basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (WELDING & METALWORK): GRADE 12 (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** (2%)	**Safety** (4%)	**Safety** (5%)	**Terminology (specific)** (10%)	(15%)	**Tools (specific)** (20%)	(30%)	**Materials** (35%)	(40%)	**Revision**	**Assessment**
TOPICS/CONCEPTS, SKILLS AND VALUES	**First Aid HIV/Aids Awareness** **OHS Act Machine-specific safety measures**	**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	**Knowledge and application of basic workshop layouts**: • Process layout • Product layout Referring to the OHS Act, analyse the responsibilities of the: • Employer • Employee **Practical:** Compare the process and product layout of two different manufacturing or maintenance workshops	**Templates:** • Marking off templates, full or part • Sets of roof trusses, beams, lattice girders and plate girders • Method of obtaining and transferring dimensions **Calculations of sheet metal for rolling and bending:** • Rolled plate • Rectangular and square plate **Practical**: Do calculations on rolling and bending plates	**Application of WELDING SYMBOLS:** All the welding symbols according to the Code of Practice for welding – SANS **Practical:** Apply the welding symbols as indicated on a given sketch according to SANS to produce a project from a template	**The principles and functions of the following purpose-made tooling and equipment**: • Stocks and die (characteristics and drill sizes) • Grinding machines (portable, bench) • Cutting machines (drilling machines, power saw, horizontal band saw) • Guillotine machine (manual and power saw) • Press machines • Joining equipment (arc, spot, gas) • Rolling machine • Punch and cropper machine • Plasma cutter • Brinell and Rockwell hardness testers • Moments and forces testers • Tensile testers • MIG/MAG welders **Practical:** Display an understanding of the use and care of purpose-made tooling and equipment when producing a product and doing maintenance		**Identify materials by**: • Sound test • Bending test • Filling test • Machine test **Practical:** Identify material types by using sound, bending, filling and machining tests	**Methods of enhancing the properties of steel (only heated temperature and cooling apply):** • Tempering • Case hardening • Hardening • Annealing • Normalising **Practical:** Do enhancement on materials by applying tempering on cutting tools and hardening soft carbon steel		**Assignment**
ASSESSMENT	**SBA (FORMAL)**	**ASSIGNMENT** **PAT - Phase 1** The legislation governing workplaces in relation to COVID- 19 is the Occupational Health and Safety Act, Act 85 of 1993, as amended, read with the Hazardous Biological Agents Regulations. Section 8 (1) of the Occupational Health and Safety (OHS) Act, Act 85 of 1993. Safe work practices are types of administrative controls that include procedures for safe and proper work used to reduce the duration, frequency, or intensity of exposure to a hazard. Examples of safe work practices for SARS-CoV-2 include: Requiring regular hand washing or using of alcohol-based hand rubs. Learners and teachers should always wash hands when they are visibly soiled and after removing any PPE. Keep safe distances and wear a mask at all times. See the document on the workshop safety measures										

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (WELDING & METALWORK): GRADE 12 (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 (NO DEVIATIONS FROM CAPS)	**Forces (specific)** (42%)		(47%)	(53%)	**Joining methods (inspection of welds) (specific)** (60%)	(70%)	(75%)	(80%)	**PAT consolidation**	**MID-YEAR EXAM**	
TOPICS/CONCEPTS, SKILLS AND VALUES	**FORCES AND MOMENTS:** Effects of forces and moments on engineering components applying design principles: STEEL WORKS: Determine graphically the magnitude and nature of forces on the members of frameworks with a maximum of 11 (eleven) parts. (Only parallel and vertical loads). Calculate the reactions		**FORCES AND MOMENTS**: Basic calculations on: • Moments found in engineering components (by calculation only) • A simple support beam with two vertical point loads and one uniformly distributed load (UDL) acting on the beam (including reactions at the support) • A simple supported beam with three vertical point loads and without uniformly distributed load (UDL) acting on the beam • Calculate the reactions at the supports • Calculate the bending moments at each and shear forces between points DRAW THE FOLLOWING DIAGRAMS TO SCALE: • Space diagram • Bending moment diagram • Shear force diagram	**STRESS AND STRAIN (Calculation of**): • Stress and strain (Hooke's law) • Comprehensive/ tensile stresses • Young's modulus of elasticity (include the factor of safety) • Determine change in length (Δl) • Stress/strain diagram **Practical:** Do calculations on stress and strain whilst taking into consideration Young's modulus for each material	**INSPECTION OF WELDS:** **(inspection during and after completion of oxy-acetylene and arc welding):** • Clean bead • Constant width and height of bead • Presence of pits • Undercutting • Distortion • Cracks • Spatter • Slag inclusion • Start and termination of weld • Correct flame • Pressure • Current **Application of destructive tests on welded joints:** • Nick break • Nick bend • Machinability tests **Practical:** Perform destructive tests on a welded joint using nick break, nick bend and machinability test to identify defects	**INSPECTION OF WELDS:** Describe and compare the following non-destructive tests: • Visual inspection • X-rays • Dye penetration • Ultrasonic test **Practical**: Perform the above non-destructive tests on a welded joint to identify defects	**INSPECTION OF WELDS:** **Stresses and distortion in welding and stress relieving**: • Shrinkage of welded joint • Identify the factors affecting distortion and residual stress • Methods to prevent or reduce distortion and stress • Identify and apply stress-relieving heat treatment processes • Describe the effect of change in temperature on steel **Practical:** Identify the factors that lead to distortion and residual stresses within a welded joint		PAT - Phase 2		
	Practical: Do calculations of moments and using a bending moment tester, perform a bending moment test on a beam										
SBA (FORMAL)	**EXAMINATION** **PAT - Phase 2** Occupational Health and Safety Act, Act 85 of 1993, as amended, read with the Hazardous Biological Agents Regulations. Section 8 (1) of the Occupational Health and Safety (OHS) Act, Act 85 of 1993 Safe work practices are types of administrative controls that include procedures for safe and proper work used to reduce the duration, frequency, or intensity of exposure to a hazard. Examples of safe work practices for SANS: Requiring regular hand washing or using of alcohol-based hand rubs. Learners and teachers should always wash hands when they are visibly soiled and after removing any PPE. Keep safe distances and wear a mask at all times See the document on the workshop safety measures										

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (WELDING & METALWORK): GRADE 12 (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 (NO DEVIATIONS FROM CAPS)		**Maintenance (specific)** (83%)	(88%)	**Terminology (development) (specific)** (90%)	(92%)	(94%)	(96%)	(98%)	(100%)	**Trial exam**	**Trial exam**	**Trial exam**
TOPICS/CONCEPTS, SKILLS AND VALUES		**Suitable preventative maintenance in operating systems for** guillotine, pedestal drill, power saw **Identify causes of malfunction of:** • Lack of lubrication or incorrect lubrication • Overloading friction	**Suitable preventative maintenance in operating systems for roller**, punch and shearing machine and pedestal grinder **Identify causes of malfunction of:** • Lack of lubrication or incorrect lubrication • Overloading friction	**Marking off template by calculation only of the following between horizontal parallel planes:** A cone frustum of slight taper	**Marking off template by calculation only of the following between horizontal parallel planes:** A cone frustum of slight taper	**Marking off template by calculation only of the following between horizontal parallel planes:** Square to round transformers (on centre only)	**Marking off template by calculation only of the following between horizontal parallel planes:** Square to round transformers (on centre only)	**Marking off template by calculation only of the following between horizontal parallel planes:** Hoppers with square or rectangular openings (on and off centre)	**Marking off template by calculation only of the following between horizontal parallel planes:** Hoppers with square or rectangular openings (on and off centre)			
		Practical: Perform periodic maintenance as prescribed by manufactures on specific machines		**Practical**: Do calculations on cone frustum, square to round transition and hoppers								
ASSESSMENT	**INFORMAL ASSESSMENT:** REMEDIATION	Classwork/case studies/worksheets/homework/class tests (theory and practical work)										
	SBA (FORMAL)	**Preparatory examination** **PAT - Phase 3 and 4 finalisation** Occupational Health and Safety Act, Act 85 of 1993, as amended, read with the Hazardous Biological Agents Regulations. Section 8 (1) of the Occupational Health and Safety (OHS) Act, Act 85 of 1993. Safe work practices are types of administrative controls that include procedures for safe and proper work used to reduce the duration, frequency, or intensity of exposure to a hazard. Examples of safe work practices for SANS: Requiring regular hand washing or using of alcohol-based hand rubs. Learners and teachers should always wash hands when they are visibly soiled and after removing any PPE. Keep safe distances and wear a mask at all times. See the document on the workshop safety measures											

2023/24 ANNUAL TEACHING PLANS: MECHANICAL TECHNOLOGY (WELDING & METALWORK): GRADE 12 (TERM 4)

TERM 4		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10
CAPS TOPICS (NO DEVIATIONS FROM CAPS)		Revision	Revision	Revision	Exams	Exams	Exams	Exams	Exams	Exams	Exams
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION	Classwork/case studies/worksheets/homework/class tests (theory and practical work)									
	SBA (FORMAL)	Final examination								Exams	Exams