Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1724701 Date: 16-06-2014

Subject Name: Advance Hydraulic and Pneumatic Systems

Time: 02:30 pm - 05:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	(i) Give comparison of pure Pneumatic, Electro pneumatic and PLC based control.	04
		(ii) Give three distinct applications of Pneumatic system.	03
	(b)	(i) Compare Hydraulic, Pneumatic and Mechanical systems.	04
		(ii) State the Pascalôs law. Explain the principle of Bramahôs press.	03
Q.2	(a)	(i) Describe the following properties of Hydraulic fluid (1) Bulk modulus (2) Lubricity (3) Aging (4) Viscosity	04
		(ii) State the effect of temperature and pressure on viscosity of fluid.	03
	(b)	(i) Explain briefly the following fire resistant fluids (1) Water-in-oil emulsion (2) Phosphate esters.	04
		(ii) Explain meaning of filter rating B_{10}=75.	03
		OR	
	(b)	(i) What is the difference between a variable displacement pump and fixed displacement pump? When you will select variable displacement pump.	04
		(ii) State different preferred locations of Filter in a hydraulic system.	03
Q.3	(a)	(i) Draw a schematic of a Swash plate type axial piston pump. Explain briefly its operation and application.	04
		(ii) How does internal gear pump differ from external gear pump? State the advantages.	03
	(b)	(i)Explain operation of servo valve with the help of block diagram of position servo valve.	04
		(ii) Differentiate between Servo valve and Proportional valve.	03
		OR	
Q.3	(a)	(i) Draw a schematic of a Radial piston pump. Explain its operation and application.	04
		(ii) State different types of pressure control valves. Explain working of any one with the help of neat sketch.	03
	(b)	(i) Explain operation of flapper type 2 stage Servo valve.	04
		(ii) Specify the points to be taken care while selecting a servo valve.	03
Q.4	(a)	(i) Compare Meter-in and Meter-out circuit.	03
		(ii) The automatic door of a bus is operated by a double acting cylinder. Both the opening and closing of the door are selected by a selector 3/2 D.C. valve and the time the door is kept open is decided by the bus driver. The speed of closing and opening is adjustable. Draw the pneumatic circuit.	04
	(b)	(i)Differentiate the functions and characteristics of close centre valve and tandem centre valve with neat sketch.	03
		(ii) Two double acting pneumatic cylinders, A and B in a process industry should extend together at the same time to open two different valves. On the return stroke too, both the cylinder piston retract at the same time. The starting is by a detent switch. Both the cylinders are of the same size with the same stroke length. Draw the Electro-pneumatic circuit.	04
		OR	

Q.4	(a)	(i) State and explain different types of accumulator. Explain Bladder type in detail.	03
		(ii) A gate is operated pneumatically by a double acting cylinder. The opening of the gate is initiated by a push button. Once the end of the gate position is reached, to start its closing another manual push button has to be pressed. In case, while closing the gate, an object is felt, due to which the gate is not able to move further, then the gate is to return to its original position. Draw the pneumatic circuit.	04
	(b)	Give sources heat in a hydraulic system.	03
		(ii) A pneumatic double acting cylinder is used in an assembly shop to press a bearing into a housing. The bearing is press fit into the housing at a pressure of 5 bar. Once pressure of 5 bar is achieved, the cylinder piston return to the retracted position. The start of the pressing operation is by a start button switch, that commences the extension of the piston rod. Draw the Electro-pneumatic circuit.	04
Q.5	(a)	(i)Illustrate the application of shuttle valve and twin pressure valve through a typical pneumatic circuit.	04
		(ii)Draw simplified symbol of service unit and explain operation of any one unit.	03
	(b)	A trap door in a silo is to open and close at periodic intervals. The trap door is operated by a double acting cylinder. This cylinder extends fully and keeps the door open for a time of 5 seconds, and then retracts. It stays in a retracted position for a period of another 5 seconds, before extending again. The operation is started by a push button switch with a detent. To stop the cycle of operation, the detent switch to be pressed again. Draw the pneumatic circuit for the cylinder.	07
		OR	
	(a)	(i)Explain the construction and operation of time delay valve. Illustrate its application in setting delay in closing time through a typical pneumatic circuit.	04
		(ii)Describe the following: (1) Quick exhaust valve (2) Memory valve.	03
	(b)	A plastic component is embossed using a die powered by a double acting cylinder. The die is to advance and emboss the plastic when a push button is operated. The return of the die is to be effected when the cylinder rod has fully extended to the embossing position and the preset pressure is reached. A roller limit valve is to confirm full extension. On the return of the embossing cylinder, the embossed plastic part is pushed on to a conveyor by another double acting cylinder. This completes one cycle. Afresh cycle can be started by pressing the push button once again.	07