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

TSC Category	Electrical and Power Engineering Fundamentals					
TSC Title	Engineering Problem Solving					
TSC Description	Apply systematic problem-solving techniques including root cause analysis, failure mode effect and analysis, containment actions, and corrective actions and preventive actions					
TSC Proficiency Description	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
			<Insert TSC Code>	<Insert TSC Code>	<Insert TSC Code>	
			Identify and analyse engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	Investigate engineering problems using problem-solving techniques including design of experiments, data analysis and synthesis of information to provide valid conclusions	Recommend solutions for complex engineering problems with appropriate consideration for public health and safety, cultural, societal, and environmental considerations	
Knowledge			• Engineering problem solving techniques • Inductive tools for problem description including '5 Why', 'Repeated Why' and 'Is / Is Not' • Deductive tools for problem description including affinity diagram and Fishbone / Ishikawa diagram • Product and process flow diagrams Documentation requirements and protocols in failure mode and effects analysis (FMEA)	• Relevant tools, processes and technologies to facilitate problem identification, investigation, analysis and resolution • Root cause analysis (RCA) tools • Product and process flow diagrams • Risk assessment techniques • Failure mode and effects analysis (FMEA) process, tools and applications • Corrective and preventive actions (CAPA) • Factors affecting the effectiveness of different corrective actions	• Industry best practices and standards in problem management • Critical processes and key touchpoints throughout the lifecycle of engineering problems • Impact of engineering problems on business and stakeholders • Application of key components in problem management • Problem investigation and diagnosis techniques and methodologies • Problem prioritisation and sizing techniques, methodologies and parameters • Implementation of controls and systems to sustain the solutions	
Abilities			• Collect information on the symptoms of the problem using symptoms checklist • Identify the need for an emergency response action	• Identify team members and stakeholders to resolve identified problems • Recommend interim containment actions	• Manage technical problems throughout their lifecycle • Establish problem management protocols and standards	

			• Describe and quantify the technical problem using inductive and deductive tools • Implement interim containment actions • Verify root cause through data collection • Create relevant diagrams relating to product and process flow to support FMEA and other problem-solving techniques • Implement project plans for solutions Maintain documentation	• Conduct RCA by reviewing product and process flow diagrams to locate the root cause of problems • Perform risk assessment • Apply FMEA to identify and assess actual and potential failures in product and process designs • Decide corrective actions for identified failure modes • Develop execution and project plans for solution implementation • Verify effectiveness of permanent corrective actions • Monitor documentation and tracking of problems encountered and resolved	• Introduce organisation structures, processes and infrastructure to guide prevention, resolution and minimisation of problems and effects • Prioritise and categorise problems according to their severity, frequency or potential implications • Develop strategies to pre-empt potential problems from occurring • Develop root cause theories • Recommend permanent corrective actions • Endorse solutions to minimise reoccurrences of similar problems • Establish controls plan to manage product and process risks as indicated in the industry standard	