



Major	Electrical Operation for Cooling Water Pumps Station
Awarded Certificate	Training Diploma
Program Duration	Two years (4 Semesters)

FIRST TRAINING SEMESTER

Course Title	Workshops		
Course Code	EG 103	Credits	3
Lecture Hours	0	Practical Hours	6
Total Hours 6			

Course Description

Manual tools like hummer, pliers, hack saw, cutter, screw driver and measuring tool. Exercise about using manual tools, measuring tools, hummer and fixed electrical drill, flat and round files, normal and open spans.

Course Title	Electric Circuits (1)		
Course Code	EG 101	Credits	5
Lecture Hours	4	Practical Hours	2
Total Hours 6			

Course Description

International system of units atom structure, electrical charges, electric voltage and potential, electric current and resistance, application on ohms law, resistors in series, parallel and compensation, applications of the resistors connections, power calculations on dc circuits, electrical power sources, batteries on their different connections, star and delta connections of resistors . Transient state of inductor and capacitor under the DC current. Thivenen and Norton theory. Maximum power Transfer.

Course Title	Materials technology		
Course Code	EI 102	Credits	2
Lecture Hours	2	Practical Hours	0
Total Hours 2			

Course Description

Specifications of conducting materials, especially metals" copper, aluminum and iron". Specifications of insulating materials especially industrial insulators like PVC, XLPE, Air, Wood, glass, rubber, oil, mica and ceramic. Magnetic materials specifications.

Course Title	Engineering Drawings		
Course Code	EG 102	Credits	2
Lecture Hours	0	Practical Hours	4
Total Hours 4			

Course Description

Introduction to engineering and electric drawings. Engineering tools, types of drawings lines. Electrical symbols, Electronic symbols. Also some mechanicals symbols. Vertical protection. Different types of sections geometric drawing. Simple electrical drawing.

Course Title	Mechanical Measuring Instruments		
Course Code	WD 155	Credits	3
Lecture Hours	2	Practical Hours	2
Total Hours 4			

Course Description

Introduction to measurement principles, measurement fields, dimensions, Quantities. Length measurement. Instruments used (Ruler, Micrometer). Temperature measurements, instruments used (Deflection thermometer, Gases Thermometer, Double Metallic Thermometer, thermo couple).

Course Title	Mathematics (1)		
Course Code	MA 110	Credits	3
Lecture Hours	3	Practical Hours	0
Total Hours 3			

Course Description

Exponents - Principles of algebra - Basics of trigonometry

Course Title	English (1)		
Course Code	EN 126	Credits	2
Lecture Hours	1	Practical Hours	2
Total Hours 3			

Course Description

Technical terms with simple linguistic expressions.

Course Title	Introduction to computer		
Course Code	CS 101	Credits	1
Lecture Hours	0	Practical Hours	2
Total Hours 2			

Course Description

Computer components (key board - CPU - mouse - monitor . etc).How to operate the computer - menus - programs

SECOND TRAINING SEMESTER

Course Title	Electrical Machines (1)		
Course Code	ED 151	Credits	5
Lecture Hours	4	Practical Hours	2
Total Hours 6			

Course Description

Separately Excited DC motor. Shunt motor. Servo Motor. Mechanical Amplifiers. Applications on control and measurement Circuits.

Course Title	Electrical control		
Course Code	ED 152	Credits	3
Lecture Hours	2	Practical Hours	2
Total Hours 4			

Course Description

Open switches and isolators. Automatic and manual circuit breakers or load break switches. Manual selector switches (Optional switches). Contactors. Push buttons .timers. Relays and fuses.Indication lamps. Limit switches . Over load Relays. Switches and other special switches. Applications on control circuits for AC and DC motors (Three phase motors – shunt and compound motors – Universal motors). Method of finding faults.

Course Title	Electrical Circuits (2)		
Course Code	EG 151	Credits	5
Lecture Hours	4	Practical Hours	2
Total Hours 6			

Course Description

Introduction to AC current. Resistance, impedance, admittance, electromagnetic induction, inductive reactance, capacitive reactance, impedance. Impedance connection (series, parallel, and combined). Single phase transformer, resonance. Star and Delta connection of impedance. Active power, reactive power, an apparent power, and power factor. Operations of single phase transformers.

Course Title	Electrical Drawings (2)		
Course Code	EM 154	Credits	3
Lecture Hours	0	Practical Hours	6
Total Hours 6			

Course Description

Electric symbols of power plant. Single line drawing of a power plant (Doha West or East or Alzour power plant). Single line diagram of a generator. Single line diagram of a generator's transformer. Single line diagram of an excitation transformer. Single line diagram of a rectification circuits. Single line diagram of a tap-changer. Cross-section in a synchronous generator. Single line diagram of an 11 KV and 132 KV transmission line. Single line diagram of an 11 KV AND 6.6 KV and 3.3 KV motors.

Course Title	Safety Regulation		
Course Code	EG 265	Credits	2
Lecture Hours	2	Practical Hours	0
Total Hours 2			

Course Description

Safety and security regulations, training on using safety tools and clothes related to work site, Installation and detaching for control and measurements devices. Following correct rules in electrically and mechanically isolating. Using tools and materials damping the sparks when dealing with gas. Dealing and arranging in work between control technician and the operator. Discover leaking then discharge and evacuation pipes from dangerous gases as chloride and soda. Using safety clothes. Identify the different places for measuring equipments in the site; identify the coloures for different lines as gas, air, chlorine, steam and services air pipes.

Course Title	Mathematics (2)		
Course Code	MA158	Credits	3
Lecture Hours	3	Practical Hours	0
Total Hours 3			

Course Description

Vectors, Polar & Cartesian coordinates, differentiation & integration.

Course Title	English (2)		
Course Code	EN 166	Credits	2
Lecture Hours	1	Practical Hours	2
Total Hours 3			

Course Description

Technical terms with simple linguistic expressions.



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THIRD TRAINING SEMESTER

Course Title	Electrical Machines (2)		
Course Code	ED 205	Credits	5
Lecture Hours	4	Practical Hours	2
		Total Hours	6

Course Description

Construction of single phase transformers. Theory of operation. Construction of three phase transformers. Theory of operation. Methods of connecting single phase and three phase transformers. Connection of open delta. Construction of synchronous generator and theory of operation. Single phase induction motor. Three phase induction motor. Shaded pole motor.

Course Title	Power system simulator (1)		
Course Code	ED 206	Credits	3
Lecture Hours	0	Practical Hours	6
		Total Hours	6

Course Description

Definition of simulator. Construction of simulator cells. Safety button / Emergency button for simulator. Electrical connections cells / power supply. Simulator cells and front description for each of the front connections for each cell and the operation and the turn off procedure. Operation of contactors and circuit breakers. Operation of turbine / generator. Operation of voltage control system. characteristics of generator under load . Short circuit of the generator. Measuring the impedance of the transformer.

Course Title	Electrical Measurements		
Course Code	ED 155	Credits	4
Lecture Hours	3	Practical Hours	2
		Total Hours	5

Course Description

Introduction to measuring devices. Analogue and digital Avometer .Applications of AVometers. Applications and types of Meggers. Theory of current transformers and their usage. Applications of current transformers. Application of clamp ammeter. Single phase and three phase KWH meters and their types and applications and their connection in single and three phase circuits

Course Title	Protection (1)		
Course Code	EG 211	Credits	3
Lecture Hours	2	Practical Hours	2
		Total Hours	4

Course Description

Introduction to protective devices. Examples on protective devices. Generator protective devices (over current and under voltage). Negative sequence relay. Differential relay. Power reverse. Earth fault. Under frequency. Transformer protection (over current and Buchholz). Earth fault. Differential. Motor protective relay (over current, differential, under voltage, phase loss). Gas C.B . . . Air C.B. Air circuit breaker relay. Isolating and earthing switches. Earthing systems .voltage transformers .current transformers. Protective devices of small motors.

Course Title	Piping & Vessels		
Course Code	WD 208	Credits	4
Lecture Hours	2	Practical Hours	4
		Total Hours	6

Course Description

Basic definition and skills for the course that contain valves which are divided based on the method of operation, construction and usage. Isolating valve (open and close). Gate valve , gland valve , spherical valves , butter fly valve , needle valve , all kind of one direction valves (alternating , piston and vertical) . Pressure control valves, Safety Valve, decreasing pressure valve and regulating pressure valve.

Course Title	Technical English (1)		
Course Code	EN 222	Credits	2
Lecture Hours	1	Practical Hours	2
		Total Hours	3

Course Description

Technical terms & names and abbreviations of equipment used in Power Operation for cooling water pumps stations utilizing illustrative drawings.

FOURTH TRAINING SEMESTER

Course Title	Power System Simulator (2)		
Course Code	ED 255	Credits	3
Lecture Hours	0	Practical Hours	6
		Total Hours	6

Course Description

Review on what have been studied in power simulator (1). Practical experiments on the system. Loading the system. Synchronizing between the units. Line boxes. Practical experiments on protection against over current, over voltage, earth fault on the stator of the generator, earth fault on the rotor of the generator and an experiment on differential protection. Introducing the Automatic system for operating power system simulator (Scada system) and applying those experiments on power system simulator on the automating operation.

Course Title	Electrical Machines		
Course Code	ED 256 251	Credits	5
Lecture Hours	4	Practical Hours	2
		Total Hours	6

Course Description

Squirrel cage three phase induction motors. Its construction. No load and full load operation. Three phase wound rotor induction motor. Its construction. Synchronous speed, slip. Effect of revolving field and speed of the rotor on the voltage of the rotor in the machine. Stator current and rotor current on different speed of motors. Control of the speed of the motor using Rheostat. Studying faults .Three phase synchronous motor .Its Construction. Starting characteristics .Using the synchronous motor as variable inductance and variable capacitance. Synchronous generator. Saturation curve .Short circuit characteristics for generator. Load characteristics. Voltage regulation of the generator with resistance, capacitance and inductance. Loading effect on voltage of the generator. Studying faults. Synchronizing synchronous generators. The output power of the synchronous generator. Starters of the three phase induction motors .Three phase transformers.

Course Title	Protection (2)		
Course Code	EG 261	Credits	3
Lecture Hours	2	Practical Hours	2
		Total Hours	4

Course Description

Control system components. Power transformer fault, differential relay theory, power transformer differential protection, inrush current protection, bus bar differential protection, over current relay theory, power transformer over current protection, restricted earth fault protection, direction protection of all network components

Course Title	Pumps & Compressors		
Course Code	WD 155	Credits	4
Lecture Hours	2	Practical Hours	4
		Total Hours	6

Course Description

Basics knowledge and skills of fluid mechanics, pressure, flow, Bernoulli Theory, types of pumps, centrifugal pumps. Positive displacement pump. Its construction, theory of operation, pump efficiency, pumps power. Efficiency factor for centrifugal pumps on constant speed. Efficiency factor for centrifugal pumps when speed changing.

Course Title	Technical English (2)		
Course Code	EN 270	Credits	2
Lecture Hours	1	Practical Hours	2
		Total Hours	3

Course Description

Advanced Technical Terms and Abbreviations of Power Operation Generation stations.

Course Title	Field Training course		
Course Code	ED 300	Credits	15
Lecture Hours	0	Practical Hours	30
		Total Hours	30

Course Description

Training in power stations at Ministry of Energy.

Course Title	Technical report		
Course Code	ED 257	Credits	3
Lecture Hours	3	Practical Hours	0
		Total Hours	3

Course Description

Definitions. Principles of organizing the report. Types of Report – Report description . Report format for equipment delivery and submission. Maintenance Report – Performance report – periodical maintenance report. Types of Managements Job title and specialty . PAAET's management structure . PAAET goals . Electrical water pumps station management .

Course Title	Scada System		
Course Code	ED259	Credits	1
Lecture Hours	0	Practical Hours	2
		Total Hours	2

Course Description

Introducing the Automatic system for operating power system simulator (Scada system) and applying those experiments on power system simulator on the automating operation.