



Engineering Program

Specialization	Electrical Installations and Equipment
Course Number	020303241
Course Title	Industrial electrical wiring
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Brief Course Description:

Electrical drawing in factories , Symbols , Feeding systems , Electrical wiring methods , Main and subsidiary panel boards, Distribution boards , Cross section and drop voltage calculations , Electrical motors and their control devices , Starters , Starting methods protections , Power systems and wiring systems protection (Selective protection) , Air conditioning and ventilation devices and their connections.

Course Objectives:

1. To know electrical drawings and installations in factories.
2. Feeding systems types
3. Distribution boards, containers and constructions.
4. Electrical motors and control devices.
5. Power system production design.
6. Air conditioning and ventilation devices and their connections.

Detailed Course Description:

Unit. No.	Unit name	Unit Contents	Time Needed
1.	Electrical drawings in factories	<ul style="list-style-type: none"> Architectural drawings , symbols use in industrial wiring , constructional drawings of factories ,drawing of machines distribution (arrangement) , lighting drawing schemes , telecommunication drawing schemes , fire alarm warning drawings . 	1 week
2.	Electrical installations in factories	<ul style="list-style-type: none"> Trunks and conduits ,types of trunks and conduits and their characteristics , classification according to site (underground, overhead , lateral) according to their materials (metallic , plastic , cement) , according to their design(single , multiple) trunks , wires and cables . junction boxes , distribution boards. 	2 weeks
3.	Electrical feeding systems	<ul style="list-style-type: none"> Feeding systems types: radial , loop , radial –loop systems feeding system choosing conditions , feeding from the national system by step –down transformer . transformer room requirements , low voltage requirements (first step , second step). Feeding from a site station or from standby power plants. Industrial loads and their types. require factor (K_r) and disperse factor (K_p). Transformer power calculations according to loading factor. 	3 weeks
4.	Main and subsidiary panel boards	<ul style="list-style-type: none"> Low voltage distribution board , main distribution board containers and constructions and its characteristics . branch distribution boards , single and three phase distribution boards for lighting and industrial loads. 	1 week

5.	<p>Cross section and drop voltage calculations</p>	<ul style="list-style-type: none"> ▪ Calculation of drop voltage and feeder cross section for DC loads (uni branch and multi branch).calculation of drop voltage and cross section for single phase and three phase loads. current calculations for DC,AC (single and three phase)loads . overload calculations ,cable cross section determining and choosing from conductors ampacity tables . lighting feeder calculation ,multi branch motors feeder calculation. Master feeder calculation(lighting and motors) .. 	
6.	<p>Electrical motors and their control devices</p>	<ul style="list-style-type: none"> ▪ Electrical motors , classification according types (ac,dc) .industrial machines and their motors, motors choosing for given working machine conditions .DC motors starting , single phase capacitors motors driving using manual switch or magnetically operated switch , starters: centrifugal switch , current relay or voltage relay . three phase motor driving using manual switch or magnetically operated switch starters : ▪ Direct starting by connecting motor coils as a star(Y) or delta direct in the motor box ▪ Manual starting via resistance or auto-transformer connected in series with motor –stators coils(or via resistance connected in series with motor-rotor coils) ▪ Cylindrical manual switches starting methods for : Y / reverse rotation , speed control (two ,three or four speeds) ▪ Automatic starting via contactors and timers using atrafotap or Y / configuration for speed control or 	

		<p>reverse rotation</p> <ul style="list-style-type: none"> Block diagram for a three phase motor protection and control branch circuit. 	
7.	Power system protection design	<ul style="list-style-type: none"> Overload and short circuit protection , protection against electrical arch , human protection against electrifying treatments , overload and short circuit protection of feeders via C.B and fuses , protection calculations , overload and short circuit of electrical machines and apparatus via C.B. and fuses , protection calculation , protection arrangements of feeders and loads such as selective protection among all protections , sigurance factor between a fuse followed by C.B. and a C.B followed by fuse. 	
8.	Air conditioning and ventilation devices and their connections	<ul style="list-style-type: none"> Natural and artificial air conditioning via fan coils , fluid refrigeration systems , general mechanical refrigeration circuit & schemes , water cooler and refrigerator ,electrical cct. and connections , air conditioning systems , single phase and three phase air conditioner , central air conditioning systems in factories , electrical circuit of the burner in the boiler of the central heating system. 	

Evaluation Strategies:

		Percentage	Date
1. Exams	First Exam.	20%	--/--/----
	Second Exam	20%	--/--/----
	Assignments		
	Final Exam	50%	--/--/----
2. Homework and Projects		10%	
3. Discussions and lecture Presentations			

□ **Teaching Methodology:**

1. Lectures

□ **References :**

1. Electrical Wiring Industrial 12th edition. Based on 2005 national Electrical code.
2. Robert L. Smith and Stephan L. Herman, copyright 2005.
3. Commercial Electric Wiring to the 1999 NEC.
4. John E. Traister.
5. التمديدات الكهربائية وحمايتها ، د. محمد و د. هاني عبيد. دار التنوير العلمي للنشر والتوزيع الطبعة الاولى ١٩٩٢ . عمان.
6. Industrial electrical Wiring: Design , Installation and maintenance. By John E. Taister, publisher Newyork : McGraw – Hill 1997.