THE HONG KONG INSTITUTION OF ENGINEERS
CONSOLIDATED MODEL TRAINING GUIDE
FOR FORMAL TRAINING SCHEME TO ASSOCIATE MEMBERSHIP
ELECTRICAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref. (Associate Members)	Length of Time (weeks)
	1. Introduction			**1**
	1.1 Information about the Company			
Location 1	***Description 1***			
	1.1.1 Own Organisation			
	a) Discuss the size, history and internal culture of the trainee's own organisation.	*CCO(AM) 1.2(a)*	11	
	b) Discuss an overview of the relationship between the trainee's own organisation, government departments and other organisations.	*CCO(AM) 1.2(b)*	11	
	c) Discuss the structure and functions of different units within the trainee's own organisation.	*CCO(AM) 1.2(c)*	11	
	d) Demonstrate the awareness to follow operational procedures and practices as required by the trainee's own organization.	*New CCO*	11	
	e) Discuss the objectives, requirements and processes that support the quality assurance system within the trainee's own organisation.	*CCO(AM) 1.7(b)*	11	
	f) Apply the quality assurance system according to the policy of the trainee's own organisation.	*CCO(AM) 1.7(b)*	11	
	1.1.2 Training Programme, Prospects and Career Development			
	a) Discuss an overview of the internal communication systems, training system and career development pathway within the trainee's own organization.	*New CCO*	11	
	b) Demonstrate a commitment to extend and develop up-to-date technical knowledge through reading relevant engineering publications, participating in seminars or conferences, and information searching.	*CCO(AM) 1.3(d)*	11	
	c) Demonstrate a commitment to extend and develop up-to-date knowledge of local, regional and international current affairs through reading relevant engineering publications, participating in seminars or conferences, and information searching.	*CCO(AM) 1.6(a)*	11	
	d) Demonstrate a commitment to participate in the local organisations or community services for general personal development.	*CCO(AM) 1.6(b)*	11	
	1.2 Information about the HKIE			
Location 2	***Description 2***			
	a) Discuss an overview of the HKIE organisation as well as its history and role in society.	*CCO(AM) 1.1(a)*	11	
	b) Demonstrate a commitment to participate in relevant activities organised by the HKIE.	*CCO(AM) 1.1(b)*	11	
	2. Professionalism			**Contin-uous**
	2.1 Conduct and Responsibilities			
Location 3	***Description 3***			
	a) Discuss the social and ethical responsibilities expected in the society.	*CCO(AM) 1.3(a), (c)*	8	

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	b) Explain the rules and standard requirements of conducting engineering activities to the HKIE, employers, clients, general public and colleagues in accordance with the HKIE Rules of Conduct.	*CCO(AM) 1.3(b)*	8	
	c) Explain the ethical standards and responsibilities required by the HKIE.	*CCO(AM) 1.3(c)*	8	
	d) Demonstrate the awareness to follow the codes of practice required by the industry.	*CCO(AM) 1.3(c)*	8	
	e) Demonstrate the awareness to uphold the dignity, standing and reputation of the engineering profession.	*New CCO*	8	
	f) Demonstrate the awareness to protect the interests of the community including the environment, welfare, health and safety in conducting engineering activities.	*New CCO*	8	
	2.2 Occupational Safety and Health			
Location 4	***Description 4***			
	a) Demonstrate an understanding of the statutory health and safety requirements.	*CCO(AM) 1.4(a)*	9	
	b) Demonstrate an understanding of the responsibilities for the health and safety of the employers, employees and general public when engaging in engineering activities.	*CCO(AM) 1.4(b)*	9	
	c) Plan the operation of safety management system in accordance with the industry standards and regulatory requirements.	*CCO(AM) 1.4(c)*	7	
	2.3 Environment			
Location 5	***Description 5***			
	a) Demonstrate an understanding of the relevant statutory environmental requirements related to the trainee's discipline.	*CCO(AM) 1.5(a)*	9	
	b) Demonstrate the awareness of the inter-relationship of technology with the environment in the work place.	*CCO(AM) 1.5(b)(i)*	9	
	c) Demonstrate the awareness of the impact of technology on the environment in society.	*CCO(AM) 1.5(b)(ii)*	9	
	3. Electrical Engineering Design, Fundamental and Operational Reliability Applied to Electrical And Associated Systems			**52**
	3.1 Workshop Training			8
Location 6	***Description 6***			
	a) Discuss the principle of electricity generation, transmission, distribution and utilization.	*CO(AM) 1.1*	1	
	b) Discuss the development trend of electricity generation, transmission, distribution and utilization.	*CO(AM) 1.1*	1	
	c) Discuss the commercial and industrial application of electricity.	*CO(AM) 1.1*	1	
	d) Discuss the operation of basic electrical components such as generators and motors, switchgear, transformers, electronic drivers, capacitors / reactors, cables, overhead lines, protection and control equipment, battery systems and renewal power generation systems etc.	*CO(AM) 1.4*	1	

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Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref. (Associate Members)	Length of Time (weeks)
	e) Select appropriate electrical components for operation such as generators and motors, switchgear, transformers, electronic drivers, capacitors / reactors, cables, overhead lines, protection and control equipment, battery systems and renewal power generation systems etc.	*CO(AM) 1.4*	5	
	f) Apply electrical components such as generators and motors, switchgear, transformers, electronic drivers, capacitors / reactors, cables, overhead lines, protection and control equipment, battery systems and renewal power generation systems etc. for the safe and reliable operation of electrical systems.	*CO(AM) 1.4*	4	
	g) Apply modern electronic, communication and computer systems to electrical power systems.	*CO(AM) 1.5*	6	
	h) Analyze modern electronic, communication and computer systems to electrical power systems.	*CO(AM) 1.5*	3	
	3.2 Engineering Design			12
Location 7	***Description 7***			
	3.2.1 Design Office Practice			
	a) Appreciate the application of engineering standards, codes of practices, technical memoranda and use of design manuals.	*CO(AM) 2.1*	2	
	b) Carry out derivation of design requirements.	*CO(AM) 2.1*	4	
	c) Assess the requirements of different stages of design.	*CO(AM) 2.1*	4	
	d) Analyse load flow, fault level or protection theory.	*CO(AM) 1.2*	3	
	e) Assess potential risks from load flow, fault level or protection theory.	*CO(AM) 1.2*	7	
	f) Evaluate social, safety and environmental effects from load flow, fault level or protection theory.	*CO(AM) 1.2*	9	
	g) Apply H.V. / M.V. / L.V. Engineering.	*CO(AM) 1.3*	4	
	h) Discuss potential risks from H.V. / M.V. / L.V. engineering.	*CO(AM) 1.3*	7	
	i) Discuss safety and environmental effects from H. / M.V. / L.V.V. engineering.	*CO(AM) 1.3*	9	
	j) Discuss the social, cultural, health, safety, sustainability and environmental effects at different stages of design.	*CO(AM) 2.1*	9	
	k) Produce well-structured, clear and concise design documents.	*CO(AM) 2.1*	10	
	l) Evaluate appropriate computer aided design drafting packages, such as Lighting Design, Power System Analysis, Building Information Modeling, in the engineering design process.	*CO(AM) 2.1*	3	
	m) Apply appropriate computer aided design drafting packages.	*CO(AM) 2.1*	5	
	3.2.2 Synthesis			
	a) Select appropriate systems, plants, materials, units or components in the design process.	*CO(AM) 2.2*	5	

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	b) Produce design by applying the concept of total design considerations including environmental influences, sustainability, safety, energy efficiency and maintainability etc.	*CO(AM) 2.2*	4	
	3.3 Manufacturing processes of the company or construction or installations			10
Location 8	***Description 8***			
	a) Carry out the preparation works of installation, testing and commissioning of an engineering project.	*CO(AM) 3.1*	6	
	b) Comply the operation safety practices and documentations with widely adopted international standards such as ISO 45001 and the required standard and regulatory requirements of Hong Kong.	CO(AM) 3.4	2	
	c) Carry out operation safety practices.	CO(AM) 3.4	6	
	d) Comply the quality assurance procedures and documentation with widely adopted international engineering standards such as ISO 9000 etc.	*CO(AM) 3.3*	6	
	e) Carry out the quality assurance procedures by employing appropriate approach and methodology.	*CO(AM) 3.3*	6	
	f) Support the quality control and quality assurance activities.	*CO(AM) 3.3*	6	
	3.4 Inspection procedure in accordance with standards and specifications or testing or commissioning			4
Location 9	***Description 9***			
	a) Appraise the installation, testing and commissioning standards, methods, procedures and practices of an engineering project.	*CO(AM) 3.1*	2	
	b) Carry out works of site preparation and setting out.	*CO(AM) 3.1*	6	
	c) Carry out works of resources scheduling, monitoring and control	*CO(AM) 3.1*	6	
	d) Carry out works of site supervision/management	*CO(AM) 3.1*	6	
	e) Apply testing forms and commissioning checklists appropriately in an engineering project.	*CO(AM) 3.1*	6	
	f) Appraise the operating principle and limitations of measuring and testing equipment.	*CO(AM) 3.2*	12	
	g) Select appropriate measuring and testing instruments with considerations such as range and accuracy.	*CO(AM) 3.2*	5	
	h) Examine the calibration and control of measurement accuracy.	*CO(AM) 3.2*	5	
	i) Carry out the testing performance monitoring.	*CO(AM) 3.2*	5	
	3.5 Operations and operational procedures or maintenance or repairs			8
Location 10	***Description 10***			
	a) Appraise different types of asset management system such as ISO 55001 and different asset performance management systems.	*CO(AM) 3.5*	5	
	b) Appraise the procedures, management and supervision of electrical equipment maintenance.	*CO(AM) 3.5*	5	

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Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref. (Associate Members)	Length of Time (weeks)
	c) Assess different types of maintenance systems and programs such as condition monitoring, predictive and preventive maintenance, corrective maintenance, fault analysis and investigation etc.	*CO(AM) 3.5*	5	
	d) Appraise different condition monitoring and predictive maintenance techniques.	*CO(AM) 3.5*	5	
	e) Apply computer-aided maintenance management system.	*CO(AM) 3.5*	6	
	f) Apply appropriate diagnostic techniques to analyze maintenance problems.	*CO(AM) 3.5*	5	
	g) Assess the health, safety and environmental effects of operation and maintenance activities.	*CO(AM) 3.5*	9	
	3.6 Project Management including cost management, programme management, quality management and environmental management			10
Location 11	***Description 11***			
	a) Apply appropriate project management techniques including supervisory skills, problem-solving, decision-making, project control, planning and programming of works, quality, safety and environmental management in engineering projects.	*CO(AM) 4.5*	6	
	b) Explain the importance of project cost and programme management.	*CO(AM) 4.5*	6	
	4. Engineering Contract Administration and Management			**25**
	4.1 Interpretation or preparation of requirements and specifications incorporating sketches and drawing, methods of construction and materials to be used			6
Location 12	***Description 12***			
	a) Carry out preparation work of design specifications that may be understood and interpreted without significant elaboration.	*CO(AM) 2.1*	4	
	b) Analyze design specifications.	*CO(AM) 2.1*	3	
	4.2 Tendering procedures, tender appraisal and contract administration			0.5
Location 13	***Description 13***			
	a) Discuss various concepts of commercial procedures such as purchase requisition, tendering and contracts management etc.	*CO(AM) 4.2*	6	
	b) Comply with the established commercial procedures.	*CO(AM) 4.2*	6	
	c) Carry out tender or purchase requisition evaluation and/or recommendation.	*CO(AM) 4.2*	6	
	4.3 Estimating labour, materials, installation and transport costs and cost control			4
Location 14	***Description 14***			
	a) Apply appropriate supervisory skills, problem-solving, decision-making and project control techniques to manage engineering projects.	*CO(AM) 4.5*	6	
	4.4 Project scheduling and work management			5
Location 15	***Description 15***			
	a) Discuss the importance of project cost and programme management.	*CO(AM) 4.5*	6	

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	b) Apply appropriate risk management for the project activities.	*CO(AM) 4.5*	7	
	4.5 Preparation of reports and manuals for procedures of installation, operation and maintenance, and codes of practice			5
Location 16	***Description 16***			
	a) Carry out procedures of installation, testing and commissioning of an engineering project.	*CO(AM) 3.1*	6	
	b) Carry out safety operational procedures of an engineering process.	*CO(AM) 3.4*	6	
	4.6 Budgeting system			0.5
Location 17	***Description 17***			
	a) Apply various finance and accounting concept such as basic accounting, account coding system, budgeting, budget control and stock control etc.	*CO(AM) 4.1*	6	
	b) Analyse various financial reports for expenditure monitoring.	*CO(AM) 4.1*	6	
	4.7 General administration knowledge including financial management, human resources study, social awareness, marketing technique etc.			4
Location 18	***Description 18***			
	a) Discuss the various leadership qualities required of a leader including accountability, conflict management and resources management etc.	*CCO(AM) 1.12(a)*	6	
	b) Explain the importance of accountability and responsibility required by a leader for making decisions on engineering activities.	*CCO(AM) 1.12(a)*	6	
	c) Apply various management skills in engineering projects.	*CCO(AM) 1.12(b)*	6	
	d) Distinguish the relationship between good leadership and good management skills.	*CCO(AM) 1.12(c)*	6	
	e) Demonstrate an understanding of the importance of teamwork, partnering and supervision skills in engineering projects.	*CCO(AM) 1.12(d)*	6	
	5. Direct Objective Training			**26**
Location 19	***Description 19***			
	This section covers any activities related to Electrical Engineering. It should aim to develop skills and knowledge relating to personal qualities, communication, human resources management and business operational sense in addition to the technical, commercial and engineering knowledge acquired by the trainees during earlier parts of their training. Latest developments in the discipline should be included. All Training Outcomes, if not yet achieved in earlier parts of training, should be completed here. *Specific project(s) should be assigned to the trainee according to the work nature of the trainee in this period. The emphasis of the project(s) should be on the applications of the essential knowledge and skills acquired in the previous phases of the training programme. The trainee is expected to report the progress at scheduled intervals.*			

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	Regular reviews between the supervisor(s) and the trainee should be arranged so as to ensure the progress to be in line with the project objective(s).			
	6. Other Common Core Outcomes for Continuous Development			**Contin-uous**
	6.1 Development of Personal Qualities			
Location 20	***Description 20***			
	a) Identify appropriate innovative approach and/or tools for professional development.	*CCO(AM) 1.10(a)*	11	
	b) Demonstrate interpersonal skills for professional development.	*CCO(AM) 1.10(b)*	10	
	c) Demonstrate negotiating skills required for various engineering activities.	*CCO(AM) 1.11 (d)*	10	
	d) Demonstrate sound time management skills for professional development.	*New CCO*	11	
	e) Demonstrate a commitment to continuous development and enhancement.	*New CCO*	11	
	6.2 Communication			
Location 21	***Description 21***			
	a) Communicate ideas orally in an accurate and clear manner under various situations (including presentations and meetings).	*CCO(AM) 1.11(a), (c)*	10	
	b) Formulate an oral presentation of complicated data and information in an effective and persuasive manner.	*CCO(AM) 1.11(a)*	10	
	c) Produce grammatically correct, clear and concise documents (including memos, letters, instructions, reports and resumes) which meet the business objectives.	*CCO(AM) 1.11(b)*	10	
	d) Evaluate the needs of the intended readers to design appropriate technical contents for communication.	*CCO(AM) 1.11(b)*	10	
	6.3 Human Resources Management			
Location 22	***Description 22***			
	a) Demonstrate the awareness of the duties and employment criteria for different job positions in an engineering project.	*CCO(AM) 1.8(a)*	6	
	b) Demonstrate an understanding of the relevant legal requirements and regulatory issues of labour employment and management.	*CCO(AM) 1.8(b)*	6	
	c) Identify the appropriate staff training and development programmes in the organisation.	*CCO(AM) 1.8(c)*	6	
	d) Comprehend human resources policies.	*CO(AM) 4.3*	6	
	e) Apply appropriate skills and methods to motivate sub-ordinates.	*CO(AM) 4.3*	6	
	6.4 Business Operations			
Location 23	***Description 23***			
	a) Recognise the importance of intellectual property to business operations.	*New CCO*	11	
	b) Describe the legal requirements in Hong Kong relevant to intellectual property rights.	*New CCO*	11	

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	c) Identify appropriate tools and method to measure and improve the productivity of business operations.	*CCO(AM) 1.7(a)*	11	
	d) Identify appropriate information technology applications to manage business information and to facilitate business operations.	*CCO(AM) 1.7(d)*	11	
	e) Recognise the importance of research and development towards business operations.	*CCO(AM) 1.7(e)*	11	
	f) Demonstrate the awareness of financial considerations in operation business.	*CCO(AM) 1.7(c)*	11	
	g) Recognise the importance of business development in business operations.	*New CCO*	11	
	h) Comprehend the data privacy policy.	*CO(AM) 4.4*	1	
	i) Comply with the information management policy.	*CO(AM) 4.4*	1	

N.B.

1. The training period must not be less than 104 weeks (24 months).
2. The programme set out is for guidance only but substantial departure should not be made. Employers should endeavour to provide training to their trainees in as many areas as possible as is appropriate to the sector of employment.
3. This guide should be read in conjunction with Section 3 of the M4 Routes to Membership.
4. During the training, each trainee is required to maintain Training Log Book, Record of Continuing Professional Development and Record of Training Outcomes.

Additional Note for Workshop Training:

The emphasis of workshop training should be given to provide hands-on experiences to the trainees to enable them to appreciate the skills, knowledge and workmanship required for a quality product. It is expected that the workshop training should cover basic engineering practices in using hand tools and electrical test equipment, basic industrial health and safety trainings, the appropriate use of different types of personal protective equipment, and basic skills related to electrical engineering. The workshop training should include, but not limited to, at least 80% of the following elements:

- Bench work
- Various basic skills in machining and metal work
- Conduit and MCB installations
- Lighting design
- Heat ventilation and air conditioning work
- Different types of control circuits, power cable jointing and termination
- LV switchboard / distribution sub-circuit testing
- Computer programming and simulation
- CAD/CAE tools practice
- PCB fabrication
- LAN configuration
- Machine windings and different configuration
- Use of different test equipment and instrument