



GAUTENG PROVINCE

Department: Education

REPUBLIC OF SOUTH AFRICA

MECHANICAL TECHNOLOGY 2026

REVISED ANNUAL TEACHING PLAN

Grade 10 – 11

AUTOMOTIVE

AUTOMOTIVE GRADE 10 – TERM 1

Topic	Content	%	Date completed	Sign
SAFETY (Generic)	Organise and manage activities responsibly and effectively, including self-management and HIV/Aids awareness; Safety precautions taken into account during performance-based activities in order to avoid injuries or incidents. Explain his/her rights, human rights, contributions and responsibilities: Knowledge of basic first aid Understand the OHS Act Learners must be fully aware of all the safety precautions when using the following tools: • Hand tools • pedestal drill • Bench grinder	2%		
	Identify safe and hazardous acts and conditions (e.g. speed of emery wheels etc.) Refer specifically to the following tools/machines/equipment (refer to Topic 2: • Compressors • Fire extinguisher • Lifts, jacks & trestles. Practical: Identify safe and hazardous acts and conditions (e.g. speed of emery wheels, Maximum lift on hydraulic equipment etc.) Apply personal hygiene measures. Note: Apply personal hygiene measures. Clean workshop on a weekly basis	5%		

Topic	Content	%	Date completed	Sign
TOOLS (Generic)	Basic tools and equipment: • Spanners: ring-, flat- and combination- • Sockets and accessories • Pliers • Hammers • Chisels, hacksaws, • Screwdrivers • Allen keys • Files • Stocks & dies.	7%		
	Application of measuring and marking-off instruments: • Steel Rule • Square • Scriber • Tape measure • Combination set • Punches	12%		
	Practical: Use the marking-off instruments to mark-off a plate (at least 5mm thick) with 5 holes.			
TOOLS & EQUIPMENT (GENERIC)	Understand the OHS Act Learners must be fully aware of all the safety precautions when using the following tools: • Compressors • Fire extinguisher • Lifts, jacks & trestles Practical: Identify safe and hazardous acts and conditions (e.g. speed of emery wheels, maximum lift on hydraulic equipment.	15%		

Topic	Content	%	Date completed	Sign
Engines (Generic)	Operating principles of 2 and 4 stroke internal combustion engines. (Single cylinder spark ignition engines only): • Stroke • Dead centre • Cycle Practical: Demonstrate knowledge of the operating principles of the 2 and 4 stroke internal combustion spark ignition engines	20%		
Engines (Specific)	Identification and function of engine components: • Pistons, • piston rings, • crankshaft, • connecting rod, • bearings, • gudgeon pin, • camshaft, • valves, • flywheel, • cylinder head, • engine block, • oil pump, • manifolds, • carburettors, etc Conventional layouts: • Engine in front with front- and rear-wheel drives • Engine at rear with rear-wheel drive • Advantages and disadvantages of each position	25% 30%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
ASSIGNMENT	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

Topic	Content	%	Date completed	Sign
Forces (Generic)	Forces: Different types of forces found in engineering components: • Pulling force (Tensile) • Compressive force • Shearing force	33%		
	Moments: Moments found in engineering components (basic calculations). Definition: Moment = force x perpendicular distance (Spanner used to tighten a nut or bolt)	40%		

Topic	Content	%	Date completed	Sign
Maintenance (Generic)	Properties of lubricants: • Viscosity • Pour point, etc.			
	Grading of oil according to viscosity: (SAE standards) • Transmission oil • Engine oil • Differential oil • Cutting fluid • Grease	46%		
	Friction: • Characteristics and Application			
	Define the following types of maintenance: • Preventive • Predictive • Reliability centred maintenance	50%		
	Lack of maintenance on equipment • Excessive wear • Overheating/seizing; and distortion • Failure	55%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
MIDYEAR TEST / EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

AUTOMOTIVE GRADE 10 – TERM 3

Topic	Content	%	Date completed	Sign
Terminology (Specific) Drive trains	Function, construction and operation of the single-plate clutch assembly: • Flywheel • Diaphragm pressure plate • Clutch Plate • Clutch couplings, etc. • Hydraulic: Master & slave cylinders, pipes • Fault finding	62%		
	Identify and investigate the various components of the constant mesh manual gearbox and define the construction, function, operation and power flow of: • Gears • Shafts • Synchronising unit, • Selector mechanism. Function, construction and operation of drive shafts: • The Slip Joint • Universal Joint • Constant Velocity Joint • Flexible coupling	68%		

Topic	Content	%	Date completed	Sign
Maintenance (Specific)	Lubrication Systems: - Splash feed, Pressure Feed and Full pressure feed Oil: - Oil purity, oil dilution, Crankcase ventilation - Oil Filtration systems: Full-flow and by-pass systems	72%		
	Temperature Control: - Factors generating heat Cooling systems: - Direct air - Indirect air cooling Components: - Radiators, - Radiator pressure cap, - Water pumps, - Thermostat, - By-pass system, etc. Practical: - Do a visual inspection on a cooling system - Do a pressure test Check and maintain all fluid levels: - Water - Oil - Brake fluid	78%		
Systems & Control (Specific)	Basic carburetion: - Function of a carburettor - Basic principle of operation, etc.	82%		
	Air filters: - Purpose and types. Hydraulic brake system: - Master Cylinder (function) - Wheel Cylinders - Disc brake assembly - Brake shoe assembly - Hand brake assembly.	87%		
REVISION / INFORMAL ASSESSMENT(S)		Date(s) completed _____	HOD Signature: _____ Date: _____	
CONTROLLED TEST		Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet	

AUTOMOTIVE GRADE 10 – TERM 4

Topic	Content	%	Date completed	Sign
Systems & Control (Specific)	Electricity: • Electron theory – basic electrical principles: ➤ Electron movement ➤ Electrons and conductors ➤ Pulse with modulation ➤ Digital & analogue signal ➤ Effects of electricity • Characteristics of magnetism • Electromagnets • Ohm's Law • Electrical units and measurements: ➤ Volts ➤ Amps ➤ Ohms • Use of the Multi-meter • Basics series and parallel circuits • Battery – lead acid type	92%		
		100%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____ All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		
FINAL EXAMINATION	Date completed _____			

AUTOMOTIVE GRADE 11 – TERM 1

Topic	Content	%	Date completed	Sign
Safety (Generic)	First Aid HIV/Aids Awareness OHS Act: Machine specific safety measures when dealing with: • Grinding machines • Cutting machines • Press machines • Hydraulic operated equipment	5%		
Tools (Generic)	The principles and functions of the following: • Stocks and dies (characteristics and drill sizes) • Grinding machines • Cutting machines (drilling machines) • Press machines	10%		
Tools (Specific)	The principles and functions of the following: • Dial indicators • Telescopic gauges • Torque wrenches • Outside, Inside micrometers and vernier calliper	15%		
Engines (Specific)	C.I. Engines: Combustion chamber designs for direct and indirect injection Injector: Function, construction, operation and types of nozzles Valve assemblies: • Identify various overhead valve arrangements • Identify various camshafts arrangements on SOHC and DOHC • Cam followers – mechanical and hydraulic valve timing diagram – • Continuously variable valve timing (CVVT) system • Purpose and importance of valve clearance • Timing gears, chains, belt drives and tensioners	20% 25%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
ASSIGNMENT	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

AUTOMOTIVE GRADE 11 – TERM 2

Topic	Content	%	Date completed	Sign
Systems & Control (Specific)	Basic function, construction and operation of final drives: • Spiral bevel type • Hypoid type • Conventional differential • Limited slip differential	27%		
	Identify the layout and purpose of different drive systems: • Four-wheel drive • All-wheel drive	30%		
	Hydraulic brakes: • Master Cylinder (Parts & Operation) • Vacuum servo unit (purpose and operation) • ABS braking system (basic lay-out and operation)	35%		
	Define the difference in construction between: • Front axles • Rear axles: ➤ Semi-floating ➤ Full-floating	40%		
	Steering systems, layout & operation: • Types of steering boxes • Power steering • Electric p/steering			
	Identify the function & purpose of the following steering control components: • Drag links • Tie rod ends • Ball joints	48%		
	Suspension layout and operation: • Define sprung and un-sprung mass • Semi-elliptic leaf • Coil springs • Torsion bars • Control ➤ Telescopic shock absorbers (gas and hydraulic) ➤ Anti-roll bars ➤ Stabilisers	58%		

REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____
MIDYEAR TEST / EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet

AUTOMOTIVE GRADE 11 – TERM 3

Topic	Content	%	Date completed	Sign
Systems & Control (Specific)	ELECTRICITY Identify the functions and describe the operation of the conventional ignition system with reference to: • Firing order • Ignition timing • Spark plugs • Purpose of mechanical and vacuum regulators	65%		
	Starting circuit: Show an understanding of the basic starting circuit.			
	Supplemental systems (purpose and operation): • Traction control • Air bag control	75%		

Topic	Content	%	Date completed	Sign
Maintenance (Generic)	Engine Lubrication Oil pumps (purpose and operation): • Gear • Vane • Rotor	80%		
Maintenance (Specific)	Demonstrate an understanding of oil control methods referring to: • Oil filtration systems • Pressure relief valve • Seals Servicing of vehicles: • Importance of regular servicing	85%		

Topic	Content	%	Date completed	Sign
Forces (Specific)	Automotive calculations and application: • Work • Power • Torque • Compression Ratio	90%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____ All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		
CONTROLLED TEST	Date completed _____			

AUTOMOTIVE GRADE 11 – TERM 4

Topic	Content	%	Date completed	Sign
Terminology (Specific)	Work shop administration ➤ Read and interpret job instructions ➤ Read & interpret & adhere manufacturers specifications	100%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____ All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		
FINAL EXAMINATION	Date completed _____			

FITTING AND MACHINING

FITTING & MACHINING GRADE 10 – TERM 1

Topic	Content	%	Date completed	Sign
SAFETY (Generic)	Organise and manage activities responsibly and effectively, including self-management and HIV/Aids awareness; Safety precautions taken into account during performance-based activities in order to avoid injuries or incidents. Explain his/her rights, human rights, contributions and responsibilities: Knowledge of basic first aid	2%		
	Understand the OHS Act Learners must be fully aware of all the safety precautions when using the following tools: • Hand tools • pedestal drill • Lathe Machine • Milling Machine • Bench grinder	5%		
	Identify safe and hazardous acts and conditions (e.g. speed of emery wheels etc.) Refer specifically to the following tools/machines/equipment (refer to Topic 2: • Power saws • Compressors • Fire extinguisher	8%		
	Practical: Identify safe and hazardous acts and conditions (e.g. speed of emery wheels, Maximum lift on hydraulic equipment etc.) Apply personal hygiene measures.			
	Note: Apply personal hygiene measures. Clean workshop on a weekly basis			

Topic	Content	%	Date completed	Sign
TOOLS (Generic)	Basic tools and equipment: • Spanners: ring-, flat- and combination- • Sockets and accessories • Pliers • Hammers • Chisels, hacksaws, • Screwdrivers • Allen keys • Files • Stocks & dies.	12%		
	Application of measuring and marking-off instruments: • Steel Rule • Square • Scriber • Tape measure • Combination set • Punches	16%		
	Practical: Use the marking-off instruments to mark-off a plate (at least 5mm thick) with 5 holes.			

Topic	Content	%	Date completed	Sign
MATERIALS (Generic)	Characteristics, composition and use of: • Ferrous metals and alloys: ➤ Low carbon steel ➤ Medium carbon steel ➤ High carbon steel ➤ Cast iron: • Grey cast iron • White cast iron ➤ Stainless steel (manganese, chrome, vanadium, titanium, tungsten, molybdenum and cobalt) • Non-ferrous elements: ➤ Copper, tin, lead, zinc, aluminium, nickel • Non-ferrous alloys: ➤ Brass, bronze, phosphor bronze, white metal, duralumin and solder	18%		
	Practical: • Collect a sample of 5 non-ferrous elements and 5 non-ferrous alloys • Give 2 uses for each sample collected	25%		

Topic	Content	%	Date completed	Sign
TERMINOLOGY (Machining) (Specific)	Simple readings on: • Vernier callipers • Outside, inside and depth micrometers Practical: Use the abovementioned measuring instruments and demonstrate the measurement of given sizes.	30%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
ASSIGNMENT	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

FITTING & MACHINING GRADE 10 – TERM 2

Topic	Content	%	Date completed	Sign
TERMINOLOGY (Machining) (Specific)	Lathe: • Classification • Types of bed: V and flat and gap • Functions of: ➤ Feed shaft ➤ Head stock ➤ Lead screw ➤ Tail stock ➤ Carriage • Function and purpose of the 3- and 4-jaw chuck • Coolants (Application and advantages and disadvantages) • Cutting tool (high speed steel): ➤ Clearance angles ➤ Cutting angles ➤ Differentiate between high-speed steel cutting tools and tungsten tip tools ➤ Tool holders and boring bars (Types and uses) • Apply cutting procedures for diameter turning and facing	40%		
		48%		

Topic	Content	%	Date completed	Sign
TERMINOLOGY (Machining) (Specific)	• Taper turning (Methods, Advantages and disadvantages): ➤ Compound slide ➤ Tail stock ➤ Taper turning attachment ➤ Cutting tool • Screw cutting (Compound slide – Theory only): ➤ Characteristics and elements of metric V-thread ➤ Parallel ➤ Half of the included angle of the thread ➤ Use of the screw thread pitch gauge and screw cutting gauge	55%		
	Practical: • Facing and parallel turning of a work piece on the centre lathe. • Machining of an outside taper using the compound slide only on the same work piece used for the facing and parallel turning	60%		

Topic	Content	%	Date completed	Sign
FORCES (Generic)	Forces: Differentiate between the different types of forces found in engineering components: • Pulling force (Tensile) • Compressive force • Shearing force	63%		
	Components of forces: • Graphical and mathematical solution of the horizontal and vertical component of a single force acting at an angle. Practical: Use basic calculations to determine forces.	68%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
MIDYEAR TEST / EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

FITTING & MACHINING GRADE 10 – TERM 3

Topic	Content	%	Date completed	Sign
JOINING METHODS (Generic)	Calculations on the size of drills and key dimensions: • Drill sizes for screw cutting • Width, thickness and length of keys	73%		
	Semi-permanent joining methods: • Bolts • Studs • Locking devices • Nuts • Split pins • Rivets	78%		
	Semi-permanent joining methods: • Keys – Identification, fitting and uses of the following types: ➢ Parallel key ➢ Taper key, ➢ Gib-head key ➢ Woodruff key Practical: Use the marking-off plate from Topic “Tools” and drill and tap two (2) holes.	82%		

Topic	Content	%	Date completed	Sign
SYSTEMS AND CONTROL (Drive systems) (Specific)	MECHANICAL: Identify different drive systems referring to application., • Spur gears • Pulleys and belt drives • Chain drives	85%		
	Identification and application on the following screw threads (properties, uses, profiles and angles): • ISO Metric V-thread (fine and coarse) • Square thread • Acme thread Practical: Identify the most suitable mechanical drive system for various applications	90%		

REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____
	Date completed _____	
CONTROLLED TEST		All theory including practical application and PAT tasks for term 1 have been completed. Marks entered onto electronic mark sheet

FITTING & MACHINING GRADE 10 – TERM 4

Topic	Content	%	Date completed	Sign
MAINTENANCE (Generic)	Properties of lubricants: • Viscosity • Pour point • Flash point	92%		
	Grading of oil according to viscosity: (SAE standards) • Transmission oil • Grease			
	Friction: • Characteristics • Application			
	Define the following types of maintenance: • Preventive • Predictive • Reliability centred maintenance	95%		
	Identify the outcome of the lack of maintenance on equipment used in the workshop: • Excessive wear • Overheating/seizing; and distortion (lack of cooling and lubrication) • Failure e.g. hydraulics/pneumatics, controls and cables			
	Disadvantages of an unbalanced work piece or machine part	100%		
	Practical: Analyse and predict the outcome of the lack of maintenance on equipment used in the workshop			
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
FINAL EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

FITTING & MACHINING GRADE 11 – TERM 1

Topic	Content	%	Date completed	Sign
SAFETY (Generic)	HIV/Aids Awareness Knowledge of basic First Aid measures Analyse the OHS Act and regulations where applicable	2%		
	Machine specific safety measures when dealing with: • Grinding machines • Cutting machines • Press machines • Lathe Machines • Milling Machines • Hydraulically Operated equipment Practical: Perform a first aid exercise to demonstrate action to be taken when a fellow learner hurts him/herself in the workshop.	7%		

Topic	Content	%	Date completed	Sign
TOOLS (Generic)	The principles and functions of the following: • Stocks and dies (characteristics and drill sizes) • Grinding machines • Cutting machines (drilling machines) • Press machines Practical: Explain the safety precautions to be followed when using the various cutting and grinding machines Press machines	11%		
TOOLS (Specific)	The principles and functions of the following: • Dial indicators • Telescopic gauges • Torque wrenches • Outside, Inside micrometers and • Vernier calliper Practical: Demonstrate competent use of: • Dial indicators • Telescopic gauges • Torque wrenches • Inside micrometers	16%		

Topic	Content	%	Date completed	Sign
TERMINOLOGY Machining (Specific)	Lathe: • Safety measures • Set up of irregular work pieces – 4 jaw chuck • Steadies (purpose and use) • Mandrels (purpose and use) • Taper turning (compound slide method – inside and outside tapers) ➤ Calculations for setting over of compound slide	22%		
	Screw cutting ➤ Description of the pitch and leads for single- and multi-start screw threads ➤ Uses of screw thread dial gauge, pitch gauge, centre gauge and graduated collar when screw thread cutting is carried out ➤ Methods to determine the locating positions on the dial gauge ➤ Calculations of depth of V-threads ➤ Square thread (calculations of the helix, leading and following angles for the cutting tools)	30%		
	Practical – Lathe: • Set-up of an irregular work piece in a 4-jaw chuck • Use the lathe to do taper turning • Use the lathe to do V-thread screw cutting			
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
ASSIGNMENT	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

FITTING & MACHINING GRADE 11 – TERM 2

Topic	Content	%	Date completed	Sign
TERMINOLOGY Machining (Specific)	Milling machine: • Safety measures • Milling machine parts • Calculations on: ➤ Centring of cutter ➤ Cutting of key ways – parallel • Milling cutters (identification and uses): ➤ Side and face cutter ➤ End mill ➤ Flute mill ➤ T-slot mill ➤ Helical cutter ➤ Involute gear tooth cutter Practical – Milling machine: • Centring of cutter • Cutting of parallel key way	38%		

Topic	Content	%	Date completed	Sign
MATERIALS (Generic)	Distinguish between the following properties of engineering materials: • Hardness • Plasticity • Elasticity • Ductility • Malleability • Brittleness • Toughness	45%		

Topic	Content	%	Date completed	Sign
FORCES (Specific)	Forces: Effects of forces, moments and torques on engineering components applying design principles Basic calculations on: Forces found in engineering components: • System of forces (maximum of three forces) • Resultant and equilibrant	51%		
	Moments: Moments found in engineering components: (By calculation only) • Law of moments: ➤ Sum of LHM = Sum of RHM A simply supported beam with two vertical point loads acting on the beam supported by two supports.	55%		
	Basic calculations on stress: • Square tubing • Round tubing Practical: Use basic calculations to determine forces, moments and stress	59%		

Topic	Content	%	Date completed	Sign
JOINING METHODS (Specific)	Identify the characteristics of the ISO metric V-thread. Use basic calculations for the ISO metric V-thread: • Root diameter • Crest diameter • Effective diameter • Pitch • Lead for multi-start screw threads Practical: Use basic calculations to determine the following for ISO metric V-thread: • The drill size to tap a V-thread • Tap hole(s) according to bolt size	65%		

REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
MIDYEAR TEST / EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

FITTING & MACHINING GRADE 11 – TERM 3

Topic	Content	%	Date completed	Sign
SYSTEMS AND CONTROL: Drive systems (Specific)	MECHANICAL COMPONENTS: Uses, functions, advantages and disadvantages of the following compound drives: • Gear train • Pulley systems (i.e. block and tackle) • V-Belt drives • Chain drives	75%		
	Basic velocity calculations on: • Gears (compound) Including idler gears • Pulley systems and • Belts (v-belts) Transfer of movement: • Spur gears • Gear Ratio • Power transmission	84%		
	HYDRAULICS / PNEUMATICS Basic calculations on: Pistons and reservoirs (only a single cylinder): volume, pressure, force, area Description, identification and application of: • Valves, pipes, pressure gauges	89%		
	Practical: Practically determine the transfer of movement of mechanical and hydraulic operating systems mentioned above including drive systems through a simple designed project			

Topic	Content	%	Date completed	Sign
PUMPS (Specific)	Identify the following pumps by referring to purpose, construction and operating principles: • Mono pumps • Centrifugal pumps • Reciprocating pumps • Gear pumps Practical: Identify the above pumps by referring to purpose, construction and operating principles:	95%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____ All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		
CONTROLLED TEST	Date completed _____			

FITTING & MACHINING GRADE 11 – TERM 4

Topic	Content	%	Date completed	Sign
MAINTENANCE (Specific)	Identify causes of malfunction of lathes and milling machines. • Lack of lubrication or incorrect lubrication • Overloading • Friction • Balancing Practical: Analyse and predict the outcome of the lack of maintenance on equipment used in the workshop:	100%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____ All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		
FINAL EXAMINATION	Date completed _____			

WELDING AND METALWORK

WELDING AND METALWORK GRADE 10 – TERM 1

Topic	Content	%	Date completed	Sign
Safety (Generic)	Organise and manage activities responsibly and effectively, including self-management and HIV/Aids awareness ;			
	First Aid - Safety precautions taken into account during performance-based activities in order to avoid injuries or incidents.	2%		
	Understanding of the OHS Act Learners must be fully aware of all the safety precautions to be taken during performance-based activities, in order to avoid injuries or incidents. Refer specifically to the following tools/machines/equipment: • Different hand tools • Pedestal drill • Bench grinder • Guillotine • Bending machine • Power saws	5%		
	Identify safe and hazardous acts and conditions e.g. speed of emery wheels, etc. Apply personal hygiene measures. Refer specifically to the following tools/machines/equipment (refer to Topic 2: Tools): • Different hand tools • Pedestal drill • Pedestal grinder • Guillotine • Compressors • Fire extinguishing apparatus	8%		
	Practical: Identify safe and hazardous acts and conditions (e.g., speed of emery wheels, Maximum lift on hydraulic equipment etc.) Apply personal hygiene measures. Note: Clean workshop on a weekly basis.			

Topic	Content	%	Date completed	Sign
TERMINOLOGY (Welding) (Specific)	Explain the following terms with the aid of sketches: • Arc • Arc length • Leg length • Included angle • Parent metal • Penetration • Reinforcement • Root • Root face • Root run • Run • Tack welding • Toe of weld • Weld bead • Welding voltage • Welding current • Welding heat PRACTICAL: Explain the welding terms by means of sketches TEMPLATES • Materials used for template: wood, cardboard steel and hardboard • Principle of simple setting-out of the right angle and the application of Pythagoras' theory Practical: Do calculations on the theorem of Pythagoras and apply the principle by setting a right-angled project.	15%		
	PRINCIPLES AND FUNCTIONS OF • Arc welding machines such as AC and DC • Arc welding accessories	20%		
	ELECTRICAL ASPECTS REGARDING ARC WELDING Explain the following: • Volts • Current (Ampere) • Resistance • Polarity • Arc voltage • Direct current • Alternating current • Earthing • Single phase • Three phase • Voltage drop Practical: Demonstrate an understanding of arc welding equipment by assembling the equipment in the correct sequence.	23%		

Topic	Content	%	Date completed	Sign
TOOLS (Generic)	Basic tools and equipment: • Spanners: ring-, flat- and combination- • Sockets and accessories • Pliers • Hammers • Chisels, hacksaws, • Screwdrivers • Allen keys • Files • Stocks & dies.	28%		
	Application of measuring and marking-off instruments: • Steel Rule • Square • Scriber • Tape measure • Combination set • Punches	32%		
	Practical: Use the marking-off instruments to mark-off a plate (at least 5mm thick) with 5 holes.			
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
ASSIGNMENT	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

WELDING AND METALWORK GRADE 10 – TERM 2

Topic	Content	%	Date completed	Sign
Joining methods (Generic)	Calculations on the size of drills and key dimensions: • Drill sizes for screw cutting • Width, thickness and length of keys	35%		
	Semi-permanent joining methods: • Bolts • Studs • Locking devices • Nuts • Split pins • Rivets	37%		
	Keys – Identification, fitting and uses of the following types: • Parallel • Taper • Gib head • Woodruff keys	40%		
Forces (Generic)	Forces: Differentiate between the different types of forces found in engineering components: • Pulling force (Tensile) • Compressive force • Shearing force	42%		
	Components of forces: • Parallelogram of forces – resultant of two forces graphically only;	48%		
	Moments: Moments found in engineering components (basic calculations): Definition: Moment = force x perpendicular distance (Spanner used to tighten a nut or bolt) Stress (Basic calculations on): • Square bar • Round bar	55%		
	Practical: Calculations to determine • forces, • moment and • stress			

Topic	Content	%	Date completed	Sign
Terminology (Welding symbols and joints)	Identifying the different WELDING SYMBOLS: • Elements of welding symbols	60%		
	Theory and Application of PERMANENT JOINTS (Arc welding): • Lap joint • Butt joint • T-joint • Edge • Corner Practical: Apply the identified welding symbols by welding different types of joints using arc-welding.	65%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
MIDYEAR TEST / EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

WELDING AND METALWORK GRADE 10 – TERM 3

Topic	Content	%	Date completed	Sign
MAINTENANCE (GENERIC)	Define the following types of maintenance: • Preventive • Predictive • Reliability centred maintenance Lack of maintenance on equipment • Excessive wear • Overheating/seizing; and distortion • Failure Disadvantages of an unbalanced work piece or machine part Practical: Analyse and predict the outcome of the lack of maintenance on equipment used in the workshop	70%		
		75%		

Topic	Content	%	Date completed	Sign
TERMINOLOGY DEVELOPMENTS (Specific)	Development of: • Elbows with one joint only • Right angled and oblique T pieces of equal diameters • Unequal diameter pipes, including shapes of holes. All branches to be on centre of the main pipe • Right cones with top and base parallel to the horizontal plane Practical: Demonstrate an understanding of developments by developing/ producing models from the drawings of right angled and oblique T-pieces of equal and unequal diameters, and the right cones with the top and base parallel to the horizontal	85%		

REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
CONTROLLED TEST	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

WELDING AND METALWORK GRADE 10 – TERM 4

Topic	Content	%	Date completed	Sign
MATERIALS (GENERIC)	Characteristics, composition and use of: • Ferrous metals and alloys: ➤ Low carbon steel ➤ Medium carbon steel ➤ High carbon steel - Cast iron: • Grey cast iron • White cast iron - Stainless steel (manganese, chrome, vanadium, titanium, tungsten, molybdenum and cobalt) • Non-ferrous elements: ➤ Copper, tin, lead, zinc, aluminium, nickel • Non-ferrous alloys: ➤ Brass, bronze, phosphor bronze, white metal, duralumin and solder	95%		
	Practical: • Collect a sample of 5 non-ferrous elements and 5 non-ferrous alloys • Give 2 uses for each sample collected.	100%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
FINAL EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

WELDING AND METALWORK GRADE 11 – TERM 1

Topic	Content	%	Date completed	Sign
Safety (Generic)	HIV/AIDS Awareness Knowledge of basic First Aid measures Analyse the OHS Act and regulations where applicable to the following machines: • Grinding machines (portable, bench and surface) • Cutting (drilling machines, power saw, band saw) • Shearing machines (manual and power driven) • Press machines • Joining (arc, gas) • Handling and usage of gas cylinders	2%		
		5%		
TERMINOLOGY Machining (Specific)	The use of TEMPLATES: • Materials used for templates: wood, cardboard, steel plate and hardboard • Principle of simple setting out of the right angle and the application of Pythagoras theorem, the ratio of 45° and 60° right angled triangles. • Use principles 3, 4 and 5 • Standard cross centres and benchmarks • Transference of floor diagrams to templates • Use of strip, flange and web templates for steel sections. Ordinary and bushed steel templates. • Use of coloured and lettered holes, instructions and conventional marks on templates.	15%		
	The application of ROOF TRUSSES: Calculations of: • Rise • Slope • Pitch The layout of roof trusses, details of purlins, truss shoes, wall plates, expansion and footing. Practical: Develop a roof truss using the given instructions and templates and by applying the theorem of Pythagoras.	18%		

TERMINOLOGY Machining (Specific)	CALCULATION OF COSTS: - Quantification from drawings - Compiling of cutting lists - Calculation of cost of roof trusses and lattice beams	22%		
	EXPLAIN THE FOLLOWING TERMS: - Deposited metal - Fusion zone - Gap - Heat effected zone - Kerf - Spatter - Weld pool WELDING SYMBOLS: - Fusion weld symbols - Supplementary symbols	25%		

Topic	Content	%	Date completed	Sign
Tools (Specific)	The principles and functions of the following purpose-made tooling and equipment: - Stocks and dies (characteristics and drill sizes) - Grinding machines (portable, bench) - Cutting machines (drilling machines, power saw, horizontal band saw) - Guillotine machine (manual and power driven) - Press machines - Joining equipment (arc, spot, gas) - Rolling machine - Punch and cropper machine - Plasma cutter - Cut –off machine Practical: Demonstrate the use and care of purpose-made tooling and equipment when producing a product and when doing maintenance.	35%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
ASSIGNMENT	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

WELDING AND METALWORK GRADE 11 – TERM 2

Topic	Content	%	Date completed	Sign
FORCES (Specific)	FORCES: Effects of forces, moments and torques on engineering components applying design principles. Forces found in engineering components. Determine graphically:			
	SYSTEM OF FORCES (Bows notation) - Triangle of forces - Polygon of forces - Resultant and equilibrant PRACTICAL: Determine graphically the magnitude of forces found in engineering components using triangle of force, polygon of forces and resultant forces.	45%		
	Moments: - Moments found in engineering components. (By calculation only): - Law of moments: Sum of LHM=Sum of RHM - A supported beam with TWO vertical point loads acting on the beam with two supports. - The calculation of shear force and bending moment diagram and graphically illustrated. PRACTICAL: Do calculations on moments of force found in engineering components?	50%		
	STRESS AND STRAIN (Calculations of) - Stress and strain (Hooke's law) - Compressive/ tensile stresses - Young's modulus of elasticity (ignore factor of safety) - Determine change in length - Stress/strain diagram PRACTICAL: Do calculations on stress and strain as indicated	55%		

WELDING AND METALWORK GRADE 11 – TERM 3

Topic	Content	%	Date completed	Sign
JOINING METHODS(Specific)	HEAT TREATMENT OF STEEL: - The changes in structure of carbon steel during heating cooling processes - The iron carbon equilibrium diagram: - The temperature range of 500-900 °C - Carbon content between 0% and 1.4% - Description of the purpose and methods for the following: - Annealing - Normalizing - Hardening - Tempering - Case hardening	74%		
	PRACTICAL: - Apply knowledge of heat treatment in performing tempering process on a cutting tool. - Apply knowledge of heat treatment in performing normalizing process on a tempered cutting tool.	77%		

Topic	Content	%	Date completed	Sign
MATERIALS (GENERIC)	Function and operation of the following equipment used during the manufacturing of steel: - Blast furnace – refining of iron ore - Bessemer convertor - Electric arc furnace	85%		
	Distinguish between the following properties of engineering materials: - Hardness - Plasticity - Elasticity - Ductility - Malleability - Brittleness - Toughness	88%		

Topic	Content	%	Date completed	Sign
TERMINOLOGY DEVELOPMENT (Specific)	Development of: • Transformations between parallel horizontal planes: ➤ Square to square ➤ Square to round • Cones on and off centres ➤ Oblique cones with top and base parallel to the horizontal plane ➤ Right cylindrical Y-connections PRACTICAL: Apply the knowledge gained on development to produce TWO transformations between parallel horizontal planes and a right cylindrical Y-connection.	95%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
CONTROLLED TEST	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		

WELDING AND METALWORK GRADE 11 – TERM 4

Topic	Content	%	Date completed	Sign
TERMINOLOGY: Steel Sections (Specific)	Knowledge of steel sections such as: • Angle sections • Channel sections • I-beam sections Referring to: • Identification of the profile of the sections • Uses of different sections • Joining of the different sections Practical: Identify different types of steel sections as used in steel structures around the school or nearby buildings	100%		
REVISION / INFORMAL ASSESSMENT(S)	Date(s) completed _____	HOD Signature: _____ Date: _____		
FINAL EXAMINATION	Date completed _____	All theory including practical application and PAT tasks for term 1 have been completed Marks entered onto electronic mark sheet		