Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem – IV Examination May 2011

Subject code: 740901

Subject Name: FLUID DRIVES & CONTROL

Date: 16/05/2011 **Time: 10.30 a.m. -01.00 p.m.**

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)** With the help of illustrative examples explain each of the following phenomenon in context of hydraulic power transmission: **07**

1. Pressure is developed according to the resistance.
2. Pressure and flow rate are independent. Justify showing the relationship between force, pressure, flow and speed.

(b) (i) Compare hydraulic and pneumatic power transmission. **04**

(ii) Draw the symbol FRL unit and explain its role in pneumatic system. **03**

Q.2 **(a)** What are the functions of hydraulic oil used for power transmission? Hence discuss which properties are required for fulfilling the functions. **07**

(b) With the help of a neat sketch, explain the working principle of an external gear pump. Explain the features of its construction in the light of working principle. Draw the characteristics of a typical gear pump and comment on the same. **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 a radial piston pump. Explain the features of its construction in the light of working principle.

Q.3 **(a)** Show the application of a sequence valve with the help of a suitable circuit diagram. Describe the working of the circuit and its components to explain how and when the sequence valve will operate. **07**

(b) What are the functions of a reservoir of hydraulic power transmission system? State the functions for each of the following components in a hydraulic reservoir. **07**

1. Strainer 2. Air Breather 3. Baffle Plate

OR

Q.3 **(a)** Enlist different type of pressure control valves. **07**
State the major function for each of them.
State the application for each of them.

(b) A mechanical shaper is to be converted to a hydraulic shaper. Develop a circuit diagram for the hydraulic shaper. Note that, existing facilities with mechanical transmission can be used. What are the force and motion requirements of a shaper? How they can be fulfilled using mechanical-hydraulic power transmission? Justify your answer. **07**

Q.4 **(a)** What are servo valves or servomotor systems? When they are used? Explain construction and working of a mechanical servo valve with the help of a neat sketch. **07**

(b) Show the application of a flow control valve with the help of a meter-out 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-out circuit. **07**

OR

Q.4 **(a)** Explain the importance of filtration in hydraulic system. How is the contamination level of oil specified? Enlist different type of filters used in hydraulics and their applications. **07**

(b) In a hydraulic system cylinder extends with velocity of 0.4 m/s with load of 5 kN. The piston diameter is 10 cm and piston rod diameter is 5 cm. If the pump capacity is 4 liters per second and relief valve is set at 30 bar, find overall efficiency of the system. **07**

Q.5 **(a)** With the help of a suitable circuit diagram explain one practical application of the pneumatic sequence system. Also explain role of roller operated DCV used in the system. **07**

(b) Enlist the valves used for performing logical operations. Explain working of each of them with the help of neat sketches. **07**

OR

Q.5 **(a)** Explain significance of flexible valving element of Quick Exhaust valve. How does the valve give higher cylinder velocity than nominal velocity in pneumatic system? **07**

(b) Explain significance of different components present in a Time delay valve. Explain one practical application of the valve. **07**

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