Total No. of Questions : 8]

SEAT No. :

P3252

[Total No. of Pages : 4

[5353] - 115
T.E. (Mechanical)
HYDRAULICS AND PNEUMATICS
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1OR Q2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw ISO symbols for the following components: **[6]**

i) 4x3 pneumatically double pilot operated DCV

ii) Pressure compensated flow control valve

iii) Gas loaded accumulator

iv) Counterbalance valve with bypass & check valve

v) Quick Exhaust valve

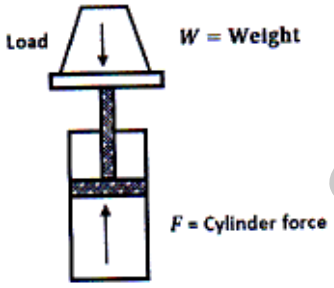
vi) Bi-directional fixed displacement hydraulic motor

b) Classify pumps used in fluid power applications. **[6]**

c) A 6000 N weight is to be lifted upward in a vertical direction for the system shown in Figure 1c. Find the cylinder force required to **[8]**

i) Move the weight at a constant velocity of 1.75 m/s.

ii) Accelerate the weight from zero velocity to 1.75 m/s in 0.5 s.



(Figure 1c)

P.T.O.

OR

Q2) a) Differentiate between hydraulics and pneumatics. **[6]**

b) What are the functions of reservoirs? Draw a neat sketch of standard reservoir showing its Internal and External features. **[6]**

c) With neat diagrams, explain what is a double rod end and telescopic cylinder. State their applications. **[8]**

Q3) a) Explain with neat sketch working of pressure reducing valve. Draw an ISO symbol of it. **[6]**

b) Draw a bleed off circuit for speed control and label the components. **[6]**

c) Draw a neat sketch of Riveting circuit and label the components. **[6]**

OR

Q4) a) Differentiate between 'closed centre' and 'tandem centre' valve position of directional control valve (DCV) with respect to ISO symbol, importance and applications. **[6]**

b) Draw regenerative circuit with a neat sketch. State its advantages. **[6]**

c) Draw a hydraulic circuit for cylinder synchronization with two cylinders connected in series. State if it will give perfect synchronization. **[6]**

Q5) a) Draw and explain throttle-out circuit used in pneumatics. **[6]**

b) Can we use atmospheric air directly in pneumatic systems? If no, why? What should be done to make use of it? **[6]**

c) State any two applications of pneumatics in low-cost automation **[4]**

OR

Q6) a) Draw a typical circuit showing the application of Shuttle Valve. **[6]**

b) Sketch compressed air generation and distribution system **[6]**

c) State any two applications in industry requiring vacuum for their operation **[4]**

Q7) In a special purpose machine hydraulic system is used for **[16]**

a) Clamping the job

b) Moving the machine bed during machining operation

The clamping force required to be developed by each of the four clamp cylinders is 1kN. The bed is to be moved against an effective load of 10kN.

Feed rate required is between 1 m/min to 3.5 m/min. The bed movement is 100cm.

Assume a suitable sequence of operations, and draw a simple hydraulic circuit which will fulfill these requirements. Select different components from the data given. Specify ratings of the components in case it is not available in the given data.

OR

Q8) a) Sequential operations of two pneumatic cylinders are required as follows: **[10]**

i) Cylinder A extends

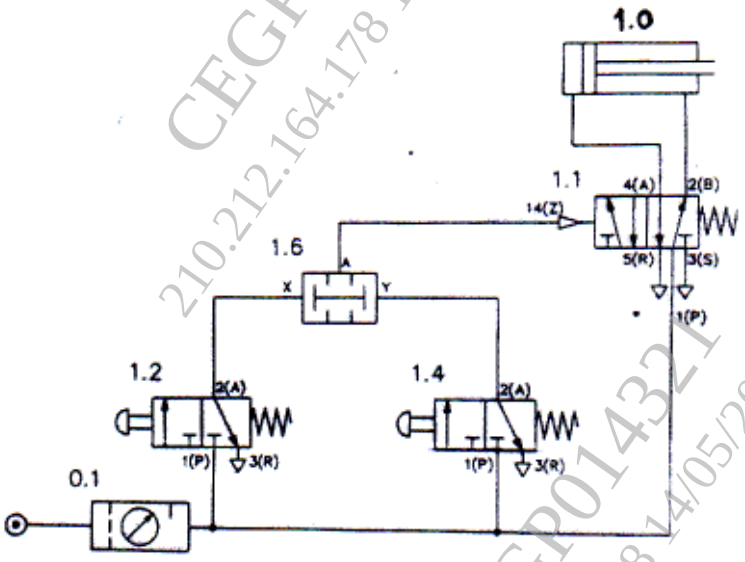
ii) Cylinder B extends

iii) Cylinder A retracts

iv) Cylinder B retracts

Develop a pneumatic circuit using pilot operated 4/2 DCV and roller operated valves. (Do not use sequence valves)

b) Label the components and analyze the circuit shown in Figure 8b. **[6]**



(Figure 8b)

DATA

1. **Suction Strainer :**

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. **Pressure Gauge :**

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

3. **Vane Pump :**

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. **Relief Valve :**

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. **Flow control Valve :**

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. **Directional Control Valve :**

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. **Check Valve :**

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. **Pilot Operated Check Valve :**

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. **Cylinder (Max Working Pressure 210 bar)**

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. **Oil Reservoirs :**

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600