Republic of Namibia

MINISTRY OF EDUCATION, INNOVATION, YOUTH, SPORTS, ARTS AND CULTURE

NAMIBIA SENIOR SECONDARY CERTIFICATE (NSSC)

MOTOR MECHANICS SYLLABUS

ORDINARY LEVEL

SYLLABUS CODE: 6189

GRADE 10-11

For implementation in 2027
For first examination in 2028

Ministry of Education, Innovation, Youth, Sports, Arts and Culture
National Institute for Educational Development (NIED)
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Namibia

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Motor Mechanics Syllabus Ordinary Level Grade 10 - 11

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1. INTRODUCTION

The Namibian Senior Secondary Certificate Ordinary (NSSCO) level is designed as a two year course for examination after completion of the Junior Secondary phase. The syllabus is designed to meet the requirements of the *National Curriculum for Basic Education (NCBE, 2018)* and has been approved by the National Examination, Assessment and Certification Board (NEACB).

The NCBE guidelines, applicable at the stage of Senior Secondary Education (Grade 10-11) and at equivalent stages of non-formal education, as a part of life-long learning, recognise the uniqueness of the learner and adhere to the philosophy of learner-centred education.

The NCBE guidelines:

- recognise that learning involves developing values and attitudes as well as knowledge and skills
- promotes self-awareness and an understanding of the attitudes, values and beliefs of others in a multilingual and a multicultural society
- encourage respect for human rights and freedom of speech
- provide insight and understanding of crucial "global" issues in a rapidly changing world which affect quality of life: the HIV and AIDS, global warming, environmental degradation, maldistribution of wealth, expanding and increasing conflicts, the technological explosion and increased connectivity
- recognise that as information in its various forms becomes more accessible, learners need to develop higher cognitive skills of analysis, interpretation and evaluation to use information effectively
- seek to challenge and to motivate learners to reach their full potential and to contribute positively to the environment, economy and society

Thus the NCBE guidelines provide opportunities for developing essential, key skills across the various fields of study. Such skills cannot be developed in isolation and they may differ from context to context according to the field of study.

Motor Mechanics contributes directly to the development of the key skills marked*
The skills developed in Motor Mechanics are:

- communication skills*
- information skills*
- numeracy skills*
- self-management and competitive skills*
- problem solving skills*
- social and co-operative skills*
- physical skills*
- work and study skills*
- critical and creative thinking skills*

2. RATIONALE

This syllabus is part of the technology learning area in the NCBE and is intended to provide a sequence in Motor Mechanics which fosters the development of both manual and intellectual skills in the automotive industry. The approach to the subject which is advocated in this syllabus is problem centred and tries to involve learners in planning, designing and executing their practical work. The overall aim is to facilitate the acquisition of technical knowledge and skills, leading to self-reliance, which is essential for daily life, further study and the world of work within the automotive industry. Ultimately, the goal of Motor Mechanics is to increase the technological literacy of learners.

3. AIMS

The aims of the syllabus are the same for all learners. They are set out below and describe the educational purposes of a course in Motor Mechanics for the NSSC examination. They are not listed in order of priority.

The aims are to:

- Extend and deepen knowledge and understanding relating to motor mechanical practical activities to underpin personal engagement in the analysis and implementation of the syllabus.
- Provide an opportunity for experiential development and implementation of motor mechanical skills.
- Stimulate the development of a range of communication skills which are central to motor mechanical and problem solving.
- Provide an opportunity for the learners to initiate personally and accept major responsibility for the organisation and management of a project.
- Develop an awareness of the significance of Motor Mechanics upon society
- Realise how their professionalism impacts the customer and their colleagues.
- Recognise and celebrate diversity in cultures and use this positively to meet customer needs.

4. ADDITIONAL INFORMATION

Guided learning hours

The NSSCO level syllabuses are designed on the assumption that learners have about 130 guided learning hours per subject over the duration of two years, but this is for guidance only. The number of hours required to gain the qualification may vary according to local conditions and the learners' prior experience of the subject. *The National Curriculum for Basic Education (NCBE)* indicates that this subject will be taught for 8 periods of 40 minutes each per 7-day cycle, or 6 periods of 40 minutes each per 5-day cycle, over two years.

Prior learning

The Motor Mechanics syllabus is designed to build on knowledge and skills acquired in the Junior Secondary phase.

It is recommended that learners who are beginning this course should have previously studied Technical Studies B in Grades 8 & 9.

Progression

NSSCO levels are general qualifications that enable learners to progress either directly to employment, or to proceed to further qualifications.

Grading and reporting

NSSCO results are shown by one of the grades A*, A, B, C, D, E, F or G indicating the standard achieved, grade A* being the highest and grade G the lowest. 'Ungraded' indicates that the candidate has failed to reach the minimum standard required for a pass at NSSCO.

Support materials and approved textbooks

NSSCO syllabuses, specimen question papers, examiner reports and assessment manuals in subjects, where applicable, are sent to all schools. Approved learning support materials are available on the *Senior Secondary Textbook Catalogue for Schools*.

5. LEARNING CONTENT

The content is divided into 10 topics which are:

1. Safety
2. Units and measurements
3. Tools and materials
4. Vehicle components and operations
5. Communication
6. Maintenance service
7. Engine operation
8. Transmissions/transaxles
9. Electricity and electronics
10. Alternative Fuel Vehicles

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
1. Safety	• know safety and health hazards in the workplace and how to prevent them	• identify safety hazards and name preventative measures in the workplace: - tools - working surface - materials • identify health hazards and name preventative measures in the workplace: - physical hazards (noise, vibration, heat/cold, manual handling, sun) - chemical hazards (solids, liquids, gases) - biological hazards (micro-organisms, insects, animals) - stress hazards (stressful working conditions)
2. Units and measurements	• acquire the skills to perform conversion calculations	• convert: - lengths - mass - time - torque - velocity - area - volume - pressure - energy - temperature - power
3. Vehicle components and operations	• know and understand vehicle components, their functions and operations	• identify the following vehicle components, state their functions and operations: - engine parts - cooling system - lubrication system - charging system - starting system

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
3. Vehicle components and operations (continued)		- lighting system - suspension system - brake system - steering system - manual transmission - automatic transmission - transfer box - axle assembly - final drive - exhaust system - catalytic converter - drive shafts
	• understand how to conduct a roadworthiness inspection	• identify areas to be examined during a roadworthy test of a vehicle • explain how to examine key areas of a vehicle during a roadworthiness test: - tyres - windows - wind shield - mirrors - lights - steering - brakes - hooter - suspension parts - wheel alignment

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
4. Tools and materials	• know different tools and special tools	• identify and apply measuring and marking out tools: - micro meters - vernier callipers - engraving tool - letter punch • identify and correctly use the following tools: - spanner set - socket set - torque wrench - filter strap wrench - tap and die set - cylinder hone (engine and brake cylinder) - soldering irons - electric drill (hand and pedestal) - clamping tools - grinding tools - pullers - hydraulic press
	• know sealing materials and adhesives	• describe the function of different gasket materials • describe the function of different rubber materials • describe the function of different seals and applications
	• acquire the skills to work with sealing materials and adhesives	• identify and use different adhesives and sealants
	• know fasteners	• identify different threads of bolts and nuts and hydraulic fittings • identify helical inserts and locking pins and keys

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
5. Communication	• show the skills of effective communication	• communicate with management, workshop personnel and customers by means of: - interpretation of data - visual communication - written communication - electronic communication - work related documents and forms (job cards)
6. Maintenance service	• acquire the skills to perform a complete maintenance and service procedures	• explain a complete maintenance and service procedure according to the workshop manual: - check and replace engine oil - replace filters (air, fuel, oil) - check and replace oil (differential, transmission, power steering) - check and replace brake fluid - lubricate hinges and door catches - apply grease to applicable grease points - replacement of brake pads and brake shoes - bleeding brakes • carry out a complete maintenance and service procedure according to the workshop manual: - check and replace engine oil - replace filters (air, fuel, oil) - check and replace oil (differential, transmission, power steering) - check and replace brake fluid - lubricate hinges and door catches - apply grease to applicable grease points - replacement of brake pads and brake shoes - bleeding brakes - visual inspection of all components - adjustments on replacement parts - function and condition of electrical and mechanical systems

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
7. Engine operation	• acquire the skills to work on engine cooling systems	• identify cooling system components • explain the function of cooling system components • differentiate between air cooled and liquid cooled engines • test radiator for leakages and pressure loss • identify cooling system faults • repair cooling system faults • describe the operation of: - the water pump - the thermostat • remove and replace: - water pumps - radiators - fans - cowlings - thermostat - hoses • test electric fan motor
	• acquire the skills to work on lubrication systems	• identify lubricating system components • describe the function of lubrication system components • describe the purpose of oil additives • describe oil filter construction and operation (including pressure relieve systems)

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
8. Transmission/transaxles	• know clutch systems	• describe: - the construction and operation of the clutch (single and multi-plate) - the construction and operation of the clutch master cylinder - the construction and operation of the slave cylinder - the construction and operation of the clutch release mechanisms
	• know the basic transmission/transaxle layouts	• identify: - main shaft/output shaft - pilot shaft/input shaft - counter shaft - dual clutch layout - synchromesh unit - selector forks and shafts mechanisms - pilot bearings - transaxle designs
9. Electricity and electronics	• know basic electrical terms	• define common electrical terms: - voltage - resistance - current
	• acquire the skills to calculate using Ohms law	• describe Ohms law • calculate advanced calculations, using Ohms law: - voltage - resistance - current - total resistance in series and parallel
	• understand basic wiring systems	• explain and draw basic electrical circuit diagrams: - starting circuit - lighting circuit - charging circuit

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
9. Electricity and electronics (continued)	• know basic electrical components in vehicles	• describe the purpose/function of electrical components in vehicles: - battery - switches - lamps - relays - solenoids - electric motors - gauges
	• know basic electronic components in vehicles	• describe the purpose/function of electronic components in vehicles: - resistors - transistors - capacitors - diodes - sensors - actuators - Integrated Circuits (IC) - printed circuits - control units
	• acquire the skills to test circuits	• test with multi-meters for short circuits, ground and high resistance
10. Alternative Fuel Vehicles	• know different alternative Fuel Vehicles (AFVs)	• identify different types of alternative fuel vehicles: - electric vehicles (EV) - hybrid vehicles (HEV and PHEV) - hydrogen fuel cell vehicles (FCEV) - compressed natural gas (CNG) vehicles - biofuel-powered vehicles • explain the advantages and limitations of alternative fuel vehicles in terms of : - environmental impact - efficiency and performance - cost and availability of fuel/charging infrastructure

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
10. Alternative Fuel Vehicles (continued)	• know different alternative Fuel Vehicles (AFVs) (continued)	• describe the basic operation and maintenance of selected AFVs, including: - battery systems and charging for EVs/HEVs - storage and handling of hydrogen and CNG - fuel systems in biofuel-powered engines

6. ASSESSMENT

6.1 Assessment objectives

The four assessment objectives in Motor Mechanics are:

A Knowledge with understanding
B Problem solving
C Interpret data
D Practical skills

A description of each assessment objective follows. Under each assessment objective a list is given of the skills a learner should be able to demonstrate.

A Knowledge with understanding

Learners should be able to:

- demonstrate the ability to state facts, recall, identify and name items, recall and describe processes
- demonstrate the ability to apply and relate knowledge to maintenance and repairing
- make reasoned arguments and anticipate consequences of the outcomes of the automotive processes.
- demonstrate a crucial awareness of the interrelationship between Technology and the needs of society

B Problem solving

Learners should be able to:

- recognise problems, identify clearly from a situation a specific need for which a solution is required
- analyse a problem
- investigate, research, collect and record relevant data and information
- generate a solution to a problem, giving consideration to the constraints of time, cost, skills and resources
- test and evaluate the effectiveness of a solution

C Interpret data

Learners should be able to:

- recognise information in one form and where necessary change it into a more applicable form
- interpret data in a variety of forms such as charts, diagrams, graphs, flow charts and drawings

D Practical skills

Learners should be able to:

- plan and organise the procedures involved in the realisation of a solution
- demonstrate appropriate manipulative skills by showing an understanding of materials and their characteristics in relation to their use
- demonstrate appropriate manipulative skills by showing the ability to correctly and efficiently use instruments and tools in the solution of a problem.
- test and evaluate the process and product in terms of aesthetic, functional and technical quality

6.2 Scheme of assessment

Learners must be entered for Paper 1, Paper 2 (Practical Examination) and Paper 3 (Portfolio).

Differentiation

All learners are expected to pursue the same curriculum content and differentiation will be by outcome.

Description of papers

Paper 1

Written	**2 hours**	**100 Marks**	**Weighting 50%**

This paper will consist of two sections, A and B.

Section A:
Section A will consist of **ten** short answer questions of variable length for a total of **30 marks**.

Section B:
Section B will consist of **seven** structured questions for a total **70 marks.**

Paper 2

Practical Examination	**3 hours**	**50 Marks**	**Weighting 25%**

Each learner will undertake a practical examination. The examination will be internally marked and externally moderated.

Learners will be expected to demonstrate practical skills which will include two tasks of maintenance and repair nature set by DNEA.

Paper 3

Portfolio	**4 terms**	**50 Marks**	**Weighting 25%**

Learners will be expected to demonstrate practical skills. **Five** practical tasks must be completed within **four** terms. The learners must commence with their project in the second trimester of Grade 10 and complete it by the end of the second trimester of Grade 11, to be ready for submission to DNEA at the beginning of the third trimester of grade 11.

The work presented for assessment will typically be in the form of an A4 sized folder.

The portfolio should include photographic evidence and written proof of tasks completed.

The portfolio will be internally marked and externally moderated by DNEA

6.3 Specification grid

Assessment objectives	Paper 1 (marks)	Paper 2 (marks)	Paper 3 (marks)	Overall weighting of papers
A Knowledge with understanding	60	-	-	30%
B Analysis and problem solving	20	-	15	17,5%
C Interpret data	10	10	15	17,5%
D Practical Skills	10	40	20	35%
Total marks	**100**	**50**	**50**	**200**
Weighting	50%	25%	25%	100%

The assessment objectives are weighted to give an indication of their relative importance. They are not intended to provide a precise statement of the number of marks allocated to a particular assessment objective**.**

6.4 Grade descriptions

Learners who have followed this curriculum are eligible for the award of grades A* to G.

The candidate is likely to have shown:

	A	C	E	G
	Excellent ability to:	**Good ability to:**	**Some ability to:**	**Limited ability to:**
Knowledge and understanding	• identify detailed facts and techniques in relation to the content of the syllabus	• identify facts and techniques accurately in relation to the content of the syllabus	• identify basic facts and techniques accurately in relation to the content of the syllabus	• identify basic facts accurately in relation to the content of the syllabus
	• describe / explain / define the theories and principles of the syllabus in detail	• describe / explain / define clearly the theories and principles of the syllabus	• familiarity with the basic theories and principles of the syllabus	• be familiar with the basic principles of the syllabus
Problem solving	• analyse and evaluate problems and situations	• analyse and evaluate problems and situations	• identify and define / describe problems and situations	• identify problems and situations
	• use judgement to structure / create effective plans of action	• use judgement to structure / create appropriate plans of action	• structure / create reasonable plans of action	• suggest solutions
Interpretation of data	• communicate information, ideas and processes (and solutions) in detail	• communicate information, ideas and processes (and solutions)	• communicate information, ideas and processes (and solutions)	• communicate information, ideas and processes (and solutions)
	• choose the most appropriate method to communicate in different situations	• choose appropriate methods to communicate in different situations	• choose communication methods for different situations	• choose different communication methods
	• interpret and handle information appropriately	• interpret and handle information adequately	• interpret and handle information	• handle information

	A	C	E	G
	Excellent ability to:	**Good ability to:**	**Some ability to:**	**Limited ability to:**
Practical skills	• apply a plan / specifications effectively and systematically	• apply a plan / specifications accurately and adequately	• apply a plan / specifications	• apply a plan / specifications
	• manage resources effectively	• manage resources	• manage resources	• manage resources
	• use equipment and tools effectively	• use equipment and tools appropriately	• use equipment and tools	• use equipment and tools
	• demonstrate correct techniques	• demonstrate appropriate techniques	• apply techniques	• be familiar with techniques
	• apply numerical skills effectively	• apply numerical skills appropriately	• apply numeric skills	• apply numeric skills
	• adhere to safety measures	• adhere to safety measures	• adhere to safety measures	• be familiar with safety measures
	• evaluate work and progress	• monitor and comment on work and progress	• comment on their work	• make basic comments about their work

6.5 GLOSSARY OF COMMAND WORDS

Analyse	examine in detail to show meaning, identify elements and the relationship between them
Calculate	work out from given facts, figures or information
Classify	to assign things or people to classes or groups
Compare	identify/comment on similarities and/or differences
Conceptualise	to arrive at a concept or generalization as a result of things seen experienced or believed
Contrast	identify/comment on differences
Convert	change from one form, state, etc., to another
Define	give precise meaning
Demonstrate	to show or prove something clearly and convincingly
Describe	state the points of a topic / give characteristics and main features
Determine	use the information given to work out the answer
Develop	take forward to a more advanced stage or build upon given information
Discuss	write about issue(s) or topic(s) in depth in a structured way
Display	to make something visible or available for others to see
Distinguish	show the difference between one or more variables
Evaluate	judge or calculate the quality, importance, amount, or value of something
Explain	set out purposes or reasons / make the relationships between things evident / provide why and/or how and support with relevant evidence
Give	produce an answer from a given source or recall/memory
Identify	name/select/recognise
Interpret	reasoning or some reference to theory, depending on the context
Investigate	examine a problem in a systematic way
Justify	support a case with evidence/argument
List	give a number of points, generally each of one word
Outline	set out main points

Relate	find the relationship between one or more variables
Report	to give information about something that has happened
Research	methodical investigation into a subject in order to discover facts, to establish or revise a theory or to develop a plan of action based on the facts discovered
Select	choose from a number of alternatives
Sketch	make a simple freehand drawing showing the key features, taking care over proportions
State	express in clear terms
Suggest	apply knowledge and understanding to situations where there are a range of valid responses in order to make proposals

7. GLOSSARY OF SUBJECT TERMS

Automatic transmission fluid	a mixture of chemicals that has various lubrication properties used in automatic transmissions and have no mineral oils
Brake fluid	a combination of chemicals that have a specific property to allow high temperatures and rubber swell protection and is used in hydraulic brake systems
Coil springs	circular shaped high tensile spring used to absorb road shocks
Compressor	machine that compresses air and stores it in a pressure vessel
Dial gauge	a measuring instrument that uses a clock type dial to measure specific tolerances and side movement
Electronic diagnosis tester	a combination of various instruments used by the workshop to diagnose the specific electrical faults of the engine management system
Filter strap wrench	a metal lever and belting used to undo an oil filter
Hoist	has 2 or 4 legs and platform where a vehicle is driven on and then hydraulically lifted to allow work to be done underneath
Jack	a special designed hydraulic cylinder and stand to lift a vehicle
Keys	a special shape of metal that is used to prevent a pulley on a shaft from rotating on it and is mostly located in a groove on the shaft and slot on pulley
Leaf springs	a set of high strength metal blades staked on top of each other to allow the vehicle to drive over a rough terrain and let the axle move independent of the vehicle body
Multi meter	an electrical measuring combination instrument that can measure volts ohms and amps
Owner's manuals	a information book about the specific vehicle model operating procedures and specifications, used by vehicle owner to operate and do minor maintenance himself
Ring squeezer	a round sheet metal and lock used to compress piston rings for installation
Shackles	a movable joint between the axle and leaf spring and allows expansion and contraction
Shock absorbers	cylinder shaped tube filled with oil and gas to allow the axles to move up and down independently to body and thereby providing comfort driving
Sling	a steel wire robe or special materials that has steel rings on ends used to lift any heavy object by crane
Split pins	a pin with two legs that are used on special castled nuts to prevent them from loosening during vehicle operations
Timing light	a strobe light that uses electrical impulses to measure the degree of engine ignition timing

Workshop manuals	a specialised technical book that has text and pictures and specifications on how to repair, adjust or maintain a vehicle, used in workshops
Anti-freeze	a combination of ethylene glycol and water used in the engine cooling system to prevent freezing and overheating
Mineral oil	is a by-product of crude oil and is extracted in a refinery and used for lubrication purposes
Studs	a special type of bolt that has no head but both sides are threaded
Telescopic gauge	a measuring tool that has two legs that move outwards and are locked to measure inside diameters
Micro meter	a precision measuring instrument that can read in very small increments and is mostly used at machine shops to measure small tolerances
Torsion bars	a very high tensile steel bar used in suspensions that provides springing by being twisted
Trestles	a leg made of pipe and three side legs that support the vehicle safely when lifted by jack
Final drive	a set of gears that allow drive at a 90 degree angle
Steel rule	a steel rule is a basic measuring tool
Tape measure	a flexible ruler that consists of a ribbon of cloth, plastic, fibre glass, or metal strip with linear-measurement markings - it is a common measuring tool
Straight edge	a bar with one accurately straight edge, used for testing whether something else is straight
Vernier calliper	a precision instrument that can be used to measure internal and external distances extremely accurately
Inside calliper	a calliper whose legs turn outward so that it can accurately measure inside dimensions, as the inside diameter of a pipe
Outside calliper	calliper for measuring outside dimensions; points on its legs curve inward
File	a tool used to remove fine amounts of material from a workpiece. It is common in woodworking, metalworking
Rasp	a coarse form of file used for coarsely shaping wood or other material
Mallet	a hammer with a large, usually wooden/rubber head
Boring tool	the process of enlarging a hole that has already been drilled (or cast), by means of a single-point cutting tool
Pincer	a gripping tool consisting of two pivoted limbs forming a pair of jaws and a pair of handles
Screwdriver	a tool with a flattened or cross-shaped tip that fits into the head of a screw to turn it

Centre punch	a tool consisting of a metal rod with a conical point for making an indentation, to allow a drill to make a hole at the same spot without slipping
Dot punch	normally used to mark the centre of a hole to be drilled either by hand or on the drilling machine. The dot punch is a lighter and thinner version of the centre punch and is used basically for the same job, however, it is more accurately as the dot produced is smaller
Hollow punch	a hollow cylindrical tool tapered on its outside diameter to form a cutting edge and used to punch circular washers from sheets of soft materials, e.g. rubber, leather etc.
Spanner	a tool with a shaped opening or jaws for gripping and turning a nut or bolt
Socket	fitted to ratchet to remove bolts and nuts
Ratchet	a socket wrench is a type of wrench or spanner that has a socket attached at one end, usually used to turn a fastener. The most prevalent form is the ratcheting socket wrench, often called a ratchet
Universal joint	a joint or coupling that allows parts of a machine not in line with each other limited freedom of movement in any direction while transmitting rotary motion
Plug spanner	a spanner for removing or tightening spark plugs into the cylinder head of an internal combustion engine
Feeler gauge	a gauge consisting of a number of thin blades for measuring narrow gaps or clearances
Torque wrench	a tool for setting and adjusting the tightness of nuts and bolts to a desired value
Chisel	a long-bladed hand tool with a bevelled cutting edge and a handle which is struck with a hammer or mallet, used to cut or shape wood, stone, or metal
Battery tester	a battery tester is an electronic device intended for testing the state of an electric battery, going from a simple device for testing the charge actually present in the cells and/or its voltage output, to a more comprehensive testing of the battery's condition
Trolley jack	a jack with wheels used as a lifting device to lift heavy loads or to apply great forces. ... The most common form is a car jack, floor jack or garage jack, which lifts vehicles so that maintenance can be performed
Vehicle hoist(2/4 post)	a hoist is a device used for lifting or lowering a load by means of a drum or lift-wheel around which rope or chain wraps. It may be manually operated, electrically or pneumatically driven and may use chain, fibre or wire rope as its lifting medium
Electric hand drill	a portable, hand-held, motor-driven tool used for boring holes in a material
Pedestal drill	a drill press (also known as pedestal drill, pillar drill, or bench drill) is a fixed style of drill that may be mounted on a stand or bolted to the floor or workbench
Transmission	the mechanism by which power is transmitted from an engine to the axle in a motor vehicle

Transaxle	an integral driving axle and differential gear in a motor vehicle
Differential	the automotive differential is designed to drive a pair of wheels while allowing them to rotate at different speeds. In vehicles without a differential, such as karts, both driving wheels are forced to rotate at the same speed, usually on a common axle driven by a simple chain-drive mechanism
Washer	a small flat metal, rubber, or plastic ring fixed between two joining surfaces or between a nut and a bolt to spread the pressure or act as a spacer or seal
Bolt	a fastener made by screwing a nut onto a threaded bolt. bolt - a screw that screws into a nut to form a fastener, fastening, holdfast, fastener
Nut	a nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten two or more parts together
Screw	a short, slender, sharp-pointed metal pin with a raised helical thread running around it and a slotted head, used to join things together by being rotated so that it pierces wood or other material and is held tightly in place
Grease	a thick oily substance, especially as used as a lubricant
Engine cleaner	type of soap to clean engine
Hand cleaner	a soap for cleaning the hands
Rags	a piece of old cloth, especially one torn from a larger piece, used typically for cleaning things
Gasket/o-rings	a shaped sheet or ring of rubber or other material sealing the junction between two surfaces in an engine or other device
Leather gloves	a glove is a garment covering the whole hand. Gloves have separate sheaths or openings for fingers. Leather gloves provide protection from occupational hazards
Latex gloves	are personal protective equipment worn over the hands to protect hand from harmful chemicals.

ANNEXE A: PRACTICAL EXAMINATION ASSESSMENT SUMMARY FORM (NSSCO MOTOR MECHANICS)

Please read the instructions printed overleaf <u>before</u> completing this form.

Centre number					Centre name		November	2	0		

Candidate number	Candidate name	Teaching group/ set	**Part A** Planning (max 20)	**Part B** Realisation (max 20)	**Part C** Reflection (max 10)	**Total mark (max 50)**	**Internally moderated mark (max 50)**

Name of subject teacher teacher completing this form		Signature		Date	
Name of internal moderator		Signature		Date	

MODERATION

(a) Internal moderation

When several teachers in a centre are involved in internal assessment, arrangements must be made within the centre for all learners to be assessed to a common standard.

It is essential that within each centre the marks for each skill assigned within different teaching groups (e.g. different classes) are moderated internally for the whole centre entry. The centre assessments will then be subjected to external moderation.

(b) External moderation

Practical assessment summary forms must be received by Regional Office / REXO during the first week of September along with samples of the practical work tasks undertaken by the learners and the schemes of assessment for each assignment. The samples should cover the full ability range. If there are ten or fewer learners, all the practical work that contributes to the final mark for all learners must be sent to DNEA. Where there are more than ten learners, all the practical work that contributes to the final mark for ten of them will be required. The centre should select learners covering the whole mark range, with the marks spaced as evenly as possible, from the top mark to the lowest mark. If appropriate, the samples should be selected from the classes of different teachers. A further sample of practical work may subsequently be required. All records and supporting work should be retained until after the publication of the results.

The Directorate of National Examination and Assessment (DNEA) will issue instructions to centres in Namibia concerning external moderation arrangements.

ANNEXE B: COURSEWORK ASSESSMENT SUMMARY FORM (NSSCO MOTOR MECHANICS)

Please read the instructions printed overleaf <u>before</u> completing this form.

Centre number					Centre name			November	2	0		

Candidate number	Candidate name	Teaching group/ set	**Practical Task1** (max. 10)	**Practical Task 2** (max. 10)	**Practical Task 3** (max. 10)	**Practical Task 4** (max. 10)	**Practical Task 5** (max .10)	**Total mark** **(max. 50)**	**Internally moderated marks** **(max. 50)**

Name of subject teacher completing this form		Signature		Date	
Name of internal moderator		Signature		Date	

A. INSTRUCTIONS FOR COMPLETING PRACTICAL WORK ASSESSMENT SUMMARY FORMS

1. Complete the information at the head of the form.
2. List the candidates in an order which will allow ease of transfer of information to a computer-printed practical work mark sheet MS1 at a later stage (i.e., in candidate index number order, where the list is known; see item B.1 below). Show the teaching group or set for each candidate. The initials of the teacher may be used to indicate a group or set.
3. Transfer each candidate's marks to this form as follows**:**
   (a) Where there are columns for individual skills or assignments enter marks initially awarded (i.e. before internal moderation has taken place).
   (b) In the column headed 'Total Mark', enter the total mark awarded before internal moderation has taken place.
   (c) In the column headed 'Internal Moderated Mark', enter the total mark awarded ***after*** internal moderation has taken place.
4. Both the teacher completing the form and the internal moderator (or moderators) should check the form and complete and sign the bottom portion.

B. PROCEDURES FOR EXTERNAL MODERATION

1. The Directorate of National Examinations and Assessment (DNEA) sends a computer-printed practical work mark sheet MS1 to each centre showing the names and index numbers of each learner. Transfer the total internally moderated mark for each learner from the practical work Assessment Summary Form to the computer-printed practical work mark sheet MS1.
2. The top copy of the computer-printed practical work mark sheet MS1 and samples of the candidates' work covering the full ability range must be dispatched in the specially provided envelope to reach the DNEA, on date to be announced officially.
3. Indicate the candidates who are in the sample by means of an asterisk (*) against the candidates' names on the overleaf. The size of the practical work sample should be as follows:

Number of candidates entered	***Number of candidates whose work is required***
0 – 10	All candidates
11 - 50	10
51 - 100	15
above 100	20

4. Where more than one teacher is involved in marking the work, the sample must include candidates marked by all teachers. Candidates must be selected so that the whole range is covered, with marks spread as evenly as possible from the top mark to the lowest mark.
5. DNEA reserves the right to request further samples of practical work.
6. Send with the sample work records of the centre's criteria for the award of marks and information as to how internal moderation was carried out.

ANNEXE C: LIST OF TOOLS, EQUIPMENT AND MATERIALS

- Steel rule
- Folding rule
- Tape measure (5m)
- Straight edge
- Callipers (vernier)
- Micro meters
- Winged compasses
- Compasses
- Dial gauge
- Telescopic gauge
- Files and rasps
- Hammers and mallets
- Drill set
- Pincers
- Screwdrivers
- Punches
- Spanners sockets
- Feeler gauge
- Torque wrench
- Chisels
- Ring squeezer
- Filter strap wrench
- Jack and trolley jack
- Trestles
- Multi meter
- Tap an die set
- Soldering iron
- Vice grip
- Pliers
- Pullers
- Steel work benches
- Bench grinder
- Allen keys
- Engraving tool
- Letter punch
- Electrical hand drill
- Pedestal drill
- Engine/vehicle
- Transmission (5 speed)
- Transaxle (manual 5 speed)
- Differential
- Vehicle suspension components
- Engine loose components-cooling/lubrication
- Lifting equipment
- Washer assortments
- Bolts, nuts and screws assortments
- Grease
- Oil
- Brake fluid
- Engine cleaner and floor cleaning agent
- Hand cleaner
- Rag
- Assortment of electrical wiring
- Assortment of electrical components
- Gasket material
- Safety glasses
- Gloves
- Ear protection
- Electrical terminals
- Starter motor
- Alternator
- Clutch kit
- Steering rack
- Small air compressor
- Engineers square
- 4post/2post lift
- Engine crane
- Shackles



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