GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Bachelor of Vocation (B.Voc), 4th Semester
Branch: Production Technology
Subject Name: Hydraulics and Pneumatics Systems
Subject Code: 21140303

Type of course: Engineering Science

Prerequisite: Zeal to learn the subject

Rationale: The concepts of hydraulics and pneumatics are important and indispensable tools being used in the innovations, circuit design and improvement of engineering processes and devices. Different types of power sources, valves and actuators are essential elements in all the manufacturing industries, specially where automation and control are required. This course is designed to develop underpinning knowledge of hydraulic and pneumatic systems which are widely used for control and other purposes in machine tools, material handling, automobile, marine, elevators, mining, metal processing equipment and other fields. This course also enables the diploma students to operate and troubleshoot different types of hydraulic and pneumatic systems in industries.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
03	00	00	03	50	00	00	00	50

L- Lectures; P- Practical; OJT- On Job Training; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Content:

Sr. No.	Content	Total Hrs.	Module % Weightage
01	**Introduction to Hydraulic Power:** Basic system of Hydraulics-Major advantages and disadvantages and application, Comparison among Electrical, Hydraulics and Pneumatics System, Principles of Hydraulic Fluid power-Pascal's Law, Brahmas Press. Sources of Hydraulic power: Pumping Theory — Pump Classification — Construction and Working. Basic hydraulic circuits with ISO symbol.	08	20
02	**Hydraulic Oils, Fluid Properties and Filter:** Types, Properties, physical characteristics & functions of hydraulic Oils, Classification Mineral based, Fire resistant& Biodegradable Oils. Filters, Contaminations, location of filter.	08	20
03	**Introduction to Pneumatic systems:** Advantages and disadvantages and application of pneumatic system, Types of Air Compressors, FRL unit, Air filter, Pressure regulator and Lubricator. Basic Pneumatic circuits with ISO symbol.	08	20
04	**Hydraulic and Pneumatic System Elements.** Types of Hydraulic Actuators, Direction control valves, Pressure control valves, Flow control valves, non-return valves. Types of Pneumatic Actuators, Pneumatic Direction control valves, Quick Exhaust Valves, Time delay Shuttle and Twin pressure	10	25

	valves.		
05	**Hydraulic and Pneumatic Circuits & its maintenance.** Basic Hydraulic Circuits: - Meter in, meter out and regenerative circuit. Basic Pneumatic Circuits: - Sequencing circuit, Speed control circuit. Maintenance, Trouble-shooting and Remedies in Hydraulic and Pneumatic systems	08	15
	Total	**42**	**100**

Distribution of marks weightage for cognitive level:

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	-	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books

1. Industrial Hydraulics by John Pippenger and Tyler Hicks, McGraw Hill.
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., ThammaiahGowda, 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.ShanmugaSundaram, S.Chand& Co Book publishers, New Delhi, 2006 (Reprint 2009)
8. Basic Pneumatic Systems, Principle and Maintenance by S R Majumdar, McGraw-Hill

Course Outcome:

Sr. No.	**CO statement**	**Marks % weightage**
CO 1	To Understand components for hydraulic systems and their applications	40
CO 2	To Understand components for pneumatic systems and their applications	40
CO 3	To apply knowledge of hydraulic and pneumatic circuits for specific applications and Maintenance and installation of hydraulic and pneumatic system	20

List of Open Source Software/learning website:
https://nptel.ac.in