

Faculty of Engineering & Technology

Vibration Principles and Monitoring

Information :

Course Code : MKT 510

Level : Undergraduate

Course Hours : 2.00- Hours

Department : Specialization of Mechatronics Engineering

Instructor Information :

Title	Name	Office hours
Professor	Hassan Ahmed Ahmed Mohamed Metered	2
Teaching Assistant	Osama Ahmed Ibrahim Mohamed Montaser	

Area Of Study :

- 1- To gain a thorough introduction to mechanical vibrations of single and multi-degree-of-freedom systems.
- 2- To gain the ability to use analytical and computational methods to analyze the vibratory response of a structure subjected to a variety of different types of excitation.
- 3- To study techniques for vibration control.
- 4- To become familiar with the processes of monitoring the operating conditions of industrial machinery and its relevance to fault detection and diagnosis.

Description :

Oscillatory motion, Single degree of freedom systems, Free vibration, Forced vibrations, Various applications, Vibration measurement, Using of vibrations in machine maintenance, Two degree of freedom systems, Lagrange's equation, Vibration absorber, Multi degree of freedom systems, Applications.

Course outcomes :

a. Knowledge and Understanding: :

1 -	Identify basic applied and engineering science.
2 -	Identify principles in the of design of mechanical components, different materials, and manufacturing technologies in the field of mechanical power engineering and some other engineering disciplines.
3 -	Identify principles in the field of design of fluid flow, thermodynamics, gas dynamics, turbo- machinery, heat transfer engineering and fundamentals of thermal and fluid processes
4 -	Develop conceptual and detailed design of construction projects and fluid power systems.

b. Intellectual Skills: :

1 -	Define the mechanical power engineering problems and evaluate designs, processes, and performance and propose improvements.
2 -	Derive different solution alternatives for the engineering problems, analyze, interpret data and design experiments to obtain new data, and evaluate the power losses in the fluid transmission lines and networks

- 3 - Analyze the performance of the basic types of internal combustion engines, hydraulic machines, fluid power systems, subsystems and various control valves and actuators. Analyze the solution alternatives and choose the optimum one.

c. Professional and Practical Skills: :

- 1 - Use laboratory, workshop equipment and field devices competently and safely.
- 2 - Analyze the record data in the laboratory.
- 3 - Prepare engineering drawings, computer graphics, and write specialized technical reports.
- 4 - Write computer programs pertaining to mechanical power and energy engineering to describe the basic thermal and fluid processes mathematically, and use the computer software for their simulation and analysis.

d. General and Transferable Skills: :

- 1 - Collaborate effectively within multidisciplinary team.
- 2 - Share ideas, communicate effectively and work in stressful environment and within constraints.
- 3 - Lead and motivate individuals and work with others according to the rules of the professional Ethics.
- 4 - Use digital libraries and/or Learning systems and demonstrate efficient IT capabilities.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to vibration as a machine condition monitoring.			
Vibration analysis of damped and undamped single and multi-degree of freedom systems			
Vibration transmission and isolating foundation design, vibration control techniques.			
Characteristics of vibration signals and frequency spectrum.			
Vibration measurement and spectrum analysis.			
Vibration as a machine condition monitoring and fault diagnosis.			

Teaching And Learning Methodologies :

Lectures

Tutorials

Presentation & Discussion

Brain storming

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Attendance	10.00	6	
Final examination	40.00	16	
Homework assignments	10.00	15	
Mid-term examination(s)	30.00	15	
Quizzes	10.00	4	

Recommended books :

Ç"Engineering Vibration" By; Daniel J. Inman, 3rd. ed., Prentice-Hall Inc., (ISBN: 0132281732) (2002).
Ç"Vibration Condition Monitoring of Machines" By: J.S. Rao, CRC Press, (ISBN: 0849309379) (2000).