates and better understand where your resources are truly spending their time.
11	Including the three capabilities would enable your organization to do what?	✓ Obtain a realistic view of both demand and capacity to deliver ✓ Manage and prioritize work requests and set appropriate expectations with key stakeholders ✓ Determine true resource availability ✓ Put the right resources on the right work at the right time ✓ Understand what roles and/or skill sets to hire to fulfill stakeholder commitments ✓ Increase and improve communication between project and resource managers and team members ✓ Spot problems earlier in the process
12	List six of the best resource management practices.	✓ Understand which resources are in short supply and focus on them ✓ Agree on a common approach to prioritizing work across shared resources ✓ Embrace different ways of working across the organization and resources

		✓ Realize resource management is an ongoing process ✓ Manage work and resources uses a blend of granularities ✓ Plan work ✓ Manage resource assignments ✓ Report time ✓ Apply assignment types that align to your business needs ✓ Account for non-project time ✓ Avoid or limit multi-tasking ✓ Keep your most valuable assets and resources productive and happy
13	Explain how to understand which resources are in short supply and focus on them.	✓ Often, you can employ the 80/20 rule, where basically 80% of the effects (or resource constraints) come from 20% of the resources. These are the people in high demand to do the work. ✓ Focus on these constrained resources, and plan around their availability, to help avoid bottlenecks and unnecessary delays.
14	Explain how to agree on a common approach to prioritizing work across shared resources.	✓ Create an agreed-upon scoring/evaluation process in advance to help facilitate objective decision making, rather than fall victim to the "squeaky wheel" problem ✓ Monitor unplanned work that can steal from your capacity and create hidden delays ✓ Keep in mind that overcommitting people can lead to quality problems and a reduction in overall throughput.
15	Explain how to embrace different ways of working across the organization and resources.	✓ Different types of work, and even different groups within your organization, may benefit from a specific methodology ✓ As such, ensure that the tools and selected approaches align and create efficiencies ✓ At higher levels, a more standardized roll up can provide the metrics needed for a comprehensive view of your organization ✓ This will enable your organization to plan, manage, and deliver work – utilizing a range of methodologies such as traditional or milestone-driven, iterative, Agile, and even collaborative work
16	Explain how to realize resource management is an ongoing process.	✓ Recognize that conflicts will occur because unexpected events and changes are inevitable (and more frequently than we would like!) ✓ Work together to resolve resource conflicts based on your immediate and downstream priorities
17	Explain how to manage work and resources uses a blend of granularities.	✓ Planning work, managing assignments, and reporting time doesn't all have to utilize the same granularity. Find the balance that works for each situation. ✓ Planning work is often the most granular, while time reporting may be elevated to simplify the reporting process

		of those tracking time, which leads to a greater level of accuracy ✓ When assigning resources to work, long-term assignments often work best at the high-levels while near-term assignments tend to be well understood allowing for more detailed planning
18	Explain how to plan work.	✓ Consider traditional tasks with start/finish dates and durations for formally defined work and less formal lists to handle lightweight assignments ✓ Align projects and other work to the strategic outcomes they are meant to support ✓ Utilize automated processes where possible to reduce administration
19	Explain how to manage resource assignments.	✓ Use high-level buckets at the project or phase level as a starting point if resource management is new to your organization ✓ Remember that one-size doesn't fit all and varies usage based on specific, constrained resources or groups. For example, DBAs may be shared and overutilized so you may want to increase the level of detail to minimize conflicts. ✓ Ensure that your resource management usage decisions can evolve as needs and challenges change over time
20	Explain how to report time.	✓ Remember that different groups may be more reluctant to time reporting, so keep things simple and easy (especially in the beginning) ✓ Further ease adoption by tracking time in the execution tool of your resources' choice ✓ Utilize actuals to assess performance and understand trends to improve future planning
21	Explain how to apply assignment types that align to your business needs.	✓ Utilize unnamed, role-based resources for long-term planning, or when the specific resource isn't known in advance ✓ Soft-booking of named resources can benefit medium-term planning and prioritization processes ✓ Hard-book named resources for the short-term when detailed information is known
22	Explain how to account for non-project time.	✓ Ensure that administrative time, paid time off, etc. are accounted for when planning in both the long and short terms ✓ Don't forget about unexpected project activities; be sure to provide a mechanism to capture this time – otherwise you will lose visibility to this reduction of capacity ✓ Realize there will be a natural time loss from common, everyday items, such as administrative tasks (e.g., email, general meetings, etc.)

23	Explain how to avoid or limit multi-tasking.	✓ Multi-tasking sounds efficient, but often results in lower overall productivity ✓ Try to limit the number of parallel tasks and your resources will perform better
24	Explain how to keep your most valuable assets and resources productive and happy.	✓ Last but certainly not least, take care of your resources because turnover causes a tremendous loss in productivity/capacity ✓ Offer training programs and don't over-utilize to reduce burnout
25	List some benefits of good resource management.	✓ Centralize demand intake and optimize project portfolio and resource capacity to deliver your organization's strategic initiatives ✓ Get the right people working on the right projects at the right time ✓ Align your resources to changes in the market and management demands ✓ Keep your projects on track, on time, and on budget

17.PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to applying sustainable and efficient operation, 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. ✓ Assess and evaluate current resource utilization ✓ Monitor and review effectiveness of ways to reduce resource usage ✓ Conduct routine checks of performance efficiency ✓ Perform preventative maintenance procedures
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Assess and evaluate current resource utilization ✓ Monitor and review effectiveness of ways to reduce resource usage ✓ Conduct routine checks of performance efficiency ✓ Perform preventative maintenance procedures
4	Demonstrate proper resource management practices	The student is expected to follow the correct step-by step process to proper resource management practices. The elements which should be assessed are: ✓ Understand which resources are in short supply and focus on them ✓ Agree on a common approach to prioritizing work across shared resources

		✓ Embrace different ways of working across the organization and resources ✓ Realize resource management is an ongoing process ✓ Manage work and resources uses a blend of granularities ✓ Plan work ✓ Manage resource assignments ✓ Report time ✓ Apply assignment types that align to your business needs ✓ Account for non-project time ✓ Avoid or limit multi-tasking ✓ Keep your most valuable assets and resources productive and happy

18.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. ✓ Assess and evaluate current resource utilization ✓ Monitor and review effectiveness of ways to reduce resource usage ✓ Conduct routine checks of performance efficiency ✓ Perform preventative maintenance procedures
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, implementing and monitoring strategies for sustainable resource use. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to accurately calculate overall equipment effectiveness	As the students attend the practical test to assess their skill in calculating overall equipment effectiveness (OEE), make sure the student use the proper techniques and the information he shared is accurate.

19.OQ=Oral Questioning

#	Questions	Answers
1	Assess and evaluate current resource utilisation	Make sure the students answer questions related to the following areas ✓ Reliable measurable indicators of resource utilisation are identified to provide data on resource consumption. ✓ Measurement is undertaken accurately and comprehensively. ✓ Comparisons are made against identified practice from a variety of sources and accepted standards of performance
2	Monitor and review effectiveness of ways to reduce resource usage	Make sure the students answer questions related to the following areas ✓ Regular data is collected and analyzed to provide accurate measures of performance. ✓ Comparisons are made with strategy objectives to assess effectiveness. ✓ Changes to implementation strategy are made as required in a timely manner to ensure outcomes are achieved or alternatives are introduced. ✓ Information obtained during monitoring and review is used to develop new strategies that are based on accumulated knowledge and experience. ✓ Information is shared on a regular basis with other councils and relevant agencies
3	Conduct routine checks of performance efficiency	Make sure the students answer questions related to the following areas ✓ Use appropriate hand tools and hand-held power tools to implement routine checks of machine performance and preventative maintenance strategy, in accordance with manufacturer instructions ✓ Assess and perform periodic servicing, such as lubrication and greasing, in accordance with manufacturer instructions ✓ Clean machine in accordance with manufacturer cleaning instructions and work environment
4	Perform preventative maintenance procedures	Make sure the students answer questions related to the following areas ✓ Inspect parts according to operating procedures and manufacturer instructions ✓ Maintain service and production records to assist with life cycle monitoring of parts and machine, as required ✓ Identify faulty parts for repair, replacement or adjustment and take necessary action ✓ Inspect, check and monitor replacement parts and consumables to ensure they comply with operational specifications

20. 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	Oher 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-18: Perform Chemical Cleaning

Unit No	18
Unit Title	Perform Chemical Cleaning
Unit Code	**CONS03CR14V1/21**

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. Prepare for cleaning							
Read or listen to work instructions from supervisor and clarify where needed	✓	✓	✓		✓	✓	✓
Identify health and safety hazards in the workplace and tell supervisor	✓	✓		✓	✓	✓	
Wear appropriate personal protective equipment and ensure correct fit			✓	✓			✓
Confirm that chemical stocks are available to meet cleaning and food safety requirements	✓	✓	✓	✓	✓	✓	✓
Confirm that services are available and ready for operation		✓	✓	✓		✓	✓
Plan equipment shut down and take equipment offline for cleaning	✓	✓	✓	✓	✓	✓	✓
Configure equipment and related valves and pipework to confirm readiness for cleaning		✓	✓			✓	✓
Set the plant for the cleaning cycle	✓	✓		✓	✓	✓	
2. Operate and monitor the cleaning process							
Carry out the cleaning cycle as directed	✓	✓	✓		✓	✓	✓
Monitor the cleaning process for completeness	✓	✓		✓	✓	✓	
Record cleaning data appropriately			✓	✓			✓
Identify, rectify and report out-of-specification process and equipment performance	✓	✓	✓	✓	✓	✓	✓
3. Dispose of waste and return plant to operating condition							
Flush cleaning chemicals from plant and dispose of accordingly	✓	✓	✓		✓	✓	✓
Set up plant to meet operational requirements	✓	✓		✓	✓	✓	
Conduct work according to workplace environmental guidelines			✓	✓			✓

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.

21. Written questions

#	Question	Answer
1	Describe 3 things employers and workers do to identify and assess hazards.	✓ Collect and review information about the hazards present or likely to be present in the workplace. ✓ Conduct initial and periodic workplace inspections of the workplace to identify new or recurring hazards. ✓ Investigate injuries, illnesses, incidents, and close calls/near misses to determine the underlying hazards, their causes, and safety and health program shortcomings. ✓ Group similar incidents and identify trends in injuries, illnesses, and hazards reported. ✓ Consider hazards associated with emergency or nonroutine situations. ✓ Determine the severity and likelihood of incidents that could result for each hazard identified, and use this information to prioritize corrective actions
2	List down 3 sources where information about workplace hazards may be available	✓ Equipment and machinery operating manuals. ✓ Safety Data Sheets (SDS) provided by chemical manufacturers. ✓ Self-inspection reports and inspection reports from insurance carriers, government agencies, and consultants. ✓ Records of previous injuries and illnesses, such as OSHA 300 and 301 logs and reports of incident investigations. ✓ Workers' compensation records and reports. ✓ Input from workers, including surveys or minutes from safety and health committee meetings.
3	Describe 2 ways workers can identify shortcoming and potential safety hazards.	✓ Conduct regular inspections of all operations, equipment, work areas and facilities. Have workers participate on the inspection team and talk to them about hazards that they see or report. ✓ Be sure to document inspections so you can later verify that hazardous conditions are corrected. Take photos or video of problem areas to facilitate later discussion and brainstorming about how to control them, and for use as learning aids. ✓ Include all areas and activities in these inspections, such as storage and warehousing, facility and equipment maintenance, purchasing and office functions, and the

		activities of on-site contractors, subcontractors, and temporary employees. ✓ Regularly inspect both plant vehicles (e.g., forklifts, powered industrial trucks) and transportation vehicles (e.g., cars, trucks).
4	What type of hazards are included under health hazards?	Health hazards include chemical hazards (solvents, adhesives, paints, toxic dusts, etc.), physical hazards (noise, radiation, heat, etc.), biological hazards (infectious diseases), and ergonomic risk factors (heavy lifting, repetitive motions, vibration).
5	What are the four points that should be included in an incident investigation plan?	✓ Who will be involved ✓ Lines of communication ✓ Materials, equipment, and supplies needed ✓ Reporting forms and templates
6	Name 3 nonroutine situations/emergencies that could potentially occur in the workplace.	✓ Fires and explosions ✓ Chemical releases ✓ Hazardous material spills ✓ Startups after planned or unplanned equipment shutdowns ✓ Structural collapse ✓ Disease outbreaks
7	Explain one way in which workers can assess and understand the identified hazards.	✓ Evaluate each hazard by considering the severity of potential outcomes, the likelihood that an event or exposure will occur, and the number of workers who might be exposed. ✓ Use interim control measures to protect workers until more permanent solutions can be implemented. ✓ Prioritize the hazards so that those presenting the greatest risk are addressed first. Note, however, that employers have an ongoing obligation to control all serious recognized hazards and to protect workers.
8	Explain what operations and maintenance of wastewater treatment plants is.	Operations are the activities to make sure the plant produces the desired quality and quantity of treated water and meets the current legislation, while maintenance are the activities to make sure the plant equipment continues to work efficiently to achieve the operational objectives.
9	What are the 5 critical elements operation and maintenance of water and wastewater plants are broken up in to?	Operation, maintenance, engineering, training, and administration – also known as OMETA .
10	Name 3 critical elements the new approach is broken into.	✓ WH&S plan ✓ Scope of service ✓ Operation plan ✓ Asset and maintenance plan

		✓ People ✓ Analytical protocols ✓ Communication and reporting ✓ Administration.
11	What is the WH&S Plan?	This is primarily a communication tool between the company and its employees, customer and contractors, to ensure that relevant site information is regularly updated between all parties and that safety is monitored, recorded and acted upon.
12	Name 3 components that should be included in a WH&S Plan.	✓ Safety Training; ✓ Safety Audits; ✓ Housekeeping Audits; ✓ Safety Meetings; ✓ Safety Reports (Near miss, incidents, observation, etc.); ✓ Customer Specific Requirements
13	List down 2 important factors about data logging.	✓ When and what data is collected; ✓ How often it is collected depends on the criticality of the process; ✓ Using online or manually collected data; ✓ Transferring data into information summarized by KPIs; ✓ Using the information to control and correct deviations; and ✓ Consult with the equipment manufacturer.
14	What is an asset & maintenance plan?	The asset and maintenance plan is primarily the processes and structure to ensure that equipment continues to deliver maximum value throughout its expected life and at the lowest cost.
15	What are some important items to address in managing people?	✓ Training based on skills matrix and training matrix; ✓ On Job Training (OJT); ✓ On Boarding and induction; ✓ Communication; ✓ Selection Process; ✓ Performance reviews; ✓ Job Description and responsibilities; and ✓ Recognition and motivation.
16	Describe 2 benefits on analytical protocols.	✓ Optimizes processes and chemical dosing ✓ Supporting decision making to control KPI's ✓ Proactive actions ✓ Regulatory requirements ✓ Reporting basis
17	Why are shift handover procedures implemented?	To ensure continuity and minimize errors, a standard procedure is implemented for shift handover.

18	Identify and explain 2 ways in which machinery can cause injuries.	✓ People can be struck and injured by moving parts of machinery or ejected material. Parts of the body can also be drawn in or trapped between rollers, belts and pulley drives. ✓ Sharp edges can cause cuts and severing injuries, sharp-pointed parts can cause stabbing or puncture the skin, and rough surface parts can cause friction or abrasion. ✓ People can be crushed, both between parts moving together or towards a fixed part of the machine, wall or other object, and two parts moving past one another can cause shearing. ✓ Parts of the machine, materials and emissions (such as steam or water) can be hot or cold enough to cause burns or scalds, and electricity can cause electrical shock and burns.
19	Why is maintenance on plant and equipment carried out?	Maintenance on plant and equipment is carried out to prevent problems arising, to put faults right, and to ensure equipment is working effectively.
20	What is the 5S system?	A method of workplace organization invented in Japan that includes making sure everything has a designated place and removing items not in use. To encourage compliance, use toolbox talks to remind everyone of the benefits of a clean, organized jobsite, such as improved safety and efficiency
21	Explain why it is ideal to eliminate waste at the source.	The less waste that arrives or is created at the site, the less disposal and cleanup is necessary
22	List 2 ways workers can reduce waste disposal.	✓ Choose products with minimal packaging. ✓ Measure carefully so you order only the materials you need, in the optimal sizes. ✓ Buy quality materials so you throw out fewer warped studs, for instance. ✓ Embrace the use of prefabricated elements when possible.
23	What can be done to manage dust safely?	Use engineering and work practice controls such as dust collection systems to limit dust in the air during certain tasks, such as sawing or grinding concrete, stone or mortar. Reduce the amount of dust created by installing water systems that steam or spray a cutting blade.
24	Why is it important to control respirable crystalline silica?	Controlling respirable crystalline silica is especially important since it can cause incurable lung disease if inhaled. Per OSHA's silica dust compliance guide for small entities, don't allow dry brushing or dry sweeping unless methods such as wet sweeping and HEPA-filtered vacuuming are not feasible. Workers should of course have access to appropriate respiratory protection.

25	What is the benefit of performing a final cleaning during closeout?	Last impressions count. Performing a final cleaning during closeout will leave a good impression on the client and possibly help you win more projects in the future. Create a checklist of tasks, such sweeping, mopping, cleaning all surfaces, washing windows, and removing any remaining stickers. And don't forget trash removal.

22.PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to performing chemical cleaning, 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. ✓ Prepare for cleaning ✓ Operate and monitor the cleaning process ✓ Dispose of waste and return plant to operating condition
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Prepare for cleaning ✓ Operate and monitor the cleaning process ✓ Dispose of waste and return plant to operating condition
4	Demonstrate proper maintenance	The student is expected to follow the correct step-by step process to proper maintenance. The elements which should be assessed are: ✓ Asset list which includes; asset name, description, asset number, location, criticality, condition, usefulness and value. The asset list will give the operator an understanding of the physical asset capability to meet the stakeholder's expectations and regulatory requirements; ✓ Implementing maintenance best practices such as; 5S, Failure Mode Effect Analysis (FMEA) or Root Cause Analysis (RCA); ✓ Proactive maintenance programs, especially for critical equipment; ✓ Preventive maintenance programs which can include; cleaning, calibration, oil change, greasing and replacing consumables; ✓ Critical spare parts list included items such as; correct quality, correct quantity, correct time, correct cost and correct supplier;

23.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. ✓ Prepare for cleaning ✓ Operate and monitor the cleaning process ✓ Dispose of waste and return plant to operating condition
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 food processing equipment that is fixed in place and cannot be moved to a cleaning station. It requires the operator to initiate, monitor and control variables during cleaning. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate the dos and don'ts of machinery safety for workers	As the students attend the practical test to assess their knowledge in the dos and don'ts of machinery safety, make sure the student use the proper techniques and the information he shared is accurate.

24.OQ=Oral Questioning

#	Questions	Answers
1	Prepare for cleaning	Make sure the students answer questions related to the following areas ✓ Read or listen to work instructions from supervisor and clarify where needed ✓ Identify health and safety hazards in the workplace and tell supervisor ✓ Wear appropriate personal protective equipment and ensure correct fit ✓ Confirm that chemical stocks are available to meet cleaning and food safety requirements ✓ Confirm that services are available and ready for operation ✓ Plan equipment shut down and take equipment offline for cleaning

		✓ Configure equipment and related valves and pipework to confirm readiness for cleaning ✓ Set the plant for the cleaning cycle
2	Operate and monitor the cleaning process	Make sure the students answer questions related to the following areas ✓ Carry out the cleaning cycle as directed ✓ Monitor the cleaning process for completeness ✓ Record cleaning data appropriately ✓ Identify, rectify and report out-of-specification process and equipment performance
3	Dispose of waste and return plant to operating condition	Make sure the students answer questions related to the following areas ✓ Flush cleaning chemicals from plant and dispose of accordingly ✓ Set up plant to meet operational requirements ✓ Conduct work according to workplace environmental guidelines

25. 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	Oher 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-19: Operate and maintain of power generation system (renewable energy)

Unit No	19
Unit Title	Operate and maintain of power generation system (renewable energy)
Unit Code	**CONS03CR15V1/21**

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. Coordinate the solar power plant operations							
Plant operational procedures are implemented in consultation with others and reviewed as required	✓	✓		✓	✓	✓	
Resources and supplies are coordinated to meet plant requirements	✓		✓	✓	✓		✓
2. Monitor solar power plant operations							
Deviations from standard plant operations are identified and recorded	✓	✓		✓	✓	✓	
Plant operation and/or condition is monitored against statutory and enterprise requirements taking into account constraints, budget requirements and performance indicators	✓		✓	✓	✓		✓
New requirements that may impact on operations are considered		✓	✓			✓	✓
Operations are monitored for suitability/approval with statutory, industry and enterprise/site requirements	✓	✓		✓	✓	✓	
3. Test solar power plant operation							
Tests are performed in accordance with defined procedures applicable to the operational test	✓	✓		✓	✓	✓	
Plant is observed for correct operational response	✓		✓	✓	✓		✓
Correct action is taken when response is not in accordance with documentation, plant integrity or personnel safety requirements		✓	✓			✓	✓
Plant is returned to required operational status upon completion of test	✓	✓		✓	✓	✓	
4. Report operations against strategy requirements							

Data is collected and processed for review against the established strategy	✓	✓		✓	✓	✓	
Plant operation and/or condition is reported against statutory and enterprise requirements taking into account constraints, budget requirements and performance indicators	✓		✓	✓	✓		✓
Abnormal operating conditions are reported		✓	✓			✓	✓
Changes to the strategy are suggested in accordance with information received	✓	✓		✓	✓	✓	

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.

26. Written questions

#	Question	Answer
1	Identify and explain what a photovoltaic cell is.	A photovoltaic cell, commonly called a solar cell or PV, is a technology used to convert solar energy directly into electricity. A photovoltaic cell is usually made from silicon alloys. Particles of solar energy, known as photons, strike the surface of a photovoltaic cell between two semiconductors. These semiconductors exhibit a property known as the photoelectric effect, which causes them to absorb the photons and release electrons. The electrons are captured in the form of an electric current
2	Describe 3 things included under administration.	Administration includes keeping records of performance and O&M measures, preparing scopes of work and selection criteria for service providers, contracting with suppliers and service providers, paying invoices, preparing budget, and securing funding and contingency plans for O&M services. Administration also includes compliance with regulations by the government or authorities having jurisdiction and mandatory guidelines issued by utilities.
3	Identify the 4 types of maintenance procedures included in PV maintenance.	✓ Administration of maintenance ✓ Preventive maintenance ✓ Corrective maintenance ✓ Condition-based maintenance
4	What is condition-based maintenance?	Condition-based maintenance is the practice of using real-time information from data loggers to schedule preventive measures such as cleaning or to head off corrective maintenance problems by anticipating failures or catching them early.
5	Describe 3 things technicians do while conducting general inspection of installation sites.	✓ Ensure roof drainage is adequate, roof drains are not clogged and confirm that there are no signs of water pooling near the array ✓ Ensure roof penetrations (if any) are watertight

		✓ Check for ground erosion near the footings of a ground mount system ✓ Confirm electrical enclosures are only accessible to authorized personnel ✓ Check for corrosion on the outside of enclosures and the racking system ✓ Check for cleanliness throughout the site to ensure that there is no debris in the inverter pad area or elsewhere
6	How often is water quality tested?	Water quality is tested after every six months to ensure that set standards are maintained.
7	What is the objective of monitoring solar power plants?	The objective of monitoring is to provide enough information to accomplish an "energy balance" accounting for the amount of solar resource available and the losses in each energy conversion process up to delivery at the point of interconnection.
8	What are the two main methodologies used for PV array inspection?	The two main methodologies used for these inspections are manual electrical testing and aerial thermal-imaging inspections.
9	What is manual electrical testing?	Manual electrical testing such as open-circuit voltage, operating current, or field I-V curve tracing is used as a method to detect faults in the DC system that the monitoring system is not able to detect.
10	Briefly describe aerial thermal imagining.	Aerial thermal imaging inspections refer to the collection and processing of image data collected by aerial sensors with the goal of detecting string, module, and sub-module faults in the array.
11	Describe the hazards associated with firefighting activities in photovoltaic solar arrays.	✓ Shock hazard due to the presence of water and PV power during suppression activities • Outdoor rated electrical enclosures may not resist water intrusion from the high • pressure stream of a fire hose. • PV panels damaged in the fire may not resist water intrusion. • Damaged conductors may not resist water intrusion ✓ Shock hazard due to direct contact with energized components • No means of complete electrical disconnect.
12	What are small stage fires?	Small stage fires are small fires that are in the beginning stage and can be controlled with a fire extinguisher.
13	Explain 2 steps that should be taken in the event of a small stage fire.	✓ The person discovering the fire should immediately dispatch someone to activate the Incident Command Team. ✓ All non-essential personnel should be removed from the hazard area. ✓ All onsite vehicles are required to carry fire extinguishers. Fire extinguishment with a fire extinguisher or other means should be attempted if the person has been trained in the use of fire extinguishers and can do so without placing themselves in danger.

		✓ The Onsite O&M Primary Contact will respond to the scene and determine if external resources or an evacuation are necessary. In the event of an evacuation, they will recruit/dispatch employees to assist with the evacuation and issue the following statement over the radio: "Attention, there is a fire emergency at (location name). Please evacuate (the affected area) and report to (designated meeting area).
14	What is the first step to take in the event of a large stage fire.	The person discovering the fire should immediately contact the Onsite O&M Primary Contact. If the fire cannot be readily extinguished, they will call 911 to report the fire.
15	Identify 5 things that should be included in site safety training of employees.	✓ Employee roles and responsibilities ✓ Recognition of potential fire hazards ✓ Alarm system and evacuation routes ✓ Location and operation of manually operated equipment (fire extinguishers) ✓ Emergency response procedures ✓ Emergency shutdown procedures ✓ Information regarding specific materials to which employees may be exposed
16	What is SolarPACES?	SolarPACES is a program of the International Energy Agency, and the database includes CSP plants that are operational, under construction, and under development.
17	What is SolarPILOT used for?	SolarPILOT is used by researchers, industry technology developers, and academics to evaluate technology performance, quantify the value of research findings, and provide third-party, independent validation for privately developed tools.
18	What is the System Advisor Model (SAM)?	The System Advisor Model (SAM) is a free techno-economic software modeling tool for predicting the performance and cost of grid-connected renewable energy projects at specific sites. SAM produces sub-hourly energy output and calculates detailed financial metrics based on installation and operating costs and system design parameters that the user inputs to the model.
19	What is the key to reliable monitoring and fault detection methodology?	The key to a reliable monitoring and fault detection methodology is to have good simultaneous measurements of the solar irradiance, environmental conditions and plant power output.
20	How is voltage and current monitored in large-scale solar PV power plants?	In large-scale solar PV power plants, voltage and current will typically be monitored at the inverter, combiner box or string level, each offering more granularity than the previous.
21	Identify the functions of an internet portal-based monitoring system?	✓ Operations management ✓ Alarm management ✓ Reporting
22	Explain 1 parameter to be measured in quality benchmark monitoring systems.	✓ Plane of array irradiance and horizontal plane irradiance: Measured using secondary standard pyranometers with a measurement tolerance within ±2 percent.46 Plane of array pyranometers are essential for contractually binding performance ratio (PR) calculations, while horizontal plane pyranometers are useful in order to compare measured irradiation with global horizontal irradiation resource

		predictions. It is considered best practice to install irradiation sensors at a variety of locations within multi-megawatt plants, while avoiding locations that are susceptible to shading. Table 14 gives a rule of thumb for the number of pyranometers recommended according to the plant capacity. ✓ Ambient temperature: Measured in a location representative of site conditions with accuracy better than ±1°C. Ideally, temperature sensors should be placed next to the irradiation sensors, particularly if the PR at provisional acceptance is calculated using a temperature compensation factor (see Section 9: EPC Contracts).
23	List down the factors that can optimize the performance of a PV power plant.	✓ Premium modules and inverters ✓ A good system design with high quality and correctly installed components ✓ A good preventative maintenance and monitoring regime leading to low operational faults.
24	Describe 3 courses of action that should be taken if an emergency develops.	✓ Evacuation procedures and assembly are contained in the Evacuation plan, which will be posted in all office trailers. Maintain site security and control. ✓ Notify proper emergency services for assistance. Dial 911 or direct-dial emergency contact numbers if possible. Emergency numbers shall be posted at each office trailer. ✓ Notify Onsite O&M Primary Contact and all affected personnel at the site through use of site radio or other communication devices. ✓ Once emergency personnel have been notified, an employee will then be designated to meet the emergency personnel at the construction trailer area and then guide them to incident location. ✓ Only after emergency is declared over by the Onsite O&M Primary Contact can all other radio communication resume. ✓ Prepare a summary of the incident as soon as possible and no later than 24 hours after the incident.
25	What are the steps that should be taken to ensure site maintenance and housekeeping?	✓ Combustible material should not be stored in mechanical rooms, electrical equipment rooms or the SCADA buildings ✓ Outside dumpsters should be kept at least 5 feet away from combustible materials and the lid should be kept closed ✓ Storage is not allowed in electrical equipment rooms, or near electrical panels ✓ Electrical panel openings must be covered ✓ Power strips must be plugged directly into an outlet and NOT daisy-chained and should be for temporary use only ✓ Extension cords and flexible cords should not be substituted for permanent

27.PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to operating and maintaining of power generation system (renewable energy), 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. ✓ Coordinate the solar power plant operations ✓ Monitor solar power plant operations ✓ Test solar power plant operation ✓ Report operations against strategy requirements
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. ✓ Coordinate the solar power plant operations ✓ Monitor solar power plant operations ✓ Test solar power plant operation ✓ Report operations against strategy requirements
4	Demonstrate proper administration of operations	The student is expected to follow the correct step-by step process to administration of operations. The elements which should be assessed are: ✓ Ensures effective implementation and control of O&M services including curation of as-built drawings, equipment inventories, owners and operating manuals, and warranties. Curation involves not only keeping an archive but also selecting what to keep, pursuing missing documents, preserving documents, keeping them up to date, and, finally, archiving documents. Administration includes keeping records of performance and O&M measures, preparing scopes of work and selection criteria for service providers, contracting with suppliers and service providers, paying invoices, preparing budget, and securing funding and contingency plans for O&M services. Administration also includes compliance with regulations by the government or authorities having jurisdiction and mandatory guidelines issued by utilities.

28.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. ✓ Coordinate the solar power plant operations ✓ Monitor solar power plant operations ✓ Test solar power plant operation ✓ Report operations against strategy requirements
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 the skills and knowledge needed for the co-ordination of the operations of a hybrid power plant. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Demonstrate how to assist an injured person	As the students attend the practical test to assess their skill in assisting an injured person, make sure the student use the proper techniques and the information he shared is accurate.

29.OQ=Oral Questioning

#	Questions	Answers
1	Coordinate the solar power plant operations	Make sure the students answer questions related to the following areas ✓ Plant operational procedures are implemented in consultation with others and reviewed as required ✓ Resources and supplies are coordinated to meet plant requirements
2	Monitor solar power plant operations	Make sure the students answer questions related to the following areas ✓ Deviations from standard plant operations are identified and recorded ✓ Plant operation and/or condition is monitored against statutory and enterprise requirements taking into account constraints, budget requirements and performance indicators ✓ New requirements that may impact on operations are considered ✓ Operations are monitored for suitability/approval with statutory, industry and enterprise/site requirements
3	Test solar power plant operation	Make sure the students answer questions related to the following areas ✓ Tests are performed in accordance with defined procedures applicable to the operational test ✓ Plant is observed for correct operational response

		✓ Correct action is taken when response is not in accordance with documentation, plant integrity or personnel safety requirements ✓ Plant is returned to required operational status upon completion of test
4	Report operations against strategy requirements	Make sure the students answer questions related to the following areas ✓ Data is collected and processed for review against the established strategy ✓ Plant operation and/or condition is reported against statutory and enterprise requirements taking into account constraints, budget requirements and performance indicators ✓ Abnormal operating conditions are reported ✓ Changes to the strategy are suggested in accordance with information received

30. 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	**Oher 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.


WATER SUPPLY
SYSTEM