هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specification

Course Title: Hydraulics and Pneumatics
Course Code: 233MMET
Program: Mechanical Maintenance Engineering Technology
Department: Mechanical Engineering Technology
College: College of Applied Industrial Technology
Institution: Jazan University
Version: V2022
Last Revision Date : 03-03-2024

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	2CR hours				
2. Course type					
a.	University ☐	College ☐	Department √	Track☐	Others☐
b.	Required √	Elective☐			
3. Level/year at which this course is offered: Fifth level/ 2nd Year					
4. Course general Description This course is directed to study the principles of operation, and calculation of fluid power systems (hydraulics and pneumatics). In addition, special attention will be paid to cover the construction, troubleshooting and maintenance of fluid power systems and their industrial applications. Also, the course will cover a good theoretical base of fluid power systems which enables the further analysis of the static and dynamic performance of different elements of fluid power systems. Together with the theoretical study, the course includes the different case studies of typical industrial circuits. Laboratory sessions involving the use of computers for simulation and analysis of different systems and individual elements performance are used. The course is introduced through two classes weekly. They are: 1 class (1 hour) for the theoretical part and 2 hours class for laboratory for which students apply and implement the concepts of the lectures.					
5. Pre-requirements for this course (if any): 241MMET Applied Thermodynamics					
6. Co- requirements for this course (if any): Nil					
7. Course Main Objective(s) Fluid power is the technology that deals with the generation, control and transmission of forces and movement of mechanical element or system with the use of pressurized fluids in a confined system. Both liquids and gases are considered fluids. Fluid hydraulic employs pressurized liquid/ oils, and pneumatic employs compressed air that is released to the atmosphere after performing the work.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	100
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	11
2.	Laboratory/Studio	22
3.	Field	---
4.	Tutorial	---
5.	Others (specify)	---
	Total	33

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Explain the basic principles and applications of fluid power systems with definition of the their basic components (air compressors, reciprocating compressor, horizontal, radial split case centrifugal pump, gear pump, diaphragm pump, piping, fittings, and different types of valves).	K1.2	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
…				
2.0	Skills			
2.1	Generalize and interpret piping and instrumentation (P&ID) diagram and standards	S11	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
2.2	Decide test, and maintain various components of hydraulic and pneumatic systems (air compressors, reciprocating compressor, horizontal, radial split case centrifugal pump, gear pump, diaphragm pump, piping, fittings, and different types of valves).	S4.1	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Evaluate the well defined technical problems to calculate the extension force of a cylinder, and changes in pressure and volume using Pascal's law and Boyles law	S1.1	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
2.4	Combine the rules and principles and prepare well organized document for 'Safety and Health Guidelines' when using hydraulic/pneumatic circuits and design the variety of pneumatic circuits including regenerative circuits, speed control circuits, fail-safe circuit and flow control circuit.	S2.2, S3.3	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
3.0	Values, autonomy, and responsibility			
3.1	Summarize the issues of various electrical control devices for fluid power systems like push button switches, limit switches, pressure switches, temperature switches, solenoids, ladder diagram, relays and timers related to engineering technology	V2.1	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
3.2	Soft skills: Formulate the interpersonal skills and manage team work	V1.2	Lecture, active learning, discussion	Quizzes, Assignments, tutorials & exams
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C. Course Content

No	List of Topics	Contact Hours
1	Introduction to basic fluid power principles and theory. Occupational Safety and Health when using hydraulic and pneumatic circuits.	6

2	Introduction to pumps and air compressors, reciprocating compressor, air treatment and pressure regulation and state of their uses and principle of operation	6
3	Understand and interpreting piping and instrumentation (P & ID) diagram	6
4	Identifying valves and control valves and actuators with uses and symbols	6
5	Hydraulic and pneumatic accessories (piping and fittings)	6
6	Testing, fault finding and maintenance for several types of valves. Sequence applications	Self Study
7	Revision of course material	3
Total		33

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	As schduled	10%
2.	Midterm	7th week	15%
3.	Self study report	3rd week	10%
4	Assignments, Tutorials	All weeks	10%
5	Lab work, Lab Exam and Viva-Voce Exam	All Weeks	15%
6	Final Exam	As scheduled	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Introduction to Fluid Mechanics", R. Fox & A. McDonald, John Wiley, New York, 1985. • "Fluid Power Control", J.R. Blackburn, G. Reethof, and J.L. Shearer, The MIT Press, Cambridge, MA, 1960.
Supportive References	• Classroom policy • "Hydraulics and Pneumatics: A Technician's and Engineer's Guide", Andrew Parr, 3rd edition, Butterworth-Heinemann, 2011. • "Control of Fluid Power", D. McCloy& H.R. Martin, 2ndEdition, John Wiley, New York, 1980 • "Hydraulics and Pneumatics", Dr.V.Jayakumar, Lakshmi Publications, India, 2016 (2006).

Electronic Materials	• https://www.youtube.com/watch?v=5KCzOHQdKPI • https://www.youtube.com/watch?v=6Zvm-lpMuQ8
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms should be furnished with • White board and appropriate Chairs • Laboratory equipped with, but not limited to: 1. Hydraulic and pneumatic training packages. 2. Pascals' Law experimental set. 3. Gauges for flow rate and pressure. 4. Piping and Instrumentation diagram
Technology equipment (projector, smart board, software)	Digital board, Computer with data show
Other equipment (depending on the nature of the specialty)	Not utilized

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Confidential student Course Evaluation Survey	Institution	Online Direct Survey
End of semester CLO	Course Coordinator	Direct Survey
Confidential student Course Evaluation Survey	Institution	Online Direct Survey
The extent to which CLOs have been achieved	Students	CLO survey, exams
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	MET
REFERENCE NO.	CAITMET20243
DATE	03-03-2024