Course Specifications of: Hydraulic Turbines MEP 517

Program(s) on which the course is given: Diploma in Mechanical Power Engineering (Conventional and Renewable Power Plants)
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: Hydraulic Turbines **Code**: **MEP 517**
Credit Hours: 3 **Lecture: 3**
Tutorial: **Practical:** **Total: 3**

B- Professional Information

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

1- Interpret the fundamentals of Hydraulic turbines.
2- Demonstrate principles and practice for the different types of energy conversions through turbines.
3- Recognize the physical principles and the most important techniques in energy transformation.
4- Enhance professional problems related to the design and installation of hydraulic Turbines.
5- Research skills are developed through a small subject oriented research project.

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

2.1 Knowledge and understanding

a1. Review theories, fundamentals and in hydraulic turbines study and categorize sciences related to professional practice. (2.1.1)
a2. List principles of professional practice in hydraulic turbines. (2.1.2)

2.2 Intellectual skills

b1. Discriminate and analyze the problems in hydraulic turbines and categorize them according to their priority. (2.2.1)
b2. Solve specialized problems in hydraulic turbines. (2.2.2)
b3. Analysis and criticize research papers and topics related to his/her area of specialization. (2.2.3)

2.3 Professional and practical skills

c1. Apply professional skills in the area of study of conventional and renewable power plants. (2.3.1)
c2. Ability to plan and implement experiment design and evaluate testing. (2.3.3)

2.4 General and transferable skills

d1. Communicate effectively using different means.(2.4.1)
d2. Use information technology to improve his professional practice.(2.4.2)
d3. Assess him/her self and identify his/her own personal learning needs.(2.4.3)
d4. Conduct self-learning and continuous education practices.(2.4.7)

3- Contents

Topic No.	Topic	No. of weeks	Total no. of hours
1	Introduction & Basic Definition	1	3
2	Flow through a set of blades	2	6
3	Lift and drag on the sets of blades	3	9
	Types of turbines		
4	• Reaction turbines	1	3
5	• Impulse turbines	1	3
6	• Pelton wheel turbines	1	3
7	• Radial turbine and Francis turbine	2	6
8	• Kaplan turbine	1	3
9	Performance of the turbine	2	6
	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	Formal lectures	Individual coursework assignments, quizzes, oral discussions and reports. Mid-year and /or final written examination is given.
2.2.1 2.2.2 2.2.3	Analysis and problem-solving skills are developed through tutorial/problem sheets and small group exercises. Research skills are developed through a small subject oriented research project.	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	Experiments demonstrations, practical work,	Practical skills are assessed through

2.3.3	laboratory visits.	laboratory experimental write-ups, coursework exercises and reports, project reports and presentations.
2.4.1 2.4.2 2.4.3 2.4.7	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	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 Text books

- Fundamentals of Fluid Mechanics,
- Turbines, Compressors and Fans
- Fundamentals of Turbomachinery
- Basic concepts of Turbomachinery

7.2 Recommended books; Periodicals & Websites.

- Yahoo mail group
- 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: Hydraulic Turbines **Code: MEP 517**
Lecture: 3 **Tutorial: ----** **Practical: ----** **Total: 3**
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Course aims	ILO's A	ILO's B	ILO's C	ILO's D
Introduction & Basic Definition	a1, a2			
Flow through a set of blades	a1	b1		d2
Lift and drag on the sets of blades	a1	b1		d2
Types of turbines, reaction turbines, Impulse turbines, Pelton wheel turbines, Radial turbine and Francis turbine, Kaplan turbine		b2	c1,c2	d3,d4
Performance of the turbine		b2,b3		d1

Matrix of course aims and ILO's

Course Title: Hydraulic Turbines **Code: MEP 517**
Lecture: 3 . **Tutorial: ----** **Practical: ----** **Total: 3**
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Course content	ILO's A	ILO's B	ILO's C	ILO's D
Understand the fundamentals of Hydraulic turbines.	a1, a2	b2		d2
Demonstrate principles and practice for the different types of energy conversions through turbines.	a1	b1		d2
Recognize the physical principles and the most important techniques in energy transformation.	a1	b1		d2
Enhancement for professional problems related to the design and installation of hydraulic Turbines.		b2	c1,c2	d3,d4
Research skills are developed through a small subject oriented research project.		b3		d1,d3,d4