

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Diploma Engineering				Branch	Mechatronics Engineering			
Semester	V				Version	1.0.0.0			
Effective from Academic Year		2018-19			Effective for the batch Admitted in		July 2018		
Subject code	1MC2501		Subject Name		Hydraulic & Pneumatic Devices				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	3	0	2	0	5	Theory	40	60	100
Hours	3	0	4	0	7	Practical	30	20	50

Pre-requisites:
Students must have knowledge of concepts of hydraulic & pneumatic system. Students must aware with Fluid, its related concepts & Fluid control system.

Course Learning Outcomes:
<p>The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:</p> <ul style="list-style-type: none"> To understand the basics of hydraulic, pneumatic, mechanical & electrical system. To understand the basic hydraulic & pneumatic elements.. Knowledge of basic hydraulic & pneumatic devices used in industries. To understand Fluid & its related concepts. To develop hydraulic&pneumatic circuits. <p>The tutorial should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate course learning outcomes.</p>

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 Fluid Power	1.1. Power transmission modes. 1.2. Hydraulic systems. 1.3. Pneumatic systems 1.4. Laws governing fluid flow: Pascal's law, continuity equation, Bernoulli's theorem, Boyle's, Charles', Gay-lussec' laws. 1.5. Flow through pipes - types, pressure drop in pipes, Working fluids used in hydraulic and pneumatic systems-types, ISO/BIS standards and designations, properties.	1a. Distinguish between hydraulic and pneumatic systems 1b. Compare fluid power transmission with electrical and mechanical transmission. 1c. Describe various laws governing fluid flows. 1d. Select appropriate hydraulic and pneumatic fluid for given application.	8	6
UNIT – 2 Hydraulic & Pneumatic Elements	2.1. Hydraulic pipes-Types, standards, designation methods and specifications, pressure ratings, applications and selection criteria. 2.2. Pumping theory, Hydraulic Pumps	2a. Select appropriate hydraulic pipe for given application. 2b. Describe the working of hydraulic control valves and actuators 2c. Describe the working of pneu-	8	6

	<p>- types, construction, working principle, applications, selection criteria and comparison.</p> <p>2.3. Hydraulic Actuators, Control valves, Accessories - their types, construction and working</p> <p>2.4. Pneumatic Pipes - materials, designations, standards, properties and piping layout.</p> <p>2.5. Air compressors, Air receivers, air dryers, Air Filters, Regulators, Lubricators (FRL unit): their types, construction, working, specifications and selection criteria of following air preparation and conditioning elements</p> <p>2.6. Pneumatic Actuators and Control valves - types, construction, working, materials and specifications</p>	<p>matic control valves</p> <p>2d. Select, appropriate hydraulic device for given application.</p> <p>2e. Select, appropriate pneumatic device for given application.</p> <p>2f. Use and maintain FRL unit in pneumatics.</p> <p>2g. Select hydraulic and pneumatic accessories with its location on hydraulic and pneumatic system.</p>		
<p>UNIT – 3 Hydraulic and Pneumatic Circuits</p>	<p>3.1 ISO symbols used in hydraulic and pneumatic circuits.</p> <p>3.2 Basic Hydraulic Circuits – types (such as intensifier, regenerative, synchronizing, sequencing, speed control, safety), circuit diagram, components, working and applications.</p> <p>3.3 Basic Pneumatic Circuits – types (such as speed control, two step feed control, automatic cylinder reciprocation, time delay, quick exhaust), circuit diagram, components, working and applications.</p> <p>3.4 Pneumatic Logic circuit design - classic method, cascade method.</p>	<p>3a. Describe ISO symbols and guiding rules for designing hydraulic and pneumatic system.</p> <p>3b. Describe the procedure for maintaining basic hydraulic and pneumatic circuit based on given system requirements.</p> <p>3c. Describe function of various components used in above mentioned circuit diagram</p> <p>3d. Describe the procedure for maintaining basic hydraulic and pneumatic circuit based on given system requirements.</p>	8	6
<p>UNIT – 4 Hydraulic and Pneumatic Devices</p>	<p>4.1 Hydraulic and Pneumatic devices – Concept and applications.</p> <p>4.2 Construction, working principle, major elements, performance variables of: Automotive hydraulic brake, Industrial Fork lift, Hydraulic jack, Hydraulic press, Automotive power steering, Automotive pneumatic brake, Automotive air suspension, Pneumatic drill, Pneumatic gun.</p>	<p>4a. Identify different parts in a given hydraulic and pneumatic device.</p> <p>4b. Describe function and working of various parts in hydraulic and pneumatic devices.</p>	10	6
<p>UNIT – 5 Installation, Maintenance and Troubleshooting</p>	<p>5.1 Installation of hydraulic and pneumatic system.</p> <p>5.2 Causes and remedies for common troubles arising in hydraulic ele-</p>	<p>5a. Describe different properties of the fluid.</p> <p>5b. Identify the various faults in the hydraulic and pneumatic system</p>	14	11

	ments. 5.3 Maintenance of hydraulic systems. 5.4 Causes and remedies for troubles arising in pneumatic elements. 5.5 Maintenance of pneumatic systems	and the remedial actions for them.		
UNIT – 6 Hydro-Pneumatics	6.1 Types, construction, working, circuit diagram and application of following hydro pneumatic elements: Air oil reservoir, Hydraulic series check unit, Hydraulic parallel check unit, Hydro pneumatic cylinder, and Air oil intensifier.	6a. Explain working of Hydro pneumatic elements.	12	10

No.	Name of Practical
1	TO STUDY ABOUT THE BASIC HYDRAULIC ELEMENTS.
2	TO RECIPROCATATE SINGLE ACTING CYLINDER USING 3/2 MANUAL OPERATED DCV.
3	TO RECIPROCATATE DOUBLE ACTING CYLINDER USING 4 WAY MANUAL OPERATED DCV.
4	PERFORM METER-IN AND METER-OUT CIRCUIT ON HYDRAULIC KIT.
5	TO OPERATE A DOUBLE ACTING CYLINDER USING 4 WAY SOLENOID OPERATED DCV.
6	TO PERFORM AN EXPERIMENT ON PRESSURE DEPENDENT SEQUENCE CONTROL OF CYLINDER.
7	PERFORM AN EXPERIMENT TO SYNCHRONISE TWO DOUBLE ACTING CYLINDER USING PARALLEL AND SERIES CONNECTIONS.
8	TO PERFORM AN EXPERIMENT USING ACCUMULATOR
9	TO PERFORM AN EXPERIMENT ON REGENERATIVE CONCEPT.
10	STUDY AND WRITE A REPORT ON ANY ONE OF HYDRAULIC & PNEUMATIC DEVICES.

List of Instruments/Equipment/Trainer Board	
1	Hydraulics Lab.
2	Bosch Rexroth Excellence Centre-Practical Lab.

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Fluid Mechanics and Hydraulics	R.S.Khurmi	S Chand publication
2	Oil Hydraulic Systems	S. R. Mujumdar	Tata Mcgraw-Hill Publication, 3/e, 2013

3	Hydraulic and Pneumatic Controls	R.Srinivasan	Vijay Nicole Imprints Private Limited, 2/e, 2008
4	Hydraulic & Pneumatic Devices	Atul prakashan	
5	Pneumatic Systems	S. R. Mujumdar	Tata Mcgraw-Hill Publication, 3/e, 2013
6	Hydraulics & Hydraulic Machinery	Patel.R.C. & Pandya.A.D.	Acharya Book Depot (1967)

Link of Learning Web Resource	
1	https://www.youtube.com/watch?v=iTanaNwMDKo&list=PL9RcWoqXmzaLnIGN39w2-1jyFyI_ALVa3&index=1
2	http://www.howstuffworks.com/search.php?terms=hydraulics
3	http://www.youtube.com/watch?v=FVR7AC8ExIM
4	http://www.youtube.com/watch?v=iOXRoYHdCV0
5	http://hyperphysics.phy-astr.gsu.edu/hbase/fluid.html#flucon

Mock Test	
1	https://www.indiabix.com/mechanical-engineering/hydraulics-and-fluid-mechanics/
2	https://www.careerride.com/mcq-daily/hydraulics-and-pneumatics-test-set-1-219.aspx