Total No. of Questions : 08]

SEAT No. :

P3617

[Total No. of Pages : 4

[4858] - 1015
T.E. (Mechanical)
HYDRAULICS AND PNEUMATICS
(2012 Pattern) (Semester - I)

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) State any two governing laws of fluid and explain any one in detail. **[6]**

b) Draw and explain a circuit for Accumulator as a shock absorber. **[6]**

c) A hydro static transmission operating at 70 bars has the following **[8]**

Pump	Motor
Vd = 84cm^3	Vd=?,Ta = ?
Volumetric efficiency = 82%	Volumetric efficiency = 92%
Mechanical efficiency = 88%	Mechanical efficiency = 90%
N = 600rpm	N = 500rpm

Find i) Displacement of motor,
ii) motor output torque.

OR

Q2) a) Enlist six different specific applications of pneumatic system. **[6]**

b) Draw neat sketches of three different types of seals, and state the various sealing materials? **[6]**

c) A 25000 N weight is being pushed up on an inclined surface by a cylinder, as shown in Figure 2c. The coefficient of friction between the weight and the inclined surface equals 0.16. For the pressure of 7000 kPa, determine - **[8]**

i) The required cylinder piston diameter, if the weight is being pushed at a constant speed.

ii) The required cylinder piston diameter, if the weight is to accelerate from 0 mm/s to 1500 mm/s in 0.5 s.

P.T.O.

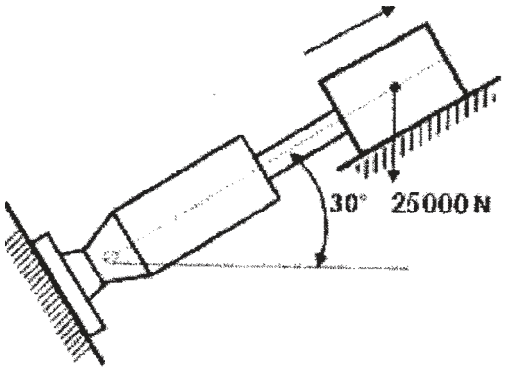

Figure 2c

Q3) a) Draw ISO symbols for any three different methods of DCV actuation, and state one application of each. **[6]**

b) Explain with neat sketch bleed off circuit. **[6]**

c) Draw a neat sketch of Pump unloading circuit and explain its working. **[6]**

OR

Q4) a) Explain with neat sketch working of pressure reducing valve. Draw an ISO symbol of it. **[6]**

b) Explain with neat sketch cylinder synchronization circuit with two cylinders connected in parallel. **[6]**

c) Draw a neat sketch of Riveting circuit and explain its working. **[6]**

Q5) a) Explain the working of Quick Exhaust Valve with a neat sketch. **[6]**

b) Draw a throttle-out circuit used in pneumatics. **[6]**

c) Differentiate between hydraulic and air motor. **[4]**

OR

Q6) a) Explain the application of AND Valve with a typical circuit. **[6]**

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

c) State any four applications of pneumatics in automobile industry and explain any one in detail. **[4]**

Q7) In a semi-automatic machine, a double acting hydraulic cylinder has a reciprocating motion. The forward motion is obtained using a regenerative circuit. The load during the forward stroke is 10 kN. The total stroke of 60 cm is to be completed in about 5 sec. The return speed is to be as fast as possible. Draw a hydraulic circuit to achieve the given objective. Select different components you have used in the circuit from the data given. Mention ratings of the components in case it is not available in the given data. **[16]**

OR

Q8) a) A hydraulic cylinder is used to push the object on a smooth surface. The total load on the hydraulic cylinder during forward stroke is 15.5 kN. The object has to be pushed at a distance of 500 mm in about 7 sec. 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) Analyze the circuit shown in Figure 8b. **[6]**

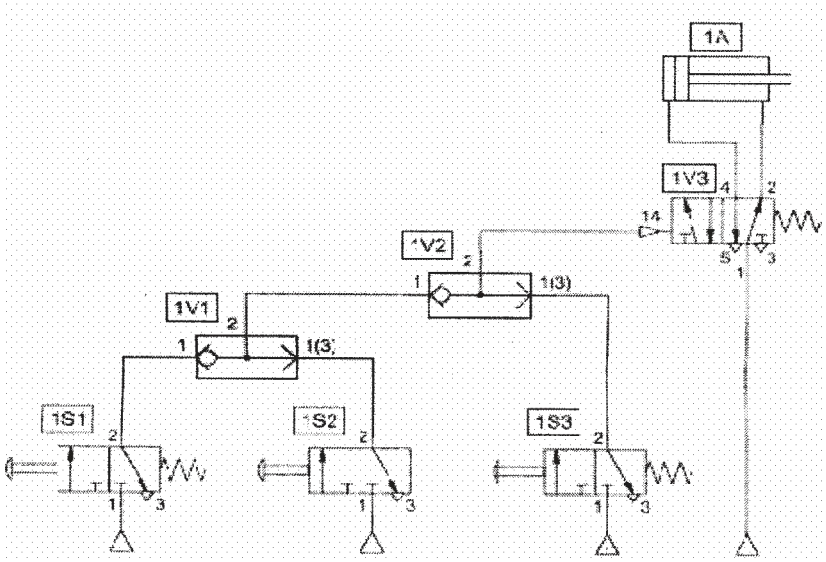

Figure 8b

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 Preasure (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

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