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## ***Course Specifications of: Control in Refrigeration and Air Conditioning systems MEP 506***

**Program(s) on which the course is given:** Diploma in Power Engineering  
(Refrigeration and Air Conditioning Technology)

**Compulsory or Elective element of program:** Elective

**Department offering the program:** Mechanical Engineering/ Power

**Academic year / Level:** year/ 2014/2015

**Date of specification approval:** 2012

### **A. Basic Information**

**Title:** *Control in Refrigeration and Air Conditioning systems* **Code:** MEP 506

**Credit Hours:** 3

**Lecture:** 3

**Tutorial:**

**Practical:**

**Total:** 3

### **B- Professional Information**

#### **1- Overall aims of course:**

This course introduces students to:

1. Classify and analyze different control systems in refrigeration and Air Conditioning field.
2. Recognize the different types of control systems applied for refrigeration and air conditioning units.
3. Practice the components of automatic control and measurement systems used in RAC systems.

#### **2- Intended learning outcomes of course (ILOs)**

By completion of the course, the student should be able to:

##### **a- Knowledge and understanding**

- a.1 demonstrate principles of professional practice in the area of *Control in Refrigeration and Air Conditioning systems*. (2.1.2)
- a.2 discuss Current problems in summer and winter air conditioning cycles (2.1.3)
- a.3 Analysis, design and operation for control of HVAC systems..(2.1.5)

##### **b- Intellectual skills**

- b.1 Critically read research papers and topics related to control in refrigeration and air conditioning systems.( 2.2.3)
- b.2 Assess the risks and hazards in refrigeration and air conditioning systems control. (2.2.4)

##### **c- Professional and practical skills**

- c.1 Apply professional skills to solve problems in the area of control in refrigeration and air conditioning systems.( 2.3.1)
- c.2 Prepare professional reports. (2.3.2)

**d- General and transferable skills**

- d.1 Use different sources for obtaining information and knowledge.( 2.4.4)  
d.2 Work in a group and manage time effectively.( 2.4.5)

**3- Contents**

Topic No.	Topic	No. of weeks	Total no. of hours
1	Basic control elements	1	8
2	Temperature and pressure control	2	8
3	Float control - Flow rate control	2	8
4	Compressor automatic control- Expansion valves control	2	8
5	Condenser and evaporator automatic control	4	16
6	Design of proportional integral differential controllers in refrigeration and air conditioning systems	3	9
7	Exam	1	3
	<b>Total</b>	15	45

**4- Course Matrix**

ILO's code number	Teaching/learning methods and strategies	Assessment methods and strategies
2.1.2 2.1.3 2.1.5	Formal lectures	Individual coursework assignments, quizzes, oral discussions and reports. Mid year and /or final written examination is given.
2.2.3 2.2.4	Analysis and problem-solving skills are developed through tutorial/problem sheets and small group exercises.	Analysis and problem-solving skills are assessed through oral and written examinations. Design and research skills are assessed through project write-ups, coursework and project reports.
2.3.1 2.3.2	Virtual Experiments demonstrations, laboratory visits.	Practical skills are assessed through laboratory experimental write-ups, coursework exercises and reports, project reports and presentations.
2.4.4 2.4.5	Those skills are not explicitly taught; however, along the course of study the student will acquire those skills to be able to perform his obligations. Attendance of seminars, workshops or conferences will help the student in developing those skills.	Project presentation



	Presentation by students (either group or individual) will train students for those skills.	
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**5- Assessment schedule**

Assessment 1	Assignments	on weeks	1, 3, 6
Assessment 2	Quizzes	on weeks	2, 4, 9, 13
Assessment 3	Mid-term exam	on weeks	8
Assessment 3	Oral exam	on week	14
Assessment 4	Final exam	on week	15

**6- Weighting of assessments**

- 20% (60 marks) Home assignments, Quizzes, and reports
- 20% (60 marks) Mid-term examination and Oral examination
- 60% (180 marks) Final-term examination
- 100% (300 marks) Total

**7- List of References**

**7.1 Essential books (Text books)**

- Handbook of HEATING, VENTILATION, and AIR CONDITIONING  
Ed. Jan F. Kreider Boca Raton, CRC Press LLC. 2001.
- Control Systems for Heating, Ventilating, and Air Conditioning, [Roger W. Haines](#), and [Douglas C. Hittle](#), sixth ed., Springer, 2003.

**7.2 Recommended books; Periodicals & Websites.**

- ASHRAE 2000 HVAC Systems and Equipment Handbook
- ASHRAE 2005 Fundamentals Handbook

**8- Facilities required for teaching and learning**

- Lecture room equipped with overhead projector
- Presentation board, computer and data show

**Prepared by Prof. Dr. Ramadan Sakr**

**Head of Department: Prof. Dr. Osama Ezzat Abdellatif**



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**Matrix of course content and ILO's****Course Title: Refrigeration and Air Conditioning Control****Code: MEP 506****Lecture: 3 . Tutorial: ---- Practical: ----****Total: 3****Program on which the course is given: Diploma in Power Engineering****Minor element of program: Elective****Department offering the program Mechanical Engineering /Power****Department offering the course: Mechanical Engineering / Power****Academic year / level: 2014/2015. Date of specifications approval: 2012**

<b>Course content</b>	<b>ILO's A</b>	<b>ILO's B</b>	<b>ILO's C</b>	<b>ILO's D</b>
Basic control elements	a1	b1		
Temperature and pressure control	a2	b2	c2	
Float control - Flow rate control	a3		c2	d1,d2
Compressor automatic control- Expansion valves control	a1	b1,b2	c2	
Condenser and evaporator automatic control	a3	b2	c1	d1,d2
Design of proportional integral differential controllers in refrigeration and air conditioning systems	a2			d1



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## Matrix of course aims and ILO's

**Course Title:** Refrigeration and Air Conditioning Control **Code:** MEP 506  
**Lecture:** 3. **Tutorial:** ---- **Practical:** ---- **Total:** 3  
**Program on which the course is given:** Diploma in Power Engineering  
**Minor element of program:** Elective  
**Department offering the program:** Mechanical Engineering /Power  
**Department offering the course:** Mechanical Engineering / Power  
**Academic year / level:** 2014/2015. **Date of specifications approval:** 2012

Course aims	ILO's A	ILO's B	ILO's C	ILO's D
1-Describe and analyse different control systems in refrigeration and Air Conditioning field.	a1,a2,a3	a2	c1	
2-Know the different types of control systems applied for refrigeration and air conditioning units.		b1	c2	d1
3-Describe the components of automatic control and measurement systems used in RAC systems		b2	c1	d2