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National Diploma in Mechanical Engineering

TVET PROGRAMME

Purpose

The National Diploma programme is aimed at providing both the theoretical principles as well as the necessary skills/ competences in mechanical engineering with specialization in plant maintenance, installation and commissioning. It enables the learner to acquire mastery of skills in welding and machining applications.

Introduction

The National Diploma in Mechanical Engineering is a three-year (3600 hours) training programme offered full-time to secondary five (S5) school leavers and learners from other professional centres. This is equivalent to six (6) semesters. Two semesters represents one academic year. A learner on full time may exit after year one and qualify for a Certificate after successfully completing all the units from semesters one and two and accumulated 120 credits. A learner can exit with an Advanced Certificate after year two if he/she has been successful on all units covered in year one and year two combined and accumulated 240 credits.

Entry Criteria

Learners wishing to apply for the Diploma in Mechanical Engineering must have attained a minimum grade of "**C**

" from the **IGCSE exam** in English, Mathematics and Design Technology or preferably Physics.
Applicants from another professional centre may be accepted exiting with a Advanced Certificate from that Institution.

Learners should be able to:

⇒ Demonstrate an in-depth knowledge of the manufacturing, commissioning and maintenance procedures used in the trade of mechanical engineering.

⇒ Demonstrate comprehensive range of specialized manufacturing and maintenance skills using all commonly used mechanical hand and power tools in compliance with all relevant health and safety legislation and best practice.

Career Opportunities in Mechanical Engineering

Career Opportunities in the Mechanical Engineering Industry exists. A graduate mechanical engineer will work with new technologies, for example advanced materials, new manufacturing processes or highly efficient cooling systems, converting demanding requirements into optimized production component designs. Later in their careers they might be leading the innovation of these technologies, for example the composite fan. Alternatively, they may be leading engineering teams that apply those technologies to the next generation of power systems.

Most of the graduate roles in the fast-moving consumer goods industry are in one of two areas: manufacturing/engineering or supply network operations/logistics. For both of these areas, the work is not defined in nice separate buckets of mechanical, electrical, chemical etc. but is normally a mixture of different engineering disciplines as a general manufacturing or logistics engineer. Graduates will pick up skills from other disciplines as they go through their training and career

A mechanical engineer in the materials and metals industry will be involved in the design, development and testing of a range of complex mechanical systems. They will work on the full maintenance lifecycle of the mechanical plant items (steam turbines, gas turbines, pumps, valves, pipework, coal mills, fans etc.)

Progression and Further Studies

Graduates with a National Diploma in Mechanical Engineering can be accepted in different universities for a degree study in Mechanical Engineering with specialization in Mechanical Engineering, maintenance engineering, CNC engineering, thermal engineering.

Assessment Technique (s) including weighting (s)

The Diploma grade is based on a weighted average of all unit result grades. Assessment approach varies from one unit to another. During every unit of study there is a minimum number of continuous assessments which the learner must undertake. This could be in the form of small tests and assignments and research. For the final unit assessments, in most cases a learner will have to sit for both a theory paper which can be multiple choice, structured or a mixture and a practical for skills demonstration.

Work based experience (WBE) is a compulsory unit and is assessed by the supervisor in the work place for full-time learners and through compilation of a portfolio and assessed against the performance criteria for the different elements in the WBE unit for learner on part-time.

To attain the required standard, a minimum of a pass grade must be achieved in all assessments prescribed .

Pass mark for every unit on the programme is **55%.**

As per SIT Assessment Policy, the final mark for a unit is made up of 40% of all continuous assessments plus 60% from the results of the final unit assessment (s) and the following grades and corresponding marks are used

Not yet Competent-**NYC-0**		-	54%
Pass	- **P**	-	55%-69%
Credit or Merit	- **M** or **C**	-	70% - 84%
Distinction	- **D**	-	85%+

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- ⇒ Exercise appropriate judgments in planning, diagnostics and delivering all services, installations and maintenance processes relating to the mechanical equipment, mechanical plants, arc and gas welding.
- ⇒ Transfer and apply theoretical understanding and technical know-how to inspect, diagnose faults, maintain and repair mechanical systems in a wide variety of domestic and commercial contexts.
- ⇒ Exercise substantial independence in the workplace, taking responsibility for mechanical and manufacturing duties performed by others and interacting with a variety of individuals and groups to Include customers, colleagues and suppliers.
- ⇒ Take initiative to identify and address self-development and training needs in both an employment and structured training environment.

- ⇒ Determine the function and role of the mechanical engineer in society to include an awareness of energy conservation and other relevant ecological concerns

Certification

To be awarded a certificate in the National Diploma in Mechanical Engineering, the learner must have achieved the expected performance criteria set out in the different elements of each unit that make up the programme. The total credit requirement for this Diploma is 360 Credits .

This qualification is at level 5 on the National Qualification Framework (NQF).

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Statement of Competencies	Unit title	Semester (s) involved	Credits
1. Apply health, safety and security procedures in the context of mechanical engineering.	Health, Safety and Security Procedures	1	4.5
2. Demonstrate knowledge of engineering materials and there properties	Engineering Materials	1	4
3. Demonstrate knowledge of Engineering Tools & Instruments.	Engineering Tools & Instruments	1 & 2	10.5
4. Demonstrate knowledge of the occupation of a mechanical engineer in the context of Seychelles	Mechanical Engineering Occupation	1	3.0
5. Apply principles and practices of technical drawing	Technical Drawing	1, 2,3 & 4	12
6. Demonstrate knowledge and skills to select appropriate components to produce or assemble functional items of equipment.	Mechanical Technology	1	20
7. Demonstrate understanding of engineering scientific principles.	Basic Engineering Science	1	6.0
8. Apply principles of basic mathematics	Mathematics	1	6.0
9. Apply knowledge and skills of metal arc and gas welding, sheet metal work, machining and fitting and inspect for and correct defects.	Engineering Practice	1	9
10. Demonstrate knowledge of Engineering Health and Safety.	Engineering Health and Safety	2	12
11.Demonstrate knowledge of engineering principles.	Engineering Principles	2	15
12. Use information and communication technology (ICT) skills	ICT	2	3
13 Apply principles of basic refrigeration and Air Conditioning.	Refrigeration	3	4.5
14. Demonstrate principles of engineering maintenance, installation and commissioning	Principles of maintenance, installation and Commissioning	3 & 4	15
15. Apply principles and practice of Science	Advanced Science	3	9

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Structure of the Programme for (8 semesters) for part-time learners

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Health, Safety and Security Procedures (30/15) *(2hrs per week)*	Engineering Health and Safety (80/40)	Refrigeration (30/15) (2hrs per week)		Maintenance of machine systems (100/80) (4hrs per week)			Project (40/20) (2hrs per week)
Engineering Materials (20/10) (2hrs per week)	Engineering Principles (80/40) (2hrs per Week)		Principles of maintenance, installation and Commissioning (100/50) (4hrs per week)		Organizing and managing engineering operations (80/40) (4hrs per week)		Management (40/20) (2hrs per week)
Engineering Tools & Instruments (30/15) (2hrs per week)					Principles of Electrical & Electronics Engineering (130/110) (4hrs per week)		Entrepreneurship (40/20) (2hrs per week)
				Auto CAD (40/40) (2hrs per week)			
Mathematics (60/30) (2hrs per week)		Advanced Mathematics (60/30) (4hrs per week)			Electronic power control principles and practice (80/80) (4hrs per week)		
ICT (20/10) (2hrs per week)						Energy efficiency (40/20) (2hrs per week)	
	Technical Drawing (80/40) *(2hrs per weeks)*					Renewable energy (30/30) (2hrs per week)	
Mechanical Technology (100/100) (2hrs per week)			Electricity (30/15) (2hrs per week)				
Basic Engineering Science (60/30) (2hrs per week)		Advanced Science (60/30) (2hrs per week)					
Engineering Practice (60/30) (4hrs per week)							
Mechanical Engineering Occupation (20/10) (2hrs per week)							
Semester one: 360/240 (600) Notional Hours (360+240) = 600		**Semester two:** 260/130 (390) Notional Hours (260+130+210) = 600	**Semester three:** 260/130 (390) Notional Hours (260+130+210) = 600	**Semester four:** 250/140 (390) Notional Hours (250+140+210) = 600	**Semester five:** 310/290 (600) Notional Hours (310+290) = 600	**Semester six:** 120/60 (180) Notional Hours (120+60+420) = 600	
	Total hours for the program: 3600						

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Structure of the Programme for (6 semesters) for Full-time learners

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Health, Safety and Security Procedures (30/15)	Engineering Health and Safety (80/40)	Refrigeration (30/15)	Maintenance of machine systems (40/20)	Maintenance of machine systems (60/60)	Project (40/20)
Engineering Materials (20/20)	Engineering Principles (100/50)	Principles of maintenance, installation and Commissioning (60/30)	Organizing and managing engineering operations (80/40)	Electronic power control principles and practice (80/80)	Management (40/20)
Engineering Tools & Instruments 1 (30/15)	Engineering Tools & Instruments 2 (40/20)	Advanced Science (60/30)	Principles of Electrical & Electronics Engineering (40/20)	Principles of Electrical & Electronics Engineering (90/90)	Entrepreneurship (40/20)
Mechanical Engineering Occupation (20/10)	ICT (20/10)	Advanced Mathematics (60/30)	Renewable energy (30/30)	Energy efficiency (40/20)	
Technical Drawing 1 (20/10)	Technical Drawing 2 (20/10)	Technical Drawing 3 (20/10)	Technical Drawing 4 (20/10)	Auto CAD (40/40)	
Mechanical Technology (100/100)		Electricity (30/15)	Principles of maintenance, installation and Commissioning (40/20)		
Basic Engineering Science (40/20)					
Mathematics (40/20)					
Engineering Practice (60/30)					
	Work Based Experience (W.B.E rotation 2) (210)	Work Based Experience (W.B.E rotation 2) (210)	Work Based Experience (W.B.E rotation 2) (210)		Work Based Experience (W.B.E rotation 2) (420)
Semester one: 360/240 (600) Notional Hours (360+240) = 600	Semester two: 260/130 (390) Notional Hours (260+130+210) = 600	Semester three: 260/130 (390) Notional Hours (260+130+210) = 600	Semester four: 250/140 (390) Notional Hours (250+140+210) = 600	Semester five: 310/290 (600) Notional Hours (310+290) = 600	Semester six: 120/60 (180) Notional Hours (120+60+420) = 600
Total hours for the program: 3600					

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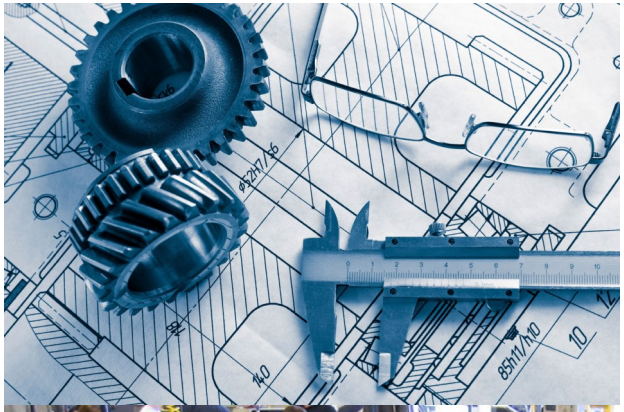
16. Apply principles and practice of Mathematics	Advanced Mathematics	3	9
17. Apply principles of electricity	Electricity	3	4.5
18. Demonstrate knowledge and skills in maintenance of machine systems .	Maintenance of machine systems	4	18
19. Demonstrate knowledge and skills in Organizing and managing of engineering operations	Organizing and managing engineering operations	4	12
20. Demonstrate knowledge of principles of Electrical & Electronics Engineering	Principles of Electrical & Electronics Engineering	4 & 5	24
21. Demonstrate knowledge of Renewable energy	Renewable energy	5	6
22. Apply principles and practice of Electronic power control.	Electronic power control principles and practice	5	16
23. Demonstrate knowledge of Energy Efficiency	Energy efficiency	5	6
24. Produce drawings using Auto CAD	Auto CAD	5	8
25. Apply knowledge and skills in design and production .	Project	6	6
26. Demonstrate knowledge of Industrial Management	Management	6	6
27. Demonstrate knowledge of Entrepreneurship	Entrepreneurship	6	6
Apply knowledge and skills of mechanical engineering during work based experience (WBE)	Work Based Experience (W.B.E)	2,3,4&6	105
		Total number of credits	360



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Books and References for Study

A number of publications are available for study and training in the National Diploma in Mechanical Engineering. They are books which are regularly updated with new editions. Learners are advised to identify the latest versions.

The following are available in the SIT Library and can be borrowed for study and references:

- An Introduction to technical Drawing, A. Yarwood
- Technical Drawing for G.C.E and C.S.E, J.N Green
- Mathematics for technicians New level 1 A.Greer and G.W.Tayor
- Maintenance Engineering Handbook by Lindley Higgins and Keith Mobley
- Plant Equipment & Maintenance, Engineering Hand book by Duncan C. Richardson
- GCSE Additional Applied Science Student Book by Nuffield/ York.
- Physical Metallurgy: Principle and Practice, V. Raghavan. Prentice Hall India Pvt Ltd.
- Machine Tool Technology by K S Yadav
- Industrial Safety & environment, Anupana Prashav
- Engineering Fundamentals, Roger Timings
- Mechanical Workshop Practice by K. C. JOHN
- Sheet Metal Work (Workshop Practice) by R.E. Wakeford
- Basic Welding and Fabrication W Kenyon

The following websites contain journals and articles on mechanical engineering:

- http://www.academicjournals.org/journal/JMER
- http://www.ccsenet.org/journal/index.php/mer
- http://journals.sagepub.com/home/ade