

Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

2013

FLUID POWER CONTROL

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Cost of pneumatic system is

- | | |
|-----------|-------------------|
| a) lowest | b) highest |
| c) medium | d) low to medium. |

ii) Pneumatic and hydraulic required following thing to direct and regulate the flow

- | | |
|-------------------|-------------------|
| a) energy sources | b) control valves |
| c) air receiver | d) actuators. |

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

- iii) A 4/2 DCV's has
- a) 2-ports
 - b) 4-ports
 - c) 6-ports
 - d) none of these.
- iv) In electro-pneumatic systems the normally used switch in which changing current in one electrical circuit switches current ON or OFF in the circuit for solenoid operate valves is
- a) relays
 - b) change over contacts
 - c) PE converters
 - d) proximity switches.
- v) Which of the following device can be able to store high pressure fluid as well as can store and release hydraulic oil at a required system pressure ?
- a) accumulator
 - b) receiver
 - c) tank
 - d) none of these.
- vi) Which one of the following is used as a final control valve to control double-acting cylinder ?
- a) 3/2 DCV's
 - b) 5/2 DCV's
 - c) dual pressure valve
 - d) 2/2 valve.

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

- vii) A relay isolates the control circuits from
- a) high current circuits
 - b) high voltage circuits
 - c) low voltage circuits
 - d) none of these.
- viii) Process control valve used for large change in the flow rate with a small movement of the valve stem is
- a) quick opening valve
 - b) linear type valve
 - c) equal percentage valve
 - d) none of these.
- ix) For a frequency of 50 Hz, a 4-pole motor has a synchronous speed of
- a) 1500 rpm
 - b) 3000 rpm
 - c) 750 rpm
 - d) 500 rpm.
- x) One notable difference between the hydraulic and pneumatic system is that the return fluid is
- a) vented to atmosphere in pneumatic system
 - b) vented to atmosphere in hydraulic system
 - c) sent back to receiver in pneumatic system
 - d) sent back to cylinder.

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

- xi) Synchronous speed of an induction motor depends upon
- a) frequency and number of poles
 - b) supply voltage
 - c) only frequency
 - d) current.
- xii) Which of the following is used in a pneumatic circuit for switching operation depending upon a present pressure ?
- a) dual pressure valve b) time delay valve
 - c) sequence valve d) check valve.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Briefly explain the advantages of hydraulic system over pneumatic system.
3. Two cylinders each fitted with piston are connected by pipe. The area of the pistons is 2 sq. cm and 500 sq. cm. Small piston is acted upon by 8 kg force and move through a distance of 100 cm when the other move through a distance of 0.4 cm. Find the mechanical advantages of the system. Does it obey the principle of energy conservation ? Explain.

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

4. Draw a neat sketch of a pneumatic system and label it. Also show the components common to many motions.
5. In respect to electrical switching during system actuation draw the schematic diagram for
 - i) Single-pole single throw normally open and normally closed (SPST-No and SPST-NC) switching,
 - ii) Single-pole, double throw (SPDT on-off position.
6. Determine the percentage of slip of rotor having frequency 60 Hz. 8-pole motor operating at 800 rpm.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Neatly draw the ANSI symbols for
 - i) 4/2 valves
 - ii) 4/3 valves and specify them whether they are the part of pneumatic or a hydraulic system.

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

- b) i) Draw the ANSI symbols which indicates the way of operations of 4/2 valves
- ii) Draw the internal valve operation for 4/2 valve and state the connection of ports for extended and retracted position of a double acting cylinder operated by push button. 7 + 8
8. a) With a neat sketch briefly explain the operating principle of various types of stepper motor and state its application and advantages.
- b) For a certain operation it is required to generate input pulse rate of a stepper motor rotating at 300 rpm. Determine rate of pulse when the motor having 10° per step. 10 + 5
9. A hydraulic press is used to emboss a metallic component by double acting cylinder. The cylinder advances and embosses the component while the operation is carried out by push button. The retraction of the push button is effected when the piston rod is fully extended while pre-set pressure reached. Design the pneumatic circuit for the said operation.

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

10. With neat sketch briefly discuss any *two* from the followings :

$$2 \times 7\frac{1}{2}$$

- a) Gear and vane pumps
- b) Axial flow pump and Air filter
- c) AC servo motor.

11. Identify the following symbols of hydraulic and pneumatic units as shown in the following figure :

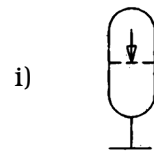


Fig. 1.i



Fig. 1.ii

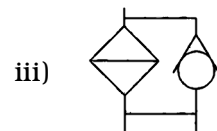


Fig. 1.iii

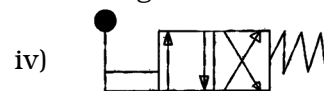


Fig. 1.iv



Fig. 1.v

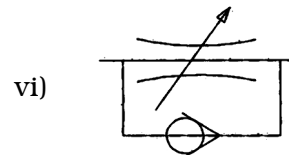


Fig. 1.vi

CS/B.Tech (ME-NEW)/SEM-6/ME-604C/2013

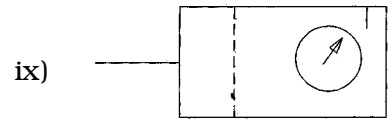
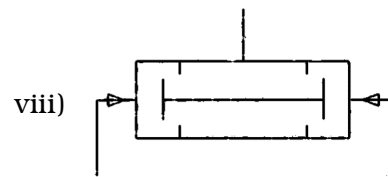
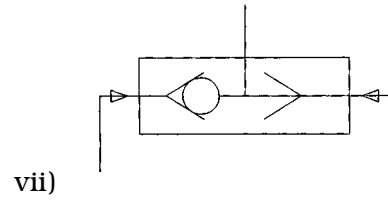


Fig. 1.ix

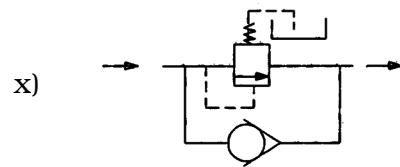


Fig. 1.x

=====