

**POWER ENGINEERING COMPETENCY FRAMEWORK FOR POWER ENGINEERING PROFESSIONALS IN PUBLIC SERVICE
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT**

TSC Category	Electrical and Power Systems Management					
TSC Title	Uninterrupted Power Supply Management					
TSC Description	Manage the design, testing and commissioning of uninterrupted power supply (UPS) systems to provide protection against power disturbances in the electrical system environment					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		<Insert TSC Code>	<Insert TSC Code>	<Insert TSC Code>	<Insert TSC Code>	
		Verify design and oversee installation and testing of UPS systems	Review design, testing and commissioning of UPS systems to ensure adherence to technical specifications	Provide solutions to optimise UPS systems, and ensure compliance with standards and requirements	Evaluate and approve proposals for UPS systems, and identify opportunities to adopt new technologies	
Knowledge		<ul style="list-style-type: none"> • Fundamental of uninterrupted power supply (UPS) • Functions and components of UPS systems • Operations and functions of batteries • Design schematics and layouts of UPS systems • Standalone and modular UPS topology • Redundant and parallel UPS systems and tier levels • Installation and operation of UPS systems • Maintenance procedures for UPS systems • Relevant regulations, standards and safety procedures 	<ul style="list-style-type: none"> • Principles and functions of UPS systems • Design criteria and Bill of Quantities (BOQ) for UPS systems • Standalone and modular UPS topology • Redundant and parallel UPS systems and tier levels • Availability considerations including Mean time between failures (MTBF) and Mean time to repair (MTTR) • Principles of valve regulated lead acid (VRLA) battery systems • Transformers and their use in circuits • Fault clearance in UPS circuits • Test equipment and functions • Relevant regulations, standards and safety procedures 	<ul style="list-style-type: none"> • Principles, functions and applications of UPS systems • Design criteria and Bill of Quantities (BOQ) for UPS systems • Standalone and modular UPS topology, redundant and parallel, static and rotary UPS systems and tier levels • Battery sizing, configuration, charging and storage and safety procedures • Generator, site and load planning • Upgrade of UPS systems and compatibility issues • Principles of maintaining efficient UPS systems • Performance requirements for UPS systems • Testing and commissioning techniques 	<ul style="list-style-type: none"> • Mission-critical applications and configuration of UPS systems • UPS systems design techniques and protocols • New technologies and industry best practices in UPS • Procurement, tendering, technical evaluation and cost analysis for UPS systems • System integration, transition and upgrade Maintenance and audit programmes • UPS system commissioning, testing and handover • UPS risk management and safety management systems • Functions and benefits of UPS control systems • Relevant regulations, standards and safety procedures 	

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				<ul style="list-style-type: none"> • Relevant regulations, standards and safety procedures 		
Abilities		<ul style="list-style-type: none"> • Describe the functions of UPS systems • Check the power control devices associated with a UPS system • Interpret design schematics and layouts for UPS systems • Oversee the installation, operation and maintenance of UPS systems • Witness routine inspections to verify that the contractors' works comply with specifications, drawings and programmes • Witness site testing of UPS systems • Verify battery storage and safety procedures • Verify safety procedures for maintenance of UPS systems 	<ul style="list-style-type: none"> • Review UPS types and configurations and their advantages • Review UPS modes and power paths • Review the UPS design and system configuration for each type of redundancy system • Verify battery size, location and configuration • Develop design specifications and BOQs for UPS systems • Check and evaluate technical proposals by tenderers for compliance with the tender requirements and specifications • Oversee selection of tools and methods for performing UPS system maintenance and testing • Identify, investigate and report defects and non-compliance found during checks, inspection and testing and commissioning and propose solutions to rectify the defects and non-conformances • Oversee maintenance procedures for UPS systems • Review compliance with relevant regulations, standards and safety 	<ul style="list-style-type: none"> • Evaluate the advantages and disadvantages for each type of energy storage device • Advise on battery size, location and configuration • Assess environmental constraints and impact on generator selection • Review design and installation to ensure compliance of UPS systems with regulations and standards • Develop technical specifications, design criteria and performance specifications for tenders • Review site and load planning to ensure successful installation • Evaluate installation and operation of UPS as per design specifications • Review maintenance procedures and types and frequency of testing for UPS systems • Monitor and control maintenance activities • Review compliance of UPS systems with relevant regulations, standards and safety procedures 	<ul style="list-style-type: none"> • Approve design and installation of UPS systems as per regulations and standards • Evaluates and approve design for reliability, completeness, feasibility, optimisation, cost-effectiveness, fit for purpose and sustainability • Develop plans to apply new technologies in system design • Develop technical tender specifications and method statements for suppliers and contractors • Evaluate manufacturer equipment against price • Phase and programme new and upgraded UPS systems • Approve maintenance schedules • Implement UPS compliance, auditing and inspection programmes • Lead UPS system commissioning, testing and handover • Review compliance of UPS system operation and maintenance with regulations and standards 	

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			procedures for UPS systems			
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