basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (FITTING AND MACHINING): GRADE 11 (TERM 1)

TERM 1	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
CAPS TOPICS	**SAFETY (GENERIC)** (3%)	(7%)	**TOOLS (GENERIC)** (9%)	(11%)	**TOOLS (SPECIFIC)** (16%)	**TERMINOLOGY MACHINING (SPECIFIC)** (22%)	(26%)	(30%)	**PAT CONSOLIDATION REVISION**		**ASSESSMENT**
TOPICS/CONCEPTS, SKILLS AND VALUES	HIV/Aids awareness Knowledge of basic first aid measures Analyse the OHS Act and regulations where applicable Machine specific safety measures when dealing with: • Grinding machines • Cutting machines	Machine specific safety measures when dealing with: • Press machines • Hydraulically operated equipment Lathe Machines Milling Machines	The principles and function of the following: • Stocks and dies (characteristics and drill sizes) • Grinding machines	The principles and functions of the following: • Cutting machines (drilling machines) • Press machines	The principles and functions of the following purpose-made tooling and equipment: • Dial indicators • Telescopic gauges • Torque wrenches • Inside micrometres (simple readings from the instruments, use of attachments) Outside micrometers Vernier calliper	**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	**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	COMPLETE PHASE 1 OF PAT REVISION		FORMAL ASSESSMENT
PRACTICAL ACTIVITIES	**Practical** Perform a first aid exercise to demonstrate action to be taken when a fellow learner hurts him-/herself in the workshop	**Practical** Perform a first aid exercise to demonstrate action to be taken when a fellow learner hurts him-/herself in the workshop	**Practical** Explain the safety precautions to be followed when using the various cutting and grinding machines	**Practical** Explain the safety precautions to be followed when using the various cutting and press machines	**Practical** Demonstrate competent use of: • Dial indicators • Telescopic gauges • Torque wrenches • Inside and outside micrometres	**Practical – Lathe** • Use the lathe to do taper turning using the compound slide method.	**Practical** Uses of screw thread dial gauge, pitch gauge, centre gauge and graduated collar when screw thread cutting is carried out	**Practical – Lathe** • Set-up of an irregular work piece in a 4-jaw chuck • Use the lathe to do V-thread screw cutting			
REQUISITE PRE-KNOWLEDGE	Prior knowledge HIV/AIDS awareness	First aid procedure learned in Grade 10	Safety precautions when using the various cutting and grinding machines	Safety precautions when using the various cutting and press machines	Knowledge of the inside and outside micrometres done in Grade 10	Knowledge of taper turning done in Grade 10	Prior knowledge of the dial indicator	Set-up of a 3-jaw chuck			
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING	OHS Act, safety signs in workshop, first aid manuals & hand tools & equipment	OHS Act, safety signs in workshop, first aid manuals & hand tools & equipment	Tools and equipment as mentioned above	Tools and equipment as mentioned above	Measuring tools	Lathe machine and cutting tools	Measuring tools and graduated gauges	Measuring and lathe cutting tools			
ASSESSMENT	**INFORMAL ASSESSMENT: REMEDIATION**	Classwork/case studies/worksheets/homework/class tests (theory and practical work)									
	SBA & PAT (FORMAL)	**PAT Phase 1** Assignment									

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (FITTING AND MACHINING): GRADE 11 (TERM 2)

TERM 2	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
CAPS TOPICS	**TERMINOLOGY (MACHINING) (SPECIFIC)** (34%)	(38%)	**MATERIALS** (45%)	**FORCES** (47%)	(51%)	(55%)	(59%)	**JOINING METHODS** (62%)	**PRACTICAL TASK AND CONSOLIDATION PAT PHASE 2**	**REVISION**	**ASSESSMENT (FORMAL)**
TOPICS/CONCEPTS, SKILLS AND VALUES	**Milling machine** • Safety measures • Milling machine parts **Calculations on:** • Centering of cutter • Cutting of keyways – parallel	**Calculations of** Milling cutters (identification and uses): • Side and face cutter • End mill • Flute mill • T-slot mill • Helical cutter • Involute gear tooth cutter	Distinguish between the following properties of engineering materials: • Hardness • Plasticity • Elasticity • Ductility • Malleability • Brittleness • Toughness	**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	**Moments** Moments found in engineering components: (By calculation only) • Law of moments: Sum of LHM = Sum of RHM	**Beams** A simply supported beam with two vertical point loads acting on the beam supported by two supports. **Basic calculations on stress:** • Square tubing • Round tubing	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 ACTIVITIES:	**Practical – Milling machine** • Centering of cutter • Cutting of parallel keyways	**Practical – Milling machine** • Centering of cutter • Cutting of parallel keyways	**Practical** Testing properties of materials	**Practical** Use basic calculations to determine forces, moments and stress	**Practical** Use basic calculations to determine forces, moments and stress	**Practical** Use basic calculations to determine forces, moments and stress	**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	**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			
REQUISITE PRE-KNOWLEDGE	Terminology content in Grade 10	Terminology content in Grade 10	Content on materials in Grade 10	Basic calculations of forces in Grade 10	Basic graphical methods of forces in Grade 10	Basic calculations of forces in Grade 11	Basic calculations of moments in Grade 11	Knowledge of joining methods in Grade 10			
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING	Measuring tools cutting tools lathe Practical demonstration videos	Measuring tools cutting tools lathe Practical demonstration videos	Different types of materials, testing equipment	YouTube videos, force board Forces training kits, whiteboard, calculators	YouTube videos, force board Forces training kits, whiteboard, calculators	Gear, belt and chain drive instructional kits. Instructional videos, ouTube videos, etc	Instructional videos, YouTube videos, etc. Old question papers Demonstration	Instructional videos, YouTube videos, etc. Old question papers Demonstration			
ASSESSMENT	**INFORMAL ASSESSMENT: REMEDIATION**	**Classwork/case studies/worksheets/homework/class tests (theory and practical work)**									
	SBA & PAT (FORMAL)	**PAT Phase 2** **Controlled Test**									

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (FITTING AND MACHINING): GRADE 11 (TERM 3)

TERM 3	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
CAPS TOPICS	**JOINING METHODS** (65%)	**SYSTEMS AND CONTROL: DRIVE SYSTEMS (SPECIFIC)** (75%)	(84%)	(87%)	(89%)	**PUMPS** (92%)	(95%)	**PRACTICAL TASK AND CONSOLIDATION OF PATS**		**REVISION**	**ASSESSMENT (FORMAL)**
TOPICS/CONCEPTS, SKILLS AND VALUES	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 thread	**Mechanical components:** **Basic velocity calculations on:** • Gears (compound) Including idler gears • Pulley systems and • Belts (v-belts)	**Mechanical components:** **Transfer of movement:** • Spur gears • Gear ratio • Power transmission	**Mechanical components:** **Hydraulics/pneumatics** **Basic calculations on:** Pistons and reservoirs (only a single cylinder): Volume, pressure, force, area	**Mechanical components:** **Description, identification and application of:** • Valves, pipes, pressure gauges	Identify the following pumps by referring to purpose, construction and operating principles: • Mono pumps • Centrifugal pumps	Identify the following pumps by referring to purpose, construction and operating principles: • Reciprocating pumps • Gear pumps	**Completion of PATs – phase 3**	**Completion of PATs- Phase 3**		
PRACTICAL ACTIVITIES	**Practical** Use basic calculations to determine the following: ISO Metric V-thread • Drill size to tap the V-thread • Tap hole(s) according to bolt size	**Practical** Practically determine the transfer of movement of mechanical and hydraulic operating systems mentioned above and included drive systems through a simple design project	**Practical** Practically determine the transfer of movement of mechanical and hydraulic operating systems mentioned above including drive systems through a simple designed project	**Practical** Practically determine the transfer of movement of mechanical and hydraulic operating systems mentioned above including drive systems through a simple designed project	**Practical** Practically determine the transfer of movement of mechanical and hydraulic operating systems mentioned above including drive systems through a simple designed project	**Practical** Identify the above-mentioned pumps by referring to purpose, construction and operating principles	**Practical** Identify the above-mentioned pumps by referring to purpose, construction and operating principles	**Practical assessment tasks**	**Practical assessment tasks**		
REQUISITE PRE-KNOWLEDGE	Joining methods Grade 10	Systems and control Grade 10	Systems and control Grade 10	Systems and control Grade 10	Systems and control Grade 10	Knowledge of a cycle pump and air pressure pumps at the fuel filling stations and air compressors	Knowledge of a cycle pump and air pressure pumps at the fuel filling stations and air compressors				
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING	Gear and pulley trainer Hydraulics trainer Videos, videos, etc.	Gear and pulley trainer Hydraulics trainer, videos, etc.	Gear and pulley trainer Hydraulics trainer, videos, etc.	Gear and pulley trainer Hydraulics trainer, videos, etc.	Valves, pipes, pressure gauges	Pumps, trainers, videos, etc.	Pumps, trainers, videos, etc.				
ASSESSMENT	**INFORMAL ASSESSMENT: REMEDIATION**	**Classwork/case studies/worksheets/homework/class tests (theory and practical work)**									
	SBA & PAT (FORMAL)	**PAT Phase 3** **Controlled Test**									

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (FITTING AND MACHINING): GRADE 11 (TERM 4)

TERM 4		WEEK 1 (97%)	WEEK 2 (100%)	WEEK 3	WEEK 4	WEEK 5	WEEK 6-10
CAPS TOPICS		MAINTENANCE (GENERIC)	MAINTENANCE (SPECIFIC)	PAT PHASE 3 & 4	PAT PHASE 3 & 4	REVISION	EXAMINATION
TOPICS/CONCEPTS, SKILLS AND VALUES		Identify causes of malfunction of lathes and milling machines •• Lack of lubrication or incorrect lubrication • Overloading • Friction	Identify causes of malfunction of lathes and milling machines • Lack of lubrication or incorrect lubrication • Overloading • Friction • Balancing	Practical tasks	Practical tasks	Revision of content	Administration of final examinations
PRACTICAL ACTIVITIES		**Practical** Analyse and predict the outcome of the lack of maintenance on equipment used in the workshop	**Practical** Analyse and predict the outcome of the lack of maintenance on equipment used in the workshop	COMPLETION OF PATS			
REQUISITE PRE-KNOWLEDGE		Knowledge of maintenance done in Grade 10	Knowledge of maintenance done in Grade 11				
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING		Instructional videos, etc.	Multi-meters, batteries, instructional, videos, etc.	Tools and machines			
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION	**Classwork/case studies/worksheets/homework/class tests (theory and practical work)**					
	SBA & PAT (FORMAL)	**PAT Phase 4** **Examination**					