Total No. of Questions : 8]

SEAT No. :

P2403

[Total No. of Pages : 4

[5253]-115

T.E. (Mechanical)

HYDRAULICS AND PNEUMATICS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 OR Q.2,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) 4×2 pneumatically pilot operated spring offset DCV

ii) Spring loaded accumulator

iii) Pressure reducing valve

iv) Unidirectional hydraulic motor

v) Pressure and Temperature compensated flow control valve

vi) Quick Exhaust valve

b) With a neat diagram, discuss Gear Pump as a Positive Displacement Pump. **[6]**

c) An 8 cm diameter hydraulic cylinder has a 4 cm diameter rod. If the cylinder receives flow at 100 LPM and 12 MPa, find the actuator speed and load carrying capacity in: **[8]**

i) Extension stroke,

ii) Retraction stroke.

P.T.O.

OR

Q2) a) Write in brief on sources of contamination and contamination control. **[6]**

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

c) Explain the applications of Double rod end and Telescopic cylinders. **[8]**

Q3) a) Classify different types of Pressure control valves used in the hydraulic circuits. Draw ISO symbol for each. **[6]**

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

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

OR

Q4) a) With neat sketches, explain any three methods of DCV actuation. **[6]**

b) Draw actuator locking circuit with pilot operated check valves. State the function of pilot operated check valves. **[6]**

c) Draw a neat sketch of Pump unloading circuit. State function of unloading valve. **[6]**

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

b) Compare characteristics of hydraulic and pneumatic systems. **[6]**

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

OR

Q6) a) State the application of Twin-pressure Valve with a typical circuit. **[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 four applications of pneumatics in low-cost automation. **[4]**

Q7) Sequential operations of two pneumatic cylinders are required as follows:**[16]**

a) Cylinder A extends

b) Cylinder B extends

c) Cylinder B retracts

d) Cylinder A retracts

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

OR

Q8) a) A hydraulic cylinder is used to push an object in the forward stroke. The total load on the hydraulic cylinder during forward stroke is 15 kN. The forward speed is approx. 3.0 m/min. Total stroke of the cylinder is 300 mm. The load during the retraction stroke is negligible, and it is to be retracted as fast as possible. Provision is required to hold the cylinder anywhere in between the end positions. Draw a simple hydraulic circuit, using Meter-in speed control method, to fulfill the given objective. Select different components from the data given. Specify ratings of the components in case it is not available in the given data. **[10]**

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

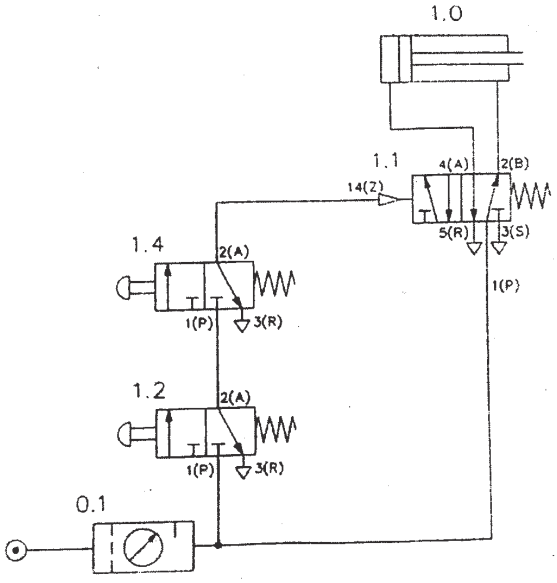

Figure 8b

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