

B.E Semester: 5 Mechanical Engineering
Subject Name: Oil Hydraulics and Pneumatics (MA505-N-A)
[Dept. Elect.-1]

A. Course Objective:

- To present a problem oriented in depth knowledge of Oil Hydraulics and Pneumatics.
- To address the underlying concepts and methods behind Hydraulics and Pneumatics systems.

B. Teaching / Examination Scheme:

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	2	5	4	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	Introduction: Introduction, Global fluid power Scenario, Basic system of Hydraulics-Major advantages and disadvantages, Principles of Hydraulic Fluid power, Hydraulic Symbols, Electrical Elements used in hydraulic circuits
2	System Components, Hydraulic Oils, Fluid Properties and Filter: Hydraulic & Pneumatic Symbols as per ISO/ANSI, Types, Properties, physical characteristics & functions of hydraulic Oils, Classification- Mineral based, Fire resistant& Biodegradable Oils, Filters, Contaminations, location of filter.
3	Hydraulic Pumps, Motors and Actuators: Construction, working principle and operation of rotary & reciprocating pumps like Gear, Vane, Generated-Rotor, Screw, Axial Piston, Radial Piston, Pump characteristics, Linear and Rotary Actuators, Hydrostatic Transmission Systems. Selection of components for applications.
4	Hydraulic Valves and Hydraulic System Accessories: Direction control valves, Pressure control valves, Flow control valves, Non-return valves, Reservoirs, Accumulators, Heating & cooling devices, Hoses. Selection of valves for circuits.
5	Design of hydraulic circuits: Basic hydraulic circuits, Industrial hydraulic circuits, Power losses in flow control circuits.
6	Introduction to Pneumatic Systems: Basic Requirements for Pneumatic System, Applications, Pneumatic fundamentals, Construction, working principle and operation of pneumatic power transmission system components like Power source, FRL unit, Actuators and control valves like DCV, FCV, PCV, time delay, quick exhaust, twin pressure, shuttle
7	Pneumatic circuits: Basic pneumatic circuits, Development of single Actuator Circuits, Development of multiple Actuator Circuits, Cascade method for sequencing.
8	Introduction to Automation in hydraulic and Pneumatic Systems.

Total hours (Theory):48
Total hours (Practical):32
Total hours:80

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 st ,2 nd ,3 rd	Unit 1	20%	1,2
2	4 th .5 th ,6 th	Unit 2	20%	3
3	7 th , 8 th ,9 th	Unit 3	20%	4
4	10 th .11 th . 12 th	Unit 4	20%	5,6
5	13 th , 14 th ,15 th ,16 th	Unit 5	20%	7,8

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted toequivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overallinternal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for theconcept being taught in lectures. Suggested list of experiment is given below

F. List of Practical:

1	Introduction about hydraulics/pneumatic kit and components
2	Study of Compressor, FRL unit and DCV.
3	Study of freeware simulation software.
4	Regenerative circuit using hydraulics/pneumatic kit
5	Speed Control circuits: meter-in, meter-out using hydraulics/pneumatic kit
6	Sequencing circuit using hydraulics/pneumatic kit
7	Rapid Traverse and Feed circuit.
8	Logical circuits using shuttle valve.

G. Students Learning Outcomes:

1	The student can identify different areas and applications of Hydraulics and Pneumatics systems.
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H. Text Books & Reference Books:

1	Industrial Hydraulics by John Pippenger and Tyler Hicks, McGraw Hill.
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2	Oil Hydraulic Systems, Principle and Maintenance by S R Majumdar, McGraw-Hill.
3	Fluid Power with Applications by Anthony Esposito, Pearson.
4	Fluid Power: Generation, Transmission and Control, Jagadeesha T., Thammaiah Gowda, Wiley.
5	The Analysis & Design of Pneumatic Systems by B. W. Anderson, John Wiley.
6	Control of Fluid Power Analysis and Design by Mc Clay Donaldson, Ellis Horwood Ltd.
7	Hydraulic and Pneumatic Controls: Understanding made Easy, K.Shanmuga Sundaram, S.Chand & Co Book publishers, New Delhi, 2006 (Reprint 2009)
8	Basic Pneumatic Systems, Principle and Maintenance by S R Majumdar, McGraw-Hill
9	Basic fluid power Dudley, A. Pease and John J. Pippenger, , Prentice Hall, 1987