COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY
Computer and IT Engineers Specific Needs

The main thrust for professional training of engineers is on knowledge, understanding subject matters, analysis and methods. Professional engineers must have analytical capabilities, adaptability to varying situations, ability to identify, rectify problems and design solutions, management capabilities, communication skills, ability to optimize resources and adherence to the professional ethics.

Every trainee in the Computer engineering and Information Technology discipline shall complete training in the types of works specified for a minimum period specified herein. Computer engineering spans a broad range off activities, from the design and modeling of devices used in the construction of computer systems to the configuration of large systems and networks of computers, including both hardware and software.

Computer and Information Technology Engineers must therefore be well versed in the following:

(a) Extra Low and Low Voltages

Extra low voltage in computer hardware and low voltage in buildings and industrial automation and engineering network systems:

- Voltage bands
- Identification and use of cores of flexible and signal cables
- Electrical installations for computer hardware
- Assessment of general characteristics
- Protection against electric shock
- Protection against thermal effects
- Protection against over current
- Protection against under and over voltage
- Isolation and switching
- Application of measures for protection against electric shock
- Application of measures for protection against over-current
- Selection and erection of equipment, common rules
- Wiring system
- Wiring system, current carrying capacities
- Switchgear and control gear, devices for isolation and switching
- Earthing arrangements and protective conductors
- Other equipment, low voltage generating sets
- Safety devices
- Initial verification
- Restrictive conductive locations

Signal and data generation, transmission and distribution.

Analogue and digital signal and data generation, transmission and distribution systems including generation by radio and radar transmitters: • Frequency bands

- Signal and data generation, transmission, distribution and transformation.

(c) Hardware and Engineering

Professional engineers in this field must have sound knowledge of computer hardware, and in particular the following:

- Setup
- Mounting
    - Fitting/removing modules
    - Fitting base modules
- Engineering
    - Control cabinet design
    - Ventilation
    - Device arrangement
    - Preventing interference
    - Suppression of interference sources
    - Shielding
    - Lightning protection measures
- Wiring
- Switching the power supply on/off
- power supply modules
    - Engineering
    - Bus terminating

(d) Computer programming and software engineering

Monitoring, control and communication computer programmes including programmable logic controllers (PLCs):

- Automation and visualization
- Compact PLCs
- Remote expansion modules
- Local expansion modules
- Modular PLCs
- Communication and telecontrol

- Modular I/O system
- field-bus components
- Display and operator units
- operator panel, infra-red technology
- operator panel, resistive technology
- Programming/parameter software
- Interface
- motor starter combinations
- switched-mode power supply units
- power supply units
- Drive technology
- semiconductor contactors
- soft starters
- frequency inverters
- vector frequency inverters
- Online Communication parameters
- Writing and editing of programs
- Controlling a Traffic Signal Unit
- Visualizing a Traffic Signal Unit

(e) Functions of Operators

Trainees should gain sound knowledge and experience in the following operational areas of computers:

- Initial PLC startup
- Loading the program into the PLC
- Starting up the PLC with a bootable and activated program
- Entering parameters or status modifications
- Starting programs
- Display programs on the hard disk (internal)
- Startup with configuration scan
- Error and event messages
- General messages
- Deleting programs from the hard disk
- Deleting programs from the working memory
- Reset function (initialisation of variables)
- Handling several programs
- Deleting programs
- Copying programs
- Editing programs
- Password
- Displaying text from the user program
- Shutting down the system

- Switching off the power supply

PROFESSIONAL TRAINING GUIDELINES

As mentioned earlier, Professional Training is intended to provide a smooth transition between academic training and field practice. It gives the trainee the opportunity to tackle engineering problems from first principles with confidence in the shortest time during his/her career. Graduate engineers who do not get supervised training upon graduation take very long to become professional engineers. This is because they are cautious of making decisions for fear of making mistakes. As a result they cannot be trusted with any major responsibility in an engineering enterprise.

The Professional Training Guidelines (PTG) requirements recommended in this document are structured such that they enable the trainee to acquire all the basic skills for managing an engineering enterprise or project with confidence and with least supervision. It is mandatory that trainees demonstrate full understanding of the key elements of engineering practice in their specific discipline, as detailed herein below. For effective learning or mentoring trainees will be expected to keep close contact with their supervisors for the periods specified.

(a) Design Office

Every trainee shall work under the supervision of a registered professional Computer Engineering and Information Technology Engineer for a minimum period of 12 months or as determined by the Board during which time knowledge and experience should be acquired in most of the following areas:

Application of relevant international and local standards, codes of practice and regulations

- Digital signal measurement
- Analogue signal processing
- Counter value measurement
- Pre-processing on-the-spot
- Control/regulation

- Application of Computer Aided Design (CAD) Programmes
- Project planning and appraisals
- Cost estimates
- Development of design philosophy, requirements, assumptions and specifications
- Design calculations, drawings and bills of quantities
- Tendering procedures including tender preparation and tender evaluation
- International tendering procedures and practices
- Analysis of impact on the environment and other systems of design in applications.

(b) Erection at Site

Every trainee shall work under the supervision of a registered professional Computer Engineering and Information Technology Engineer for a minimum period of 12 months or as determined by the Board during which time knowledge and experience should be acquired in most of the following areas:

- Drafting of working programmes;
- Planning of plant/equipment/system, labour and financial requirements;
- Interpretation of drawings, marking and setting of erection works;
- Processing and reporting on erection works;
- Processing of financial appraisals/claims/payment certificates, and
- Supervision, testing and commissioning of works.

(c) Maintenance

Every trainee shall work under the supervision of a registered professional Electrical Engineer for a minimum period of 6 months or as determined by the Board during which time knowledge and experience should be acquired in most of the following areas:

- Routine condition monitoring of plant/equipment/system and rectification where parameters are beyond the required values;
- Preparation of planned maintenance schedules for plant/equipment/system;
- Fault diagnosis and servicing/overhauling techniques for plant/equipment/system and
- Plan, design and specify materials required for corrective and preventive maintenance of plant/equipment/system, including preparation of schedules for costs of materials and labour requirement.

(d) General Management

Every trainee shall work under the supervision of a registered professional Computer Engineering and Information Technology Engineer for a minimum period of 6 months or as determined by the Board during which time knowledge and experience should be acquired in most of the following areas:

- Office management including knowledge of organization structures and their translation in practice;
- Communication skills;
- Labour management including staff regulations, labour laws and Industrial laws;
- Materials management including specifications, procurement, storage and handling;
- Knowledge of Safety regulations and first aid procedures;
- Planning and control of resources i.e. human, material and finance;
- Contracts management;
- Quality management and
- Project management.
- Managing objects in a project