

Total No. of Questions : 8]

SEAT No. :

**P3876**

**[5561]-531**

[Total No. of Pages : 4

**B.E. (Mechanical)**

**HYDRAULICS AND PNEUMATICS**

**(2015 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) Assume suitable data, if necessary.

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

- i) 3x2 pneumatically double pilot operated DCV
  - ii) Double acting hydraulic Intensifier
  - iii) Counterbalance valve with bypass & check valve
  - iv) Twin Pressure valve
  - v) Quick Exhaust valve
  - vi) Bi-directional variable displacement hydraulic motor
- b) A hydraulic pump delivers 12 L of fluid per minute against a pressure of 200 bar. **[8]**
- i) Calculate the hydraulic power.
  - ii) If the overall pump efficiency is 60%, what size of electric motor would be needed to drive the pump?

OR

**Q2) a)** What are the functions of reservoirs? Draw a neat sketch of standard reservoir showing its Internal and External features. **[6]**

b) What is cushioning of a cylinder? Explain the cushioning mechanism using integral bypass circuit. **[8]**

**P.T.O.**

- Q3)** a) Explain with neat sketch working of sequence valve. Draw an ISO symbol of it. [6]
- b) Explain features of different centre positions of DCV with ISO symbols [8]
- c) Explain pressure compensated flow control valve with neat sketch. [6]

OR

- Q4)** a) Draw a hydraulic circuit for cylinder synchronization with two cylinders connected in series. State, if it will give perfect synchronization. [8]
- b) What is filter rating? Explain Beta rating and efficiency of the filters. [6]
- c) What is contamination? Explain the sources of contamination. [6]

- Q5)** a) Differentiate between Pneumatic and hydraulic power transmission. [4]
- b) Draw and explain pneumatic circuit for quick exhaust. [6]
- c) Give the classification of air compressors. Why multistage compression is needed? [8]

OR

- Q6)** a) Explain the working of air lubricator with suitable diagram. [4]
- b) Draw a typical circuit showing the application of Shuttle Valve. [6]
- c) Draw pneumatic circuit to explain two hand operation of Single acting cylinder using twin pressure valve. [8]

- Q7)** a) A machine tool cross slide is powered by means of a hydraulic system. The motion of the cylinder is as follows: [12]
- i) Initially it moves through a distance of 200mm against an effective load of 20000N in about 5 seconds.
- ii) It is followed by a working stroke of another 200mm against an effective load of 30000N. The feed rate during this part of the stroke is required to 1.2 m/min.
- iii) The load during the return stroke is 20000N.

A meter in type circuit is used. Draw and design hydraulic circuit which will fulfill the requirements.

- b) Analyze the following circuit by naming the components used. [6]

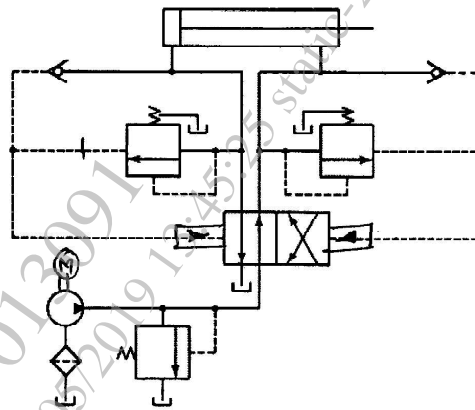


Fig. 7 (b)

OR

- Q8) a) A plastic component is to be embossed by using a die which is powered by a double acting cylinder. The return of the die is to be effected when the cylinder rod has fully extended to the embossing position and the preset pressure is reached. A roller lever valve is to be used to confirm full extension. The signal for retracting must only be generated when the piston rod has reached the embossing position. The pressure in the piston chamber is indicated by a pressure gauge. Develop pneumatic circuit using sequence valve, 3/2 roller valve, 3/2 push button valve and 5/3 DCV. [10]

- b) Analyze the following circuit and label the components. [8]

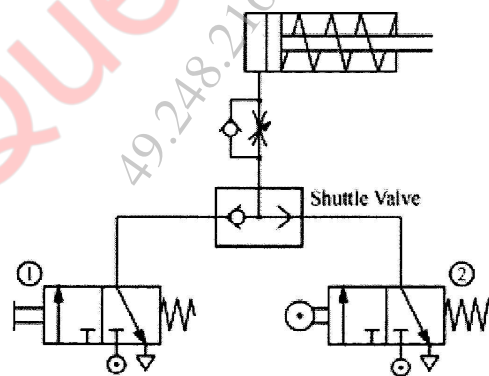


Fig. 8 (b)

## DATA

### 1. Suction Strainer :

Model	Flow Capacity (lpm)
S <sub>1</sub>	38
S <sub>2</sub>	76
S <sub>3</sub>	152

### 2. Pressure Gauge :

Model	Range (bar)
PG <sub>1</sub>	0 - 25
PG <sub>2</sub>	0 - 40
PG <sub>3</sub>	0 - 100
PG <sub>4</sub>	0 - 160

### 3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P <sub>1</sub>	8.5	7.1	5.3
P <sub>2</sub>	12.9	11.4	9.5
P <sub>3</sub>	17.6	16.1	14.3
P <sub>4</sub>	25.1	23.8	22.4
P <sub>5</sub>	39.0	37.5	35.6

### 4. Relief Valve :

Model	Flow capacity (lpm)	Max Working Pressure & bar
R <sub>1</sub>	11.4	70
R <sub>2</sub>	19	210
R <sub>3</sub>	30.4	70
R <sub>4</sub>	57	105

### 5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (lpm)
F <sub>1</sub>	70	0-4.1
F <sub>2</sub>	105	0-4.9
F <sub>3</sub>	105	0-16.3
F <sub>4</sub>	70	0-24.6

### 6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
D <sub>1</sub>	350	19
D <sub>2</sub>	210	38
D <sub>3</sub>	210	76

### 7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
C <sub>1</sub>	210	15.2
C <sub>2</sub>	210	30.4
C <sub>3</sub>	210	76

### 8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
PO <sub>1</sub>	210	19
PO <sub>2</sub>	210	38
PO <sub>3</sub>	210	76

### 9. Cylinder (Max Working Pressure-210 bar)

Model	Bore dia. (mm)	Rod dia. (mm)
A <sub>1</sub>	25	12.5
A <sub>2</sub>	40	16
A <sub>3</sub>	50	35
A <sub>4</sub>	75	45
A <sub>5</sub>	100	60

### 10. Oil Reservoirs :

Model	Capacity (litres)
T <sub>1</sub>	40
T <sub>2</sub>	100
T <sub>3</sub>	250
T <sub>4</sub>	400
T <sub>5</sub>	600

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