Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E -IVth SEMESTER–EXAMINATION – MAY- 2012

Subject code: 740901 Date: 12/05/2012

Subject Name: Fluid Drives & Control

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)** State and explain the advantages and disadvantages of oil hydraulic power transmission. **07**

(b) Why is a pneumatic power transmission preferred as a central power supply for a large factory/plant? What are the components of that central power source? Describe each of the components. **07**

Q.2 **(a)** State the properties of hydraulic oil desirable for power transmission. Explain why each of these properties is required for the purpose of power transmission. **07**

(b) What is the function of a pump in an oil hydraulic power transmission system? Why only positive displacement pumps are suitable for the purpose? How the pumps are protected against excessive system pressure? What are the criteria for selection of a pump? **07**

OR

(b) When do you prefer the reciprocating pumps over rotary pumps? Why? **07**

With the help of a neat sketch, explain the working principle of an In-line piston pump. Explain the features of its construction in the light of working principle.

Q.3 **(a)** What is the purpose of a pressure relief valve? How does a pressure relief valve work? Explain with the help of a neat schematic diagram, the construction and working of the pressure relief valve. **07**

(b) With the help of neat sketches describe the construction, working and application for each of the following: **07**

1. Ram type actuators
2. Telescopic type actuators.

OR

Q.3 **(a)** Explain cracking pressure and pressure override in the context of a pressure relief valve. Draw the pressure override characteristics for an ideal condition, for a conventional spring loaded pressure relief valve and a compound pressure relief valve. Comment on the same. **07**

(b) With the help of a block diagram describe how the servo valve is used in a feedback control system? **07**

Q.4 **(a)** Show the application of a flow control valve with the help of a meter-in circuit used for the speed control. Describe the working of the circuit and its components to explain when the flow control valve will operate and how does it control the flow. State the application of meter-in circuit. **07**

(b) (i) With the help of a neat schematic diagram bring out main features of a hydraulic reservoir. **03**

(ii) Draw the symbol of a hydraulic accumulator. List the different types of accumulator. Describe working of any one of them. **04**

OR

Q.4 **(a)** What is the difference between a simple solenoid valve and a proportional valve? Explain the working of a proportional valve to support the difference stated in the answer. **07**

(b) A machine vise is to be powered by oil. It involves following operations. **07**

1. The vise jaws are moving in the clamp position.
2. Holding pressure is built-up and applied, when the vise jaws are in clamped position.
3. The holding pressure is relieved.
4. The jaws are moved to the original position.

Suggest a suitable arrangement of hydraulic components represented in the form of a complete circuit using ANSI/ISO symbols. Justify your selection.

Q.5 **(a)** A pneumatic system has two cylinders operating in sequence. Explain functions of main components of the system and state at least one application of the system. **07**

(b) With the help of a neat sketch explain construction and working of Quick Exhaust valve. State its practical application. **07**

OR

Q.5 **(a)** A pneumatically actuated 4/2 DCV operates a double acting pneumatic cylinder. By using roller operated 3/2 DCV as pilot valve, prepare the system to achieve automatic operation of the cylinder. Substantiate your answer with relevant circuit diagrams. **07**

(b) With the help of neat sketches explain construction and working of a shuttle valve and a twin pressure valve. Also state logical operation performed by each of them. **07**

****