Total No. of Questions : 12]

SEAT No. :

P2370

[Total No. of Pages :4

[4758] - 515

T.E. (Mechanical)

HYDRAULICS AND PNEUMATICS

(2012 Pattern) (302045) (Semester -I) (End-Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer 6 questions.*
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) Distinguish between Hydraulics and Pneumatics systems. **[6]**

OR

Q2) Draw ISO symbols for the following components: **[6]**

a) Unidirectional, fixed displacement pump

b) Quick disconnect coupling with check

c) 3/2, solenoid operated, spring return DCV

d) 4/3, tandem centre, spring centered, oil pilot operated DCV

e) Muffler

f) Double acting cylinder with both side variable cushioning.

Q3) a) Classify and Explain hydraulic accumulators. **[4]**

b) A gas charged accumulator supplies energy to a system with 15 liters of oil within the range of 125 bar (abs) to 175bar (abs). If the accumulator has pre-charged pressure of 90 bar (abs). Size the accumulator for Adiabatic process. **[4]**

OR

P.T.O.

Q4) a) Classify hydraulic Pumps & define various efficiencies of a pump? **[6]**

b) Draw symbolic representation of Hydraulic Power Pack unit. **[2]**

Q5) What is Cushioning of Cylinders? Explain with neat sketch with symbolic representation. **[6]**

OR

Q6) Explain with neat sketch Piston type Hydraulic Motors. **[6]**

*Q7)*a)Draw neat sketch and explain the following with their application in circuit:**[12]**

i) Three Way, Two Position Direction Control Valve

ii) Four Way, Three Position Direction Control Valve (Closed Centre)

b) Draw & Explain Meter-In speed control circuit. Specify its application.**[6]**

OR

Q8) a) For the circuit diagram given in Fig.1, identify the type of Circuit & the numbered Components, also describe the circuit's operation. **[8]**

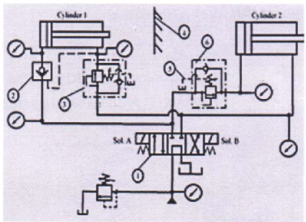

Fig.1

b) Draw a circuit for automatic cylinder recirprocation using sequence valves & explain its operation. **[10]**

Q9) a) Explain the working of a FRL unit with neat sketch and symbols. **[8]**

b) Write a short note on the following with application in the circuit: **[8]**

i) Shuttle valve (OR Gate)

ii) Quick Exhaust Valve

OR

*Q10)*a) Draw and explain position dependent sequencing circuit for two cylinders in pneumatics. **[8]**

b) Compare Air Motors with Electric Motors. **[4]**

c) Classify different actuators used in pneumatics with symbols. **[4]**

*Q11)*Movement of a machine is obtained by using hydraulic system. Load on the cylinder during the forward stroke is 12kN while that the return stroke is 10kN.

Requirement of the machine is such that the forward speed and the return speed are to be equal. Range of speeds for the cylinder is between 2m/min and 4m/min. The total stroke of the cylinder is 350mm.

Draw a circuit which will fulfill these requirements. Select different components used in the circuit from the data given. Mention ratings of components in case it is not available in the given data (Suitable system requirements can be assumed, if required). **[16]**

OR

*Q12)*A machine tool cross slide is moved by means of a hydraulic system. The motion of the cylinder is as follows: **[16]**

a) Initially it moves through a distance of 150mm against a load of 15kN in about 4 seconds.

b) It is followed by a working stroke of another 150mm against an effective load of 25kN.

The feed rate during this part of the stroke is required to be 1m/min.

c) The load during return stroke is 15kN.

A meter -in type of circuit is used. Draw a circuit which will fulfill these requirements. Select different components used in the circuit from the data given. Mention ratings of components in case it is not available in the given data.

DATA

1. SUCTION STRAINER:

Model	Flow capacity (lpm)
S1	38
S2	76
S3	152

2. PRESSURE GAUGE:

Model	Range (bar)
PG1	0-25
PG2	0-40
PG3	0-100
PG4	0-160

3. VANE PUMP:

Model	Delivery (lpm)		
	at 0 bar	at 35 bar	at 70 bar
P1	8.5	7.1	5.3
P2	12.9	11.4	9.5
P3	17.6	16.1	14.3
P4	25.1	23.8	22.4
P5	39	37.5	35.6

4. RELIEF VALVE:

Model	Flow range	Max. working pressure
	(lpm)	(bar)
R1	11.4	70
R2	19	210
R3	30.4	70
R4	57	105

5. FLOW CONTROL VALVE:

Model	Max. working pressure	Flow range
	(bar)	(lpm)
F1	70	0-4.1
F2	105	0-4.9
F3	105	0-16.3
F4	70	0-24.6

6. DIRECTION CONTROL VALVE:

Model	Max. working pressure	Flow capacity
	(bar)	(lpm)
D1	350	19
D2	210	38
D3	210	76

7. CHECK VALVE:

Model	Max. working pressure	Flow capacity
	(bar)	(lpm)
C1	210	15.2
C2	210	30.4
C3	210	76

8. SEQUENCE VALVE

Model	Max. working pressure	Flow capacity
	(bar)	(lpm)
PO1	210	19
PO2	210	38
PO3	210	76

9. CYLINDER (Max. working pressure - 210):

Model	Bore Dia.	Rod Dia
	(mm)	(mm)
A1	25	12.5
A2	40	16
A3	50	35
A4	75	45
A5	100	50

10. OIL RESERVOIR:

Model	Capacity (lit)
T1	40
T2	100
T3	250
T4	400
T5	600

☼ ☼ ☼