Engineering Training Center
Ain Shams University / Faculty of Engineering

Engineering Training Programs

Part 1

Engineering Training Cente
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Electrical Engineering Programs

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Electrical Engineering Programs

SAMPLING SYSTEMS AND ANALYICALINSTRUMENTS

COURSE OBJECTIVES:

To provide participants with full understanding and experience of sampling systems and analytical instrumentation that are usually applied in oil, gas, chemical and petrochemical industries.

COURSE CONTENTS:

- Representative Sampling: Methods - Selection of sites - Sources of turbulence - Multi points - Non - interactive material - Leak lag.
- Gas Sampling: Procedures - Sampling tubes - Filters - Water vapor.
- Liquid Sampling: Procedures - Obtaining samples - Liquid sampling systems layouts.
- Humidity Measurement: Principles - Methods of measurement.
- Electrical Conductivity Liquids: Conductance – Conductivity - Whetstone bridge.
- Thermal Conductivity of Gases: Conductivity of gases - Katharometer principles - Measuring circuits - Errors.
- Chromatography: Principles - Separation of mixtures - Applications - Charts readout .
- Infra - Red Absorption: Electromagnetic spectrum - Absorption analysis - Methods of detection.
- PH Measurement: Acidity - Alkalinity - pH scale - Calomel reference electrode - Asymmetric potential - Isopotential em - Calibration .
- Oxygen Deletion: Principles - Practice - Magnetic wind annulus - Using N2 filled dumb - bell - Protection using zircon probe.
- Viscosity: Principles - Newtonian and non - Newtonian fluids - Viscometers.

TARGET PARTICIPANTS:

Engineers, Chemists, Supervisors and talented Technicians.

LOCATION:

DURATION: One week

DATE:

GENERATION OF ELECTRICAL POWER

COURSE OBJECTIVES:

To familiarize participants with different components of electrical power generating plants and to equip them with skills required to specify, select, install and operate such plants.

COURSE CONTENTS:

- Load Curves.
- Power Plant Economics .
- Tariffs and Power Factor Improvement.
- Selection of Plant.
- Diesel and Gas Turbine Plants.
- Thermal Power Plants.
- Hydro Electric Plants.
- Nuclear Power stations.
- Economics of the Operation of Steam Plants.
- HydroThermal Co-ordination.
- Parallel Operation of Alternators.
- Major Electrical Equipment in Power Plants.
- System Interconnections.
- New Energy Sources.
- Environmental Aspects of Energy General.
- Generating Capacity Reliability Evaluation.

TARGET PARTICIPANTS:

Engineers and qualified technicians who are responsible for the selection, and installation of electrical power generation projects.

LOCATION:

DURATION: One week

DATE:

ELECTRICAL POWER SYSTEMS TROUBLESHOOTING

COURSE OBJECTIVES:

To provide participants with understanding and full appreciation of electric power systems trouble shooting

COURSE CONTENTS:

- Transformers.
- Motors.
- Operation control system.
- Maintenance and troubleshooting.
- Control devices.
- Power control devices.
- Analysis of control circuit.
- Maintaining control equipment.
- Troubleshooting control circuit.
- Measurement.
- Demineralization, neutralization & duration plants.
- Installation troubleshooting.
- Control devices.
- Power control devices.
- Analysis of control circuit.
- Maintaining control equipment.
- Troubleshooting control circuit.
- Measurement.
- Demineralization, neutralization & duration plants.
- Installation troubleshooting testing and maintenance.
- Batteries troubleshooting.
- Loss prevention.
- Distribution system.
- Troubleshooting and emergency repair of AC- Machinery.
- Industrial control troubleshooting.
- Mechanical troubleshooting & Maintenance of electrical machinery.
- Economics, staffing and tooling in electrical maintenance.
- Over current protection of generators, distribution system, motors and other electrical apparatus.

ELECTRICAL POWER SYSTEMS TROUBLESHOOTING

TARGET PARTICIPANTS:

Engineers, supervisors and qualified technicians in industrial, petroleum and petrochemical installations.

LOCATION:

DURATION: One week

DATE:

ELECTRIC MOTORS

COURSE OBJECTIVES:

Provide participants with detailed knowledge on all types of electric motors and the critical factors affecting motor selection and the fundamentals of their operation.

COURSE CONTENTS:

- Motors General Characteristics : Power supply (Standard motor voltages, frequency and phase).

- Horsepower Rating - Temperature rise limits - Speed characteristics - Directions of rotation - Full load current - Torque's (pull - up, pull- in , pull - out, starting, breakdown)- Starting current - Enclosing and protective features.

- Types of Motors :
  Small power motors (fractional horsepower motors).
  Single Phase Large Power Motors.
  Polyphones Induction Large - Power Motors.
  Polyphones Synchronous Large - Power Motor.
  Direct Current Large Power Motors.

- Electric Motors Control : Control for: single -Phase, polyphones, current, and synchronous motors.

- Maintenance of Motors : Routine and preventive maintenance- Mantling and dismantling - Inspection techniques - -Spare parts requirements.

- Typical Selection For Specific Applications : Air compressors - Blowers - Conveyors - Fans - Generators - Hostess - Machine tools.

- Pumps - Centrifugal - Refrigerating compressors - Reciprocating - Textile machinery - Vacuum pumps - Valves.

TARGET PARTICIPANTS:

Mechanical and electrical maintenance engineers, foremen, and technicians involved in the selection, operation and maintenance of electric motors in different applications.

LOCATION:

DURATION: One week

DATE:

TELEPHONE NETWORKS

COURSE OBJECTIVES:

To Provide participants with fundamental knowledge and particle experience in the field of telephone networks.

COURSE CONTENTS:

- General information about telephone networks.
- Joining on PES or EEFDC cable.
- Terminal branch joints.
- Soldering of earth wire to the screen on FEEDC cables.
- Open and closed cables.
- Location of cables pillars and joints in secondary network.
- General information about M.D.F. cable fault in the cabinet terminal box.
- Connecting strips, terminal blocks and test clips.
- Open and closed heat shrinks.
- Installation.

TARGET PARTICIPANTS:

Newly graduated engineers, and qualified technicians who are conceded with telephone networks in their organizations.

LOCATION:

DURATION: One week

DATE:

SWITHGEARS

COURSE OBJECTIVES:

Provide participants with thorough understanding of the different types of switchers and their design considerations. The course will also develop participant's skills in choosing, installing, operating and maintaining switchers in high voltage electrical plants.

COURSE CONTENTS:

- General classification of switchers.

1. High voltage AC circuit breakers.
2. Air actuated circuit breakers.
3. Air actuated circuit breakers.
4. Air - Break circuit breakers.
5. Air blast circuit breakers.
6. Vacuum circuit breakers.
7. Sulfur Hex Florid circuit breakers. (SF6).
8. Oil actuated circuit breakers.
9. Installation and maintenance of different types of circuit breakers.
10. Safety precaution in using switchers.
11. Testing and inspection of AC circuit breakers.

TARGET PARTICIPANTS:

Electrical engineers, Supervisors and qualified technicians who are responsible for the installation, operation and maintenance of high voltage AC circuit breakers in different industrial plants.

LOCATION:

DURATION: One week

DATE:

Electrical Engineering Programs

ELECTRICAL POWER DISTRIBUTION SYSTEMS

COURSE OBJECTIVES:

Provide the participants with the necessary information and knowledge that enables them to design, install and inspect electrical power distribution systems in different types of installation. The participants will be trained on how to solve practical problems and to select the right equipment.

COURSE CONTENTS:

- Systems for electrical power distribution.
- Main components of distribution system:

1. (Feeders, switches, distribution transformers, protective equipment).
2. Load characteristics.
3. Demand and demand factors.
4. Utilization and diversity factors.
5. Maximum demand.
6. Connected, load factors and load growth.
7. Distribution transformers.
8. Distribution substation.
9. Sub-station bus schemes.
10. Rating of a distribution substation.
11. Primary and secondary distribution systems.
12. Voltage drop, power factor improvement, power loss, and voltage regulation.
13. Distribution system protection and fault types.
14. Types of cables for underground distribution systems.

Electrical Engineering Programs

ELECTRICAL POWER DISTRIBUTION SYSTEMS

TARGET PARTICIPANTS:

Electrical engineers and experienced technicians who are involved in the design, installation and maintenance of electrical power distribution systems.

LOCATION:

DURATION: One week

DATE:

OPTICAL FIBER TELECOMMUNICATIONS

COURSE OBJECTIVES:

Participants will learn How to compare optical communications with other transmission technologies, How to recognize types of optical fibers, sources and receivers, How to understand optical fiber systems design and operation.

COURSE CONTENTS:

- Components :
  1. Over view of Optical Communications.
  2. Optical Fibers.
  3. Optical Sources:
  4. Laser action - Laser diode structure.
  5. Threshold condition - Performance of LDDS.
  6. Light-Emitting diodes structure and performance.
  7. Light source - Materials - Reliability considerations.
  8. Electronic derives for optical sources.
  9. Systems
- Optical Fiber System Design :
  1. Generation of optical fiber systems requirements.
  2. Design conditions - Transmission distance versus Bit rate - Comparison with other transmission technologies.
  3. Wavelength Division Multiplexing :
  4. Performance criteria.
  5. Angular discursive devices.

OPTICAL FIBER TELECOMMUNICATIONS

1. Modulation of Optical Radiation :
2. The Electro-optic effect.
3. Amplitude modulation -phase modulation.
4. Accost optical devices.
5. Integrated optical modulators.

- Optical Measurements: Attenuation measurement - Optical time domain reflectometer - Dispersion measurements - Refractive - Index profile measurements- Optical sources class - Eye patter.
- Optical Fiber Fabrication & Cabling :

1. Fiber materials - Fiber fabrication.
2. Mechanical properties of fibers.
3. Fiber optic cables.

TARGET PARTICIPANTS:

Telecommunication engineers, senior engineers and technicians who are involved in the design, selection, operation and maintenance of optical fiber and microwave communication system.

LOCATION:

DURATION: One week

DATE:

ELECTRICAL & ELECTRONIC INSTRUMENTS

COURSE OBJECTIVES:

To Provide participants with knowledge concerning electrical and electronic instrumentation usually used in industrial plants as part of the measuring and control systems.

COURSE CONTENTS:

- AMPLIFIERS AS A SYSTEM: Equivalent circuit of amplifier - Circuitry of a single stage - Differential for inverting and non-inverting Amplifiers Differential gain of a differential amplifier - Common mode- Rejection ratio - Feedback amplifiers- Condition for oscillation.

- SMALL SIGNAL AMPLIFICATION: Small signal circuit - H-parameter of emitter dipolar transistor - Amplifiers: Resistance load - Potential divider bias- Circuits of emitter - Amplifiers with resistance load and unbypassed enitter resistor - How stages are cascaded.

- NEGATIVE FEEDBACK:

- Negative feedback amplifier and block diagrams.

- SINUSOIDAL OSCILLATORS: Tuned collector oscillator - R.C ladder network oscillator - Frequency stability.

- Switches: Construction and operation of a uniselector (Stepping relay) - Use of the thyristor.

- APPLIED ELECTRICAL TECHNIQUES: Electromechanical closed loop servosystem- d.e. servo- indicator or recorder - Self balancing potentiometric instrument using a chopper amplifier and an induction motor - Use of high impedance device.

- APPLIED LOGIC: Logic gates - Integrated circuit logic gates- Silicon metal oxide semi- conductor logic (CMOS) - Diode transistor logic (D.T.L.) - Transistor logic (T.T.L) - Emitter coupled logic (I.C.L) - Precautions to be taken when testing or handling various types of logic integrated circuits – Application.

LOCATION:

DURATION: One week

DATE:

Electrical Engineering Programs

International Standards for Electrical Energy and Energy Efficiency Systems

COURSE OBJECTIVES:

The course introduces the trainees to the basic concepts of energy efficiency and energy management, with a focus on buildings. This includes adminstrative, residential and multi-purpose buildings. In application to the said principles an overview of various IEEE related standards including IEEE 2747-2020, IEEE 1547-2019, etc.

LOCATION:

DURATION: 5 days

Topic	Duration (Day)
Definition of electrical Energy systems	0.5
IEEE standards for electrical Energy	0.5
Energy management basic principles	1
Demand side management for different types of buildings	1
Supply side management for different types of buildings	1
Project Exercise	1

DATE:

Basic PLC Programming course

COURSE OBJECTIVES:

The objectiv eof this introductory course ro PLCs is to provide the trainees with the funadamentals of PLCs, including heir structure, applications, prgramming, ladder diagrams, etc. Furthermore, the applications for timers, counters and comparators is introduced. Trouble shooting and diagnostics are explained to trainees.

LOCATION:

DURATION: 5 days

Topic	Duration (Day)
Relay logic fundamentals	0.5
PLC system structure	0.5
Basic ladder logic	0.5
Programming, Commenting, Advanced ladder logic	0.5
Timers, Counters & Comparators	0.5
Digital and Analogue I/O	1
Online Diagnostics	0.5
Project exercises	1

DATE:

Maintenance of plc systems

COURSE OBJECTIVES:

This cources provides a practical perspective of PLC maintenance. It starts with a description of PLC systems and practical monitoring of PLC components. It continues to fault diagnosis and trouble shooting. Practical Case studies are presented as a practical training session in the end of this course.

LOCATION:

DURATION: 5 days

Topic	Duration (Day)
Hardware structure of PLC systems	1
Monitoring of PLC System components	1
Fault diagnosis of PLC system components	1
Troubleshooting of PLC systems components	1
Practical Case studies	1

DATE:

Electrical Engineering Programs

Testing, maintenance and operation of power transformers

COURSE OBJECTIVES:

The course aims to introduce the trainees to the practical aspects of testing, operating and maintaining transformers, starting with the theoretical foundations for connecting coils inside transformers and their various cooling and protection systems, passing through tests of transformers, as well as systems for measuring voltage, current and temperature in the transformer, as well as advanced chemical tests for oils.

LOCATION:

DURATION: 5 days

DATE: