Course Specifications of: Power Plants MEP 611

Program(s) on which the course is given: Post Graduate **M. Eng.** in Mechanical Power Engineering
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: Power Plants **Code: MEP 611**
Credit Hours: 3 **Lecture: 3**
Tutorial: **Practical:** **Total; 3**

B- Professional Information

1- Overall aims of course:
This course introduces students to:

1. Understand the fundamentals of power plants and its contents.
2. Demonstrate principles and practice for the different types of power plants including nuclear power plants.
3. Recognize all types of boilers and its control physical principles and the most important techniques in power plants.

2- Intended learning outcomes of course (ILOs)
By completion of the course, the student should be able to:

2.1 Knowledge and understanding

a1. Define theories, fundamentals and specialized knowledge in power station. (2.1.1)
a2. Describe the two way impact of the relationship between power station practice and its effect on the environment. (2.1.2)
a3. Outline the scientific developments in power station. (2.1.3)
a4. Summarize the role of ethics in professional power plants practice and the procedures followed to conduct a scientific research. (2.1.4)

2.2 Intellectual skills

b1. Analyze and assess information in the field of power station and draw analogies to solve problems.(2.2.1)
b2. Assess risks in professional practices in power station.(2.2.5)
b3. Plan for performance development in power station.(2.2.6)
b4. Make professional decisions in various professional contexts.(2.2.7)

2.3 Professional and practical skills

c1. Master basic professional and modern skills in power station.(2.3.1)
c2. Write and evaluate professional reports.(2.3.2)

c3. Assess methods and current tools in power station. (2.3.3)

2.4 General and transferable skills

d1. Assess him/her self and identify his/her own personal learning needs.(2.4.3)
d2. Use different sources for obtaining information and knowledge. (2.4.4)
d3. Set basis and standards to assess the performance of others. (2.4.5)
d4. Conduct self-learning and continuous education practices. (2.4.8)

3- Contents

Topic No.	Topic	No. of weeks	Total no. of hours
1	Thermodynamics - heat transfer – steam boilers – fire tube boilers – water tube boiler - water circulation systems – steam drums – steam super heaters	2	6
2	Economizers- air preheaters - chimney - control systems of steam boilers - fuel combustion (coal fuel - liquid fuels - fuel Natural gas - systems to supply fuel - soot and dust separators - environmental impact and environmental protection)	3	9
2	Condensers – condenser design - cooling water systems - cooling towers - ponds and channels cooling stations - multi purposes - nuclear power plants nuclear energy - nuclear reactions - fission reactions of fusion reactions	3	9
3	Energy from nuclear reaction - control in the fission reaction – chain reaction - nuclear reactors - pressurized water reactors - boiling water reactors	2	6
4	Reactors – gas cooled reactors – gas cooled gas reactors with a high temperature - pressurized heavy water reactors – fast breeder reactors- analysis of disasters caused by nuclear power plants - environmental impact of nuclear stations - nuclear safety - The economics of nuclear power plants..	3	9
14	Oral exam	1	3
15	Final Exam	1	3
	Total	15	45

4- Course Matrix

ILO's code number	Teaching/learning methods and strategies	Assessment methods and strategies
2.1.1 2.1.2 2.1.3 2.1.4	Formal lectures	Individual coursework assignments, quizzes, oral discussions and reports. Mid-year and /or final written examination is given.
2.2.1 2.2.5 2.2.6	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.

2.2.7	Research skills are developed through a small subject oriented research project.	Design and research skills are assessed through project write-ups, coursework and project reports.
2.3.1 2.3.2 2.3.3	Experiments demonstrations, practical work, laboratory visits.	Practical skills are assessed through laboratory experimental write-ups, coursework exercises and reports, project reports and presentations.
2.4.3 2.4.4 2.4.5 2.4.8	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. Presentation by students (either group or individual) will train students for those skills.	Project presentation

5- Assessment schedule

Assessment 1	Assignments	on weeks	2, 5, 8, 11
Assessment 2	Quizzes	on weeks	6, 12
Assessment 3	Mid-term exam	on weeks	9
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)

- Power Plant Engineering by C. Elanchezhian (Apr 23, 2007)
- Power Plant Engineering by Larry Drbal, Kayla Westra and Pat Boston (Dec 31, 1995)
- Course notes Prepared by the instructor

7.2 Recommended books; Periodicals & Websites.

- Power Generation Handbook : Selection, Applications, Operation, Maintenance by Philip
- Kiameh (Aug 28, 2002)
- www.google.com/Thermodynamics
- www.sciencedirect.com
- www.4shared.com

8- Facilities required for teaching and learning

- Lecture room equipped with overhead projector

- Presentation board, computer and data show
- Laboratory

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Matrix of course content and ILO's

Course Title: Power Plants **Code: MEP 611**
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Course content	ILO's A	ILO's B	ILO's C	ILO's D
1. Thermodynamics - heat transfer – steam boilers – fire tube boilers – water tube boiler - water circulation systems – steam drums – steam super heaters	a1,a3	b1	c1	d1
2. Economizers- air preheaters - chimney - control systems of steam boilers - fuel combustion (coal fuel - liquid fuels - fuel Natural gas - systems to supply fuel - soot and dust separators - environmental impact and environmental protection)	a1	b2	c3	d2
3. Condensers – condenser design - cooling water systems - cooling towers - ponds and channels cooling stations - multi purposes - nuclear power plants nuclear energy - nuclear reactions - fission reactions of fusion reactions	a2	b4		d4
4. Energy from nuclear reaction - control in the fission reaction – chain reaction - nuclear reactors - pressurized water reactors - boiling water reactors	a4	b2	c2	
5. Reactors – gas cooled reactors – gas cooled gas reactors with a high temperature - pressurized heavy water reactors – fast breeder reactors- analysis of disasters caused by nuclear power plants - environmental impact of nuclear stations - nuclear safety - The economics of nuclear power plants..	a3	b3		d3

Matrix of course aims and ILO's

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1- Understand the fundamentals of power plants and its contents.	a1,a2	b1,b3	c1 c2	d1 d4
2- Demonstrate principles and practice for the different types of power plants including nuclear power plants.	a1,a3	b1,b4	c1	d1,d3
3- Recognize all types of boilers and its control physical principles and the most important techniques in power plants.	a4	b2,b1	c3	d2