NATIONAL CERTIFICATES (VOCATIONAL)

ASSESSMENT GUIDELINES

STORED PROGRAMME SYSTEMS

NQF Level 4

April 2008

CONTENTS

SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

This document provides the lecturer with guidelines to develop and implement a coherent, integrated assessment system for Stored Programme Systems in the National Certificates (Vocational). It must be read with the *National Policy Regarding Further Education and Training Programmes: Approval of the Documents, Policy for the National Certificates (Vocational) Qualifications at Levels 2 to 4 on the National Qualifications Framework (NQF)*. This assessment guideline will be used for National Qualifications Framework Levels 2-4.

This document explains the requirements for the internal and external subject assessment. The lecturer must use this document with the *Subject Guidelines: Stored Programme Systems* to prepare for and deliver Stored Programme Systems. Lecturers should use a variety of resources and apply a range of assessment skills in the setting, marking and recording of assessment tasks.

SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

1 ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

Assessment in the National Certificates (Vocational) is underpinned by the objectives of the National Qualifications Framework (NQF). These objectives are to:

- Create an integrated national framework for learning achievements.
- Facilitate access to and progression within education, training and career paths.
- Enhance the quality of education and training.
- Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities.
- Contribute to the holistic development of the student by addressing:
  - social adjustment and responsibility;
  - moral accountability and ethical work orientation;
  - economic participation; and
  - nation-building.

The principles that drive these objectives are:

- ***Integration***

To adopt a unified approach to education and training that will strengthen the human resources development capacity of the nation.

- ***Relevance***

To be dynamic and responsive to national development needs.

- ***Credibility***

To demonstrate national and international value and recognition of qualification and acquired competencies and skills.

- ***Coherence***

To work within a consistent framework of principles and certification.

- ***Flexibility***

To allow for creativity and resourcefulness when achieving Learning Outcomes, to cater for different learning styles and use a range of assessment methods, instruments and techniques.

- ***Participation***

To enable stakeholders to participate in setting standards and co-ordinating the achievement of the qualification.

- ***Access***

To address barriers to learning at each level to facilitate students' progress.

- ***Progression***

To ensure that the qualification framework permits individuals to move through the levels of the national qualification via different, appropriate combinations of the components of the delivery system.

- ***Portability***

To enable students to transfer credits of qualifications from one learning institution and/or employer to another institution or employer.

- ***Articulation***

To allow for vertical and horizontal mobility in the education system when accredited pre-requisites have been successfully completed.

- ***Recognition of Prior Learning***

To grant credits for a unit of learning following an assessment or if a student possesses the capabilities specified in the outcomes statement.

- ***Validity of assessments***

To ensure assessment covers a broad range of knowledge, skills, values and attitudes (SKVAs) needed to demonstrate applied competency. This is achieved through:

  - clearly stating the outcome to be assessed;
  - selecting the appropriate or suitable evidence;
  - matching the evidence with a compatible or appropriate method of assessment; and
  - selecting and constructing an instrument(s) of assessment.

- ***Reliability***

To assure assessment practices are consistent so that the same result or judgment is arrived at if the assessment is replicated in the same context. This demands consistency in the interpretation of evidence; therefore careful monitoring of assessment is vital.

- ***Fairness and transparency***

To verify that no assessment process or method(s) hinders or unfairly advantages any student. The following could constitute unfairness in assessment:

  - Inequality of opportunities, resources or teaching and learning approaches
  - Bias based on ethnicity, race, gender, age, disability or social class
  - Lack of clarity regarding Learning Outcome being assessed
  - Comparison of one student's work with another, based on learning styles and language

- ***Practicability and cost-effectiveness***

To integrate assessment practices within an outcomes-based education and training system and strive for cost and time-effective assessment.

2 ASSESSMENT FRAMEWORK FOR VOCATIONAL QUALIFICATIONS

The assessment structure for the National Certificates (Vocational) qualification is as follows:

2.1 Internal continuous assessment (ICASS)

Knowledge, skills values, and attitudes (SKVAs) are assessed throughout the year using assessment instruments such as projects, tests, assignments, investigations, role-play and case studies. The internal continuous assessment (ICASS) practical component is undertaken in a real workplace, a workshop or a "Structured Environment". This component is moderated internally, and externally quality assured by Umalusi. All internal continuous assessment (ICASS) evidence is kept in a Portfolio of Evidence (PoE) and must be readily available for monitoring, moderation and verification purposes.

2.2 External summative assessment (ESASS)

The external summative assessment is either a single paper or set of written papers set to the requirements of the Subject Learning Outcomes. The Department of Education administers the theoretical component according to relevant assessment policies.

A compulsory component of external summative assessment (ESASS) is the **integrated summative assessment task (ISAT).** This assessment task draws on the student's cumulative learning throughout the year. The task requires **integrated application of competence** and is executed under strict assessment conditions. The task should take place in a simulated or "Structured Environment". The integrated summative assessment task is the most significant test of students' ability to apply acquired knowledge.

The integrated assessment approach allows students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

External summative assessments will be conducted annually between October and December, with provision made for supplementary sittings.

3 MODERATION OF ASSESSMENT

3.1 Internal moderation

Assessment must be moderated according to the internal moderation policy of the Further Education and Training (FET) college. Internal college moderation is a continuous process. The moderator's involvement starts with the planning of assessment methods and instruments and follows with continuous collaboration with and support to the assessors. Internal moderation creates common understanding of Assessment Standards and maintains these across vocational programmes.

3.2 External moderation

External moderation is conducted by the Department of Education, Umalusi and, where relevant, an Education and Training Quality Assurance (ETQA) body according to South African Qualifications Authority (SAQA) and Umalusi standards and requirements.

The external moderator:

- monitors and evaluates the standard of all summative assessments;
- maintains standards by exercising appropriate influence and control over assessors;
- ensures proper procedures are followed;
- ensures summative integrated assessments are correctly administered;
- observes a minimum sample of ten (10) to twenty-five (25) percent of summative assessments;
- gives written feedback to the relevant quality assuror; and
- moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures be customised for students who experience barriers to learning, and supported to enable these students to achieve their maximum potential.

4 PERIOD OF VALIDITY OF INTERNAL CONTINUOUS ASSESSMENT (ICASS)

The period of validity of the internal continuous assessment mark is determined by the *National Policy on the Conduct, Administration and Management of the Assessment of the National Certificates (Vocational).*

The internal continuous assessment (ICASS) must be re-submitted with each examination enrolment for which it constitutes a component.

5 ASSESSOR REQUIREMENTS

Assessors must be subject specialists and should ideally be declared competent against the standards set by the ETDP SETA. If the lecturer conducting the assessments has not been declared a competent assessor, an assessor who has been declared competent may be appointed to oversee the assessment process to ensure the quality and integrity of assessments.

6 TYPES OF ASSESSMENT

Assessment benefits the student and the lecturer. It informs students about their progress and helps lecturers make informed decisions at different stages of the learning process. Depending on the intended purpose, different types of assessment can be used.

6.1 Baseline assessment

At the beginning of a level or learning experience, baseline assessment establishes the knowledge, skills, values and attitudes (SKVAs) that students bring to the classroom. This knowledge assists lecturers to plan learning programmes and learning activities.

6.2 Diagnostic assessment

This assessment diagnoses the nature and causes of learning barriers experienced by specific students. It is followed by guidance, appropriate support and intervention strategies. This type of assessment is useful to make referrals for students requiring specialist help.

6.3 Formative assessment

This assessment monitors and supports teaching and learning. It determines student strengths and weaknesses and provides feedback on progress. It determines if a student is ready for summative assessment.

6.4 Summative assessment

This type of assessment gives an overall picture of student progress at a given time. It determines whether the student is sufficiently competent to progress to the next level.

7 PLANNING ASSESSMENT

An assessment plan should cover three main processes:

7.1 Collecting evidence

The assessment plan indicates which Subject Outcomes and Assessment Standards will be assessed, what assessment method or activity will be used and when this assessment will be conducted.

7.2 Recording

Recording refers to the assessment instruments or tools with which the assessment will be captured or recorded. Therefore, appropriate assessment instruments must be developed or adapted.

7.3 Reporting

All the evidence is put together in a report to deliver a decision for the subject.

8 METHODS OF ASSESSMENT

Methods of assessment refer to who carries out the assessment and includes lecturer assessment, self-assessment, peer assessment and group assessment.

LECTURER ASSESSMENT	The lecturer assesses students' performance against given criteria in different contexts, such as individual work, group work, etc.
SELF-ASSESSMENT	Students assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
PEER ASSESSMENT	Students assess another student's or group of students' performance against given criteria in different contexts, such as individual work, group work, etc.
GROUP ASSESSMENT	Students assess the individual performance of other students within a group or the overall performance of a group of students against given criteria.

9 INSTRUMENTS AND TOOLS FOR COLLECTING EVIDENCE

All evidence collected for assessment purposes is kept or recorded in the student's Portfolio of Evidence.

The following table summarises a variety of methods and instruments for collecting evidence. A method and instrument is chosen to give students ample opportunity to demonstrate that the Subject Outcome has been attained. This will only be possible if the chosen methods and instruments are appropriate for the target group and the Specific Outcome being assessed.

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	**Task-based** (Structured)	**Test-based** (More structured)
Assessment instruments	• Observation • Class questions • Lecturer, student, parent discussions	• Assignments or tasks • Projects • Investigations or research • Case studies • Practical exercises • Demonstrations • Role-play • Interviews	• Examinations • Class tests • Practical examinations • Oral tests • Open-book tests
Assessment tools	• Observation sheets • Lecturer's notes • Comments	• Checklists • Rating scales • Rubrics	• Marks (e.g. %) • Rating scales (1-5)
Evidence	• Focus on individual students • Subjective evidence based on lecturer observations and impressions	**Open middle**: Students produce the same evidence but in different ways. **Open end**: Students use same process to achieve different results.	Students answer the same questions in the same way, within the same time.

10 TOOLS FOR ASSESSING STUDENT PERFORMANCE

Rating scales are marking systems where a symbol (such as 1 to 5) or a mark (such as 5/10 or 50%) is defined in detail. The detail is as important as the coded score. Traditional marking, assessment and evaluation mostly used rating scales without details such as what was right or wrong, weak or strong, etc.

Task lists and **checklists** show the student what needs to be done. These consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the student has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

Rubrics are a hierarchy (graded levels) of criteria with benchmarks that describe the minimum level of acceptable performance or achievement for each criterion. Use of rubrics provides a different way of assessing that cannot be compared to tests. Each criterion described in the rubric must be assessed separately. Mainly two types of rubrics, namely holistic and analytical, are used.

11 SELECTING AND/OR DESIGNING RECORDING AND REPORTING SYSTEMS

The selection or design of recording and reporting systems depends on the purpose of recording and reporting student achievement. **Why** particular information is recorded and **how** it is recorded determine which instrument will be used.

Computer-based systems, for example spreadsheets, are cost and time effective. The recording system should be user-friendly and information should be easily accessed and retrieved.

12 COMPETENCE DESCRIPTIONS

All assessment should award marks to evaluate specific assessment tasks. However, marks should be awarded against rubrics and not be simply a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) that a student must demonstrate to achieve each level of the rating scale.

When lecturers or assessors prepare an assessment task or question, they must ensure that the task or question addresses an aspect of a Subject Outcome. The relevant Assessment Standard must be used to create the rubric to assess the task or question. The descriptions must clearly indicate the minimum level of attainment for each category on the rating scale.

13 STRATEGIES FOR COLLECTING EVIDENCE

A number of different assessment instruments may be used to collect and record evidence. Examples of instruments that can be (adapted and) used in the classroom include:

13.1 Record sheets

The lecturer observes students working in a group. These observations are recorded in a summary table at the end of each project. The lecturer can design a record sheet to observe students' interactive and problem-solving skills, attitudes towards group work and involvement in a group activity.

13.2 Checklists

Checklists should have clear categories to ensure that the objectives are effectively met. The categories should describe how the activities are evaluated and against which criteria they are evaluated. Space for comments is essential.

SECTION C: ASSESSMENT IN STORED PROGRAMME SYSTEMS

1 SCHEDULE OF ASSESSMENT

At NQF levels 2, 3 and 4, lecturers will conduct assessments as well as develop a schedule of formal assessments that will be undertaken in the year. All three levels also have an external examination that accounts for 50 percent of the total mark. The marks allocated to assessment tasks completed during the year, kept or recorded in a Portfolio of Evidence account for the other 50 percent.

The Portfolio of Evidence and the external assessment include practical and written components. The practical assessment in Stored Programme Systems must, where necessary, be subjected to external moderation by Umalusi or an appropriate Education and Training Quality Assurance (ETQA) body, appointed by the Umalusi Council in terms of Section 28(2) of the *General and Further Education and Training Quality Assurance Act, 2001 (Act No. 58 of 2001).*

2 RECORDING AND REPORTING

Stored Pogramme Systems, as is the case for all the other Vocational subjects, is assessed according to five levels of competence. The level descriptions are explained in the following table.

Scale of Achievement for the Vocational component

RATING CODE	RATING	MARKS %
5	Outstanding	80-100
4	Highly competent	70-79
3	Competent	50-69
2	Not yet competent	40-49
1	Not achieved	0-39

The programme of assessment should be recorded in the Lecturer's Portfolio of Assessment for each subject. The following at least should be included in the Lecturer's Assessment Portfolio:

- A contents page
- The formal schedule of assessment
- The requirements for each assessment task
- The tools used for each assessment task
- Recording instrument(s) for each assessment task
- A mark sheet and report for each assessment task

The college must standardise these documents.

The student's Portfolio of Evidence must include at least:

- A contents page
- The assessment tasks according to the assessment schedule
- The assessment tools or instruments for the task
- A record of the marks (and comments) achieved for each task

Where a task cannot be contained as evidence in the Portfolio of Evidence, its exact location must be recorded and it must be readily available for moderation purposes.

The following units guide internal assessment in Stored Programme Systems Level 4:

NUMBER OF UNITS	ASSESSMENT	COVERAGE
2	Formal written tests	One or more completed topics
1	Internal written exam	All completed topics
3	Practical assessments	The related Subject Outcomes: 1.1 The application of integrated control of a manufacturing concern using a host computer and control software. 2.1 Arranging and connecting field bus control components, connecting the various signal transfer mediums, selecting field bus control equipment in accordance with cost and function, reading, interpreting and producing field bus control application diagrams, interconnecting hybrid manufacturing control applications in flexible manufacturing systems, planning field bus control applications, preparing all the required documentation, ensuring that safety has been considered and installing in accordance with regulation. 3.1 The configuration and setting up of various integrated control applications in a manufacturing systems application, the programming sequence using one of the programming aids and programming the industrial PLC for correct function using one of the listed programming languages.

ASSESSMENT OF STORED PROGRAMME SYSTEMS

LEVEL 4

3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN STORED PROGRAMME SYSTEMS – LEVEL 4

Topic 1: Describe and apply communication systems used in stored program automation systems

SUBJECT OUTCOME	
1.1 Describe and apply communication systems *Range: Data communication; Modulator/ demodulators; Networking (LAN, WAN); Protocols; Interfacing; Field bus systems; (profibus, interbus, S, ASI bus); Industrial Ethernet technology; field bus software. Communication media utilised (co-axial, fibre optic, twisted pairs); SCADA software*	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The meaning of the terms and concepts data communication in industry, interfacing, protocols as used in industrial networked applications, modulation/ demodulation and synchronous and asynchronous communication are explained. • Networking and various sub-systems of networking are explained. • The hierarchies of networked systems, the flow of information in integrated mechatronic systems, and measuring techniques used in networked systems are described and explained. • Field bus topology, and the fundamental differences between the various field bus systems are explained. • Industrial Ethernet technology is explained. • Communication systems as used in industry are described by selecting the correct system for specific application. • The correct information flow medium is chosen. • Integrated control of a manufacturing concern is applied using a host computer and control software.	• Explain what is meant by ▪ data communication in industry ▪ interfacing ▪ protocols as used in industrial networked applications ▪ modulation/ demodulation ▪ synchronous and asynchronous communication • Explain ▪ what networking is ▪ various sub-systems of networking • Describe and explain ▪ the hierarchies of networked systems ▪ the flow of information in integrated mechatronic systems ▪ measuring techniques used in networked systems • Explain what is meant by field bus topology • Explain the fundamental differences between the various field bus systems • Explain industrial Ethernet technology • Describe communication systems as used in industry by selecting the correct system for specific application • Choose the correct information flow medium • Apply integrated control of a manufacturing concern using a host computer and control software.
ASSESSMENT TASKS OR ACTIVITIES	
• Lecturer's notes, observation sheets and an assignment or task on data communication in industry, interfacing, protocols as used in industrial networked applications, modulation/ demodulation, synchronous and asynchronous communication, networking, sub-systems of networking, the hierarchies of networked systems, flow of information in integrated mechatronic systems, measuring techniques used in networked systems, field bus topology, the fundamental differences between the various field bus systems and Ethernet technology. • A project on communication systems as used in industry by selecting the correct system for specific application and choosing the correct information flow medium. • Practical exercises on the application of integrated control of a manufacturing concern using a host computer and control software.	

Topic 2: Select, apply and install bus systems in integrated industrial control applications

SUBJECT OUTCOME
2.1 Describe and install field bus control applications *Range: Transfer, sorting, measurement, palletising, processing, robot assembly, automated warehouse, quality assurance*

ASSESSMENT STANDARDS	LEARNING OUTCOMES
• The advantages of using field bus technology in hybrid manufacturing systems, the various control applications that are used in manufacturing system applications, the importance of industrial robots as used in manufacturing system applications, and the advantages and disadvantages thereof are described • Field bus control components are arranged and connected. • Various signal transfer mediums are connected. • Field bus control equipment is selected in accordance with cost and function. • Field bus control application diagrams are read, interpreted and produced. • Hybrid manufacturing control applications are interconnected in flexible manufacturing systems. • Field bus control applications are planned. • All required documentation is prepared. • Safety is considered and applied. • Installation is done in accordance with regulation.	• Describe ▪ the advantages of using field bus technology in hybrid manufacturing systems ▪ the various control applications that are used in manufacturing system applications ▪ the importance of industrial robots as used in manufacturing system applications and the advantages and disadvantages thereof • Arrange and connect field bus control components • Connect the various signal transfer media • Select field bus control equipment in accordance with cost and/or function • Read, interpret and produce field bus control application diagrams • Interconnect hybrid manufacturing control applications in flexible manufacturing systems • Plan field bus control applications • Prepare all the required documentation • Ensure that safety has been considered • Install in accordance with regulation
ASSESSMENT TASKS OR ACTIVITIES	
• An investigation or research project with checklists on the advantages of using field bus technology in hybrid manufacturing systems, the various control applications used in manufacturing systems applications, the importance of industrial robots as used in manufacturing systems applications, and the advantages and disadvantages thereof. • Practical exercises, rating scales and rubrics on arranging and connecting field bus control components, connecting the various signal transfer mediums, selecting field bus control equipment in accordance with cost and function, reading, interpreting and producing field bus control application diagrams, interconnecting hybrid manufacturing control applications in flexible manufacturing systems, planning field bus control applications, preparing all the required documentation, ensuring that safety has been considered and installing in accordance with regulation.	

Topic 3: Interface, set up and programme related bus systems in advanced industrial PLC mechatronic applications

SUBJECT OUTCOME	
3.1 Configure and programme an advanced PLC system in manufacturing system control applications	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• Programming languages used in advanced control programming are listed. • The procedure for safely interfacing the control medium is explained. • The various safety aspects that must be considered when working with control applications are listed and explained. • Various integrated control applications are configured and set up in a manufacturing system application. • The programming sequence is produced using one of the programming aids. • The industrial PLC is programmed for correct function using one of the listed programming languages.	• List various programming languages used in advanced control programming • Explain the procedure for safely interfacing the control medium • List and explain the various safety aspects that must be considered when working with control applications • Configure and set up various integrated control applications in a manufacturing system application • Produce the programming sequence using one of the programming aids • Programme the industrial PLC for correct function using one of the listed programming languages
ASSESSMENT TASKS OR ACTIVITIES	
• An assignment or task, class questions and an open-book test on the five programming languages used in advanced control programming, and the procedure for safely interfacing the control medium. • Various safety aspects that must be considered and applied when working with control applications in accordance with regulations, legislation, company policies and organisational requirements. • Demonstrations and practical exercises on the configuration and setting up of various integrated control applications in a manufacturing systems application, the programming sequence using one of the programming aids, and programming the industrial PLC for correct function using one of the listed programming languages.	

Topic 4: Create, test, debug and network PLC source control programs to an industrial automated system

SUBJECT OUTCOME	
4.1 Describe and apply mechatronic automated manufacturing systems *Range: Documentation: Single line diagrams, equipment position diagram, terminal diagram, interconnection diagram, program listing, operational instructions, technical manual, functional description.* *Terms: Verbal description, sequence diagram of switching algebra, program flow chart, status or function line, signal line*	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The fundamental documentation required for an integrated mechatronic system, mechatronic system related terms, and the function and procedure of PLC diagnostic program types are described. • Specifications are reviewed and interpreted, manufacturing system applications are planned and integrated into an integrated hybrid system. • Installation is tested and adjusted for correct function. • PLC diagnostics are applied.	• Describe ▪ the fundamental documentation required for an integrated mechatronic system ▪ mechatronic system related terms ▪ the function and procedure of PLC diagnostic program types • Review and interpret specifications, plan and integrate manufacturing system applications into an integrated hybrid system • Test and adjust installation for correct function • Apply PLC diagnostics
ASSESSMENT TASKS OR ACTIVITIES	
• An assignment or task on the fundamental documentation required for an integrated mechatronic system, mechatronic system related terms, and the function and procedure of PLC diagnostic program types. • Practical exercises on the review and interpretation of specifications, planning and integration of manufacturing system applications into an integrated hybrid system, the testing and adjusting of installation for correct function, and the application of PLC diagnostics.	

Topic 5: Maintain and commission networked PLC based industrial control systems

SUBJECT OUTCOME	
5.1 Commission faults in integrated systems *Range: Commissioning process requirements*	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The requirements for the commissioning process in integrated systems are listed and described. • Goals are set for standardisation. • The term *commissioning* is defined and the actual conditions of commissioning guidelines listed. • The following are described: ▪ structuring of products for easy commissioning (purpose, preliminary testing and commissioning) ▪ methods of structuring products for easy commissioning ▪ the possible fault terms used during the commissioning process (fault, malfunction, function, disturbance) ▪ damage classes, commissioning faults and component faults ▪ trouble shooting methods (determination-asking questions, systematic approach using tools, correction and repair procedure) ▪ tools for repair (program flow charts, sequential function, function charts, circuit diagrams) • Various troubleshooting tools are applied to perform commissioning of PLC application control programs. • Maintenance required for various hybrid manufacturing systems applications is planned.	• List and describe the requirements for the commissioning process in integrated systems • Set goals for standardisation • Define what is meant by the term *commissioning* • List the actual conditions of commissioning guidelines • Describe ▪ structuring of products for easy commissioning (purpose, preliminary testing and commissioning) ▪ methods of structuring products for easy commissioning ▪ the possible fault terms used during the commissioning process (fault, malfunction, function, disturbance) ▪ damage classes, commissioning faults and component faults ▪ trouble shooting methods (determination-asking questions, systematic approach using tools, correction and repair procedure) ▪ tools for repair (program flow charts, sequential function, function charts, circuit diagrams) • Apply various troubleshooting tools to perform commissioning of PLC application control programs • Plan maintenance required for various hybrid manufacturing systems applications

ASSESSMENT TASKS OR ACTIVITIES
• A research project on the theoretical concepts related to commission faults in integrated systems • Practical exercises on the application of various troubleshooting tools for performing commissioning of PLC application control programs, and the maintenance required for various hybrid manufacturing systems applications by means of a presentation and report

4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN STORED PROGRAME SYSTEMS – LEVEL 4

4.2 Integrated summative assessment task (ISAT)

A compulsory component of the external assessment (ESASS) is the **integrated summative assessment task (ISAT)**. The integrated summative assessment task draws on the student's cumulative learning achieved throughout the year. The task requires **integrated application of competence** and is executed and recorded in compliance with assessment conditions.

Two approaches to the integrated summative assessment task may be as follows:

- The students are assigned a task at the beginning of the year which they will have to complete in phases throughout the year to obtain an assessment mark. A final assessment is made at the end of the year when the task is completed.

OR

- Students achieve the competencies throughout the year but the competencies are assessed cumulatively in a single assessment or examination session at the end of the year.

The integrated summative assessment task is set by an externally appointed examiner and is conveyed to colleges in the first quarter of the year.

The integrated assessment approach enables students to be assessed in more than one subject with the same integrated summative assessment task.

4.3 National Examination

A national examination is conducted annually in October or November by means of a paper(s) set and moderated externally. The following distribution of cognitive application is suggested:

LEVEL 3	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
	30%	50%	20%

MARK ALLOCATION PER QUESTION		
Section 1: Compulsory (must cover all topics)		
Question 1:	Describe and apply communication systems used in stored programme automation systems	20
Question 2:	Select, apply and install bus systems in integrated industrial control applications	20
Question 3:	Interface, set up and programme related bus systems in advanced industrial PLC mechatronic applications	20
Question 4:	Create, test, debug and network PLC source control programs to an industrial automated system	20
Question 5:	Maintain and commission networked PLC based industrial control systems	20
	TOTAL	100%