



BENHA UNIVERSITY



FACULTY OF ENGINEERING AT SHOUBRA

COURSE SPECIFICATIONS (2014-2015)

Model No.12

Course Specifications: Fault diagnostic By Using Vibration Analysis

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

1- Course Data

Course Code: MDP442

Course Title: Fault diagnostic By Using Vibration Analysis

Specialization: Production and Mechanical Engineering Design

Course Type: Elective

Study Year: Fourth Year

Teaching Hours: Lecture: 3

Tutorial: 2

Practical: 0

Total: 5

2- Course Aim

For students undertaking this course, the aims are to:

1. Teach the students how to model control system, obtain system response, Study the systems stability analysis and design the control system.

3- Intended Learning Outcomes of Course (ILO's)

- a. Knowledge and Understanding Skills:** On completing this course, students will be able to demonstrate the knowledge and understanding of:
 - a.1) Concepts and theories of mathematics and sciences, appropriate to the fault diagnostic by using vibration analysis (A.1).
 - a.2) The basic concepts of different methods in vibration analysis.
 - a.3) Characteristics of engineering materials related to fault diagnostic by using vibration analysis (A.3).
 - a.4) Principles of design including elements design, process and/or a system related to specific fault diagnostic by using vibration analysis (A.4).
 - a.5) Steps to approach problem solution by using vibration analysis (A5).
 - a.6) The effect of varying the key parameters on the type of maintenance strategies. (A13)
- b. Intellectual Skills:** At the end of this course, the students will be able to:
 - b.1) Select appropriate mathematical and computer-based methods for modeling and analyzing Vibration measurements and sensors (B1).
 - b.2) Assess the differences between the actual and ideal vibration analysis processes [B11].
 - b.3) Evaluate the performance of the components as well as overall system for vibration analysis and propose improvements [B6].
 - b.4) Analyze the performance of the Vibration measurements and sensors. [B12]
- c. Practical and Professional Skills:** On completing this course, the students are expected to be able to:
 - c.1) Apply vibration for out of balance fault analysis. [C1]
 - c.2) Create and/or re-design a process, Gear fault analysis, Bearing fault analysis, Lubricant fault analysis, and carry out specialized engineering designs(C.3).
 - c.3) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the vibration analysis and develop required computer programs (C.6).
 - c.4) Prepare and present technical reports. [C11]



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- d. General and Transferable Skills:** At the end of this course, the students will be able to:
- d- 1) Collaborate effectively within multidisciplinary team(D.1).
 - d- 2) Communicate effectively(D.3).
 - d- 3) Effectively manage tasks, time, and resources (D.6).

Course Contents

Week no.	Topics
1	Introduction to vibration analysis
2	Fast Fourier transformer
3	Vibration measurements and sensors
4	Vibration isolation
5	Type of maintenance strategies
6	Predictive maintenance
7	Out of balance fault analysis
8	Midterm exam
9	Gear fault analysis
10	Cavitation's fault analysis
11	Gear fault analysis
12	Bearing fault analysis
13	Lubricant problems fault analysis
14	Review on application
15	Final exam
16	Final exam

5- Teaching and Learning Methods

- 5.1 Lectures
- 5.2 Seminar / workshop
- 5.3 Class activity
- 5.4 Case study
- 5.5 Assignments / homework

6- Teaching and Learning Methods of Disables

- Nothing.

7- Student Assessment

a- Student Assessment Methods

1. Four assignments to assess knowledge and intellectual skills.
2. Two quiz to assess knowledge, intellectual and professional skills.
3. Mid-term exam to assess knowledge, intellectual, professional and general skills.
4. Final exam to assess knowledge, intellectual, professional and general skills.

b- Assessment Schedule

NO.	Assessment	Week
1	Assignments	2, 5, 7, 9
2	Quiz	3, and 10
3	Midterm exam	8
4	Final exam	15



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c- Weighting of Assessments

Assessment	Weight (%)
Mid-Term Examination	18 %
Final-Term Examination	64 %
Practical Examination	08 %
Other types of assessment	10%
Total	100

8- List of References

a- Course Notes: Course notes prepared by instructor.

Course Coordinator: Dr. Maha Mahmoud Ali Lashen

Head of Department: Prof. Dr. Osama Ezzat Abdelatif



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FACULTY OF ENGINEERING AT SHOUBRA

COURSE SPECIFICATIONS (2014-2015)

Model No.11A

Course Specifications: Fault diagnostic By Using Vibration Analysis

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Introduction to vibration analysis	1	a1,a3,a4	b2		
2	Fast Fourier transformer	2	a3	b1		
3	Vibration measurements and sensors	3	a1,a4	b3		
4	Vibration isolation	4		b1,b3		
5	Type of maintenance strategies	5	a4,a5		c1	d2
6	Predictive maintenance	6		b3		d3
7	Out of balance fault analysis	7		b1	c4	d1
8	Midterm exam	8				
9	Gear fault analysis	9	a1,a3	b2		
10	Cavitation fault analysis	10		b4	c2	d1
11	Gear fault analysis	11	a4			d1,d2
12	Gear fault analysis	12		b3	c2	d3
13	Lubricant problems fault analysis	13	a5		c3	d2
14	Review on application	14	a1	b2	c3	d1,d2
15	Final exam	15				
16	Final exam	16				

Course Coordinator: Dr. Maha Mahmoud Ali Lashen

Head of Department: Prof. Dr. Osama Ezzat Abdelatif



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COURSE SPECIFICATIONS (2014-2015)

Matrix of Course Aims and ILO's

Course Title: Fault Diagnostic By Using Vibration Analysis

Course Code: MDP442

Teaching Hours: Lecture: 3 Tutorial: 2 Total: 5

Major or minor element of program: Major

Program on which the course is given: B.Sc. Mechanical Engineering Department

Department offering the program: Mechanical Engineering Department

Academic year / level: 2014-2015 Fourth Year / First Semester

Date of specifications approval: 2014

Course aims	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skills
1- To Teach The students how to model control system, obtain system response, Study the systems stability analysis and design the control system	a1,a3,a4	b1,b2,b3,b4	c1,c3,c4	d1,d2,d3

Course Coordinator: Dr. Maha Mahmoud Ali Lashen

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