2022 Annual Teaching Plan: Term 1 Mechanical Technology: Welding and Metalwork Grade 11

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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Term 1 (47 days)	Week 1 – 2 (10 days)	Week 3 (5 days)	Week 4 (5 days)	Week 5 (5 days)	Week 6 (4 days)	Week 7 (5 days)	Week 8 (4 days)	Week 9 – 10 (10 days)
CAPS Topics	**Safety (Generic)**	**TERMINOLOGY Machining (Specific)**			**Tools (Specific)**	**Consolidation of PAT and revision**		**Assignment**
Topics /Concepts, Skills and Values	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	**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. **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. **CALCULATION OF COSTS:** • Quantification from drawings • Compiling of cutting lists • Calculation of cost of roof trusses and lattice beams **EXPLAIN THE FOLLOWING TERMS:** • Deposited metal • Fusion zone • Gap • Heat effected zone • Kerf • Spatter • Weld pool **WELDING SYMBOLS:** • Fusion weld symbols • Supplementary symbols			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.		
Requisite pre-knowledge	HIV/Aids Awareness	Terminology content in grade 10			Grade 10 tools			
Resources (other than textbook) **to enhance learning**	OHS act, Safety signs in workshop, First aid manuals & Tools & Equipment	Tools and equipment as mentioned above. Calculator			Tools and equipment mentioned above			
Assessment	**Informal Assessment:** Remediation	Classwork/case studies/worksheets/homework/class tests (Theory and practical work)						
	SBA (Formal)	**Assignment** **PAT Phase 1 = 50 Marks (Practical of Safety & Tools and equipment)** 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							

2022 Annual Teaching Plan: Term 2 Mechanical Technology: Welding and Metalwork Grade 11

TERM 2 (53 days)	Week 1 – 4 (16 days)	Week 5 (4 days)	Week 6 – 8 (15 days)	Week 9 - 10 (10 days)	Week 11 -12 (9 days)
CAPS Topics	**FORCES (Specific)**	**MAINTENANCE (Specific)**	**JOINING METHODS**	**JOINING METHODS**	**Revision and Consolidation and Term Test**
Topics /Concepts, Skills and Values	**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. **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? **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/stra2n diagram **PRACTICAL:** Do calculations on stress and strain as indicated	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:	**Identify the application and uses of the following processes:** • Gas welding • MIG welding **PRACTICAL**: Apply the theoretical knowledge in performing welding processes to produce a project using oxy acetylene, and MIG/MAGS welding. **Apply the welding process to CARBON STEEL:** • The heating and cooling cycle • To control the hardness • Pre heating and tempering **The use and application of SPOT (Resistance) WELDING:** • Description of process • Current • Electrodes • Time cycle • Maintenance and care of electrodes tips	**Identify defects in welds, the causes and remedies for:** • Blow holes • Porosity • Incomplete penetration • Undercutting • Weld crater • Restarts • Slag inclusion • Cracks **PRACTICAL:** Identify defects from different welds, the causes and remedies.	**Half-year examination**
Requisite pre-knowledge	Grade 10 forces	Grade 10 maintenance	**PRACTICAL:** Produce a project using spot welding, taking in consideration the size of the plate thickness; size tips; and maintenance of tips.	Grade 10 welding theory	
Resources (other than textbook) **to enhance learning**	YouTube videos, force board. Forces training kits. White board/chalkboard. Calculators	Prescribed workshop machines and videos.	Gas , MIG Spot welding	Workpieces with different weld defects	
Classwork/case studies/worksheets/homework/class tests (Theory and practical work)					
Term Test **PAT Phase 2 (Practical of Safety & Tools and equipment)** 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					

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2022 Annual Teaching Plan: Term 3 Mechanical Technology: Welding and Metalwork Grade 11

TERM 3 (52 days)		Week 1 – 2 (9 days)	Week 3 (5 days)	Week 4 – 8 (23 days)	Week 9 – 11 (15 days)
CAPS Topics		**JOINING METHODS**	**MATERIALS (GENERIC)**	**TERMINOLOGY DEVELOPMENT (Specific)**	**Revision, Remediation, Consolidation of PAT & TEST.**
Topics /Concepts, Skills and Values		**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 **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.	Function and operation of the following equipment used during the manufacturing of steel: • Blast furnace – refining of iron ore • Bessemer convertor • Electric arc furnace Distinguish between the following properties of engineering materials: • Hardness • Plasticity • Elasticity • Ductility • Malleability • Brittleness • Toughness	**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.	
Requisite pre-knowledge			Grade 10 Materials.	Grade 10 Development and templates	
Resources (other than textbook) **to enhance learning**			Various bolts and nuts. Thread gauges, thread charts. Etc.	Videos, materials on which to test the properties.	
Assessment	**Informal Assessment:** Remediation	Classwork/case studies/worksheets/homework/class tests (Theory and practical work)			
	SBA (Formal)	**Term Test** **PAT Phase 3 Practical of Development)** 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			

2022Annual Teaching Plan: Term 4 Mechanical Technology: Welding and Metalwork Grade 11

TERM 4 (47 days)		Week 1 (4days)	Week 2 (5 days)	Week 3 (5 days)	Week 4 – 5 (10 days)	Week 6 – 10 (23 days)
CAPS Topics		**TERMINOLOGY: Steel Sections (Specific)**			**Revision, Remediation**	**Completion of PAT Examination**
Topics /Concepts, Skills and Values		**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				
Requisite pre-knowledge		Grade 10 Materials			Term 1-4	
Resources (other than textbook) **to enhance learning**		Steel profile pieces from hardware or industry. Videos and YouTube videos.			Previous question papers and notes	
Assessment	**Informal Assessment:** Remediation	Classwork/case studies/worksheets/homework/class tests (Theory and practical work)				
	SBA (Formal)	**EXAMINATION**				