

GANPAT UNIVERSITY
B.Tech Sem VIth (Mechatronics)
Regular CBCS Examination April - June 2015
2MC603 Hydraulics & Pneumatic Systems

Time: 3 Hrs

Marks: 70

Instructions:

- (i) All questions are compulsory.
- (ii) Answers to two sections must be written in separate answer sheets.
- (iii) Assume suitable data wherever necessary.
- (iv) Figure to right indicates marks.
- (v) Prepare neat, clean and technically correct circuit diagram with correct symbol where ever it is required.

SECTION - I**Q1** Answer the following questions: 12

- (a) Evaluate following with equal performance of pumps.
 1. Which pump have high pressure built up capacity?
 2. Which pump creates less noise?
 3. Which pump is more balanced and variable flow rate?
 4. Which pump is less costly and low maintenance cost?
- (b) Explain Hydraulics Oil conditioning equipments in brief.
- (c)

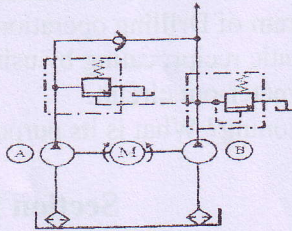


Fig. 1 Que. 1(c)

- A. How would you modify the system shown in fig. 1, if you wanted to unload pump B instead of pump A?
- B. Write down applications and advantage of this circuit.

OR**Q1** Answer the following questions: 12

- (a)
 1. What is power density?
 2. Explain: Selection criteria of Electrical, Hydraulics, and Pneumatics systems for making different system automated.
- (b) Why pressure compensation is required in vane pumps? How is it done?
- (c) Modify circuit shown in fig. 2, To start the return stroke of cylinder after pressure development has occurred in rod side of cylinder.

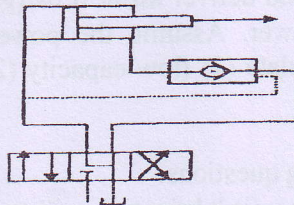


Fig. 2 Que. 1(c) OR

Q2 Answer the following questions:

- (a) What do meant by normal (central) position of direction control valve? Explain different normal positions of $\frac{3}{4}$ direction control valves and its applications. 4
- (b) Draw drill machine circuit by using two sequence valves. 4
- (c) Explain bleed of circuits shown in fig. 3 and when such kind of arrangements is 3

used in hydraulic system?

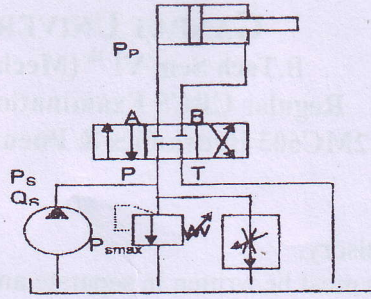


Fig. 3 Que. 2(c)

OR

Q2 Answer the following questions:

- (a) Draw the regenerative circuit, state its purpose and explain it. 4
- (b) Differentiate throttle valve, 2 way flow control valve and three way flow control valve. 3
- (c) A double acting cylinder is hooked up to reciprocate. The relief valve setting is 70 bars. The piston area is 0.016 m^2 and the rod area is 0.0045 m^2 . If the pump flow is $0.0013 \text{ m}^3 / \text{s}$, find the cylinder speed and load-carrying capacity for the
 1. Extending stroke 4
 2. Retracting stroke.

Q3 Answer the following questions (any **THREE**).

- (a) Explain limitation of Direct operated Pressure Relief valve & working of Pilot Operated Pressure Relief valve with neat sketch. 12
- (b) Explain function diagram of Drilling operation.
- (c) Single cylinder automatic reciprocating by using sequence valve.
- (d) Explain meter-in and meter-out circuit.
- (e) What is cylinder cushioning? What is its purpose? Explain it.

Section II

Q. 4 Answer the following questions.

- (a) Explain construction and use of 5/3 direction control valve in pneumatic circuit with their symbols. 12
- (b) Describe function of OR valve with figure and symbol.
- (c) Make pneumatic circuit for: Cylinder extends when two 3/2 DCV (Switch A) or one other 3/2 DCV (Switch B) pressed.

OR

Q. 4 Answer the following questions.

- (a) Explain the various mountings of pneumatic cylinder with figure. 12
- (b) Make pneumatic circuit for Cylinder returns when Switch A or Switch B is released. (you can use any combination of pneumatic valves.)
- (c) A compressor suck and deliver air at 6 bar(g) pressure with a flow rate of $0.25 \text{ m}^3 / \text{min}$. per KW of power. Assume the power rating 100 KW. If the compressor efficiency 75%, calculate (1) flow capacity (2) average flow capacity (3) amount of condensation.

Q.5 Answer the following questions.

- (a) a). Draw the symbols : (i) lubricator ii) twin pressure valve [03]
- b). Convert 9 kg/cm^2 absolute pressure in to gauge pressure.
- (b) Make a pneumatic circuit for the following application. [04]
 “When both push buttons of the two 3/2 DCVs are pressed then only a DA cylinder starts the forward stroke after few seconds. When the cylinder completes forward stroke, it start return stroke automatically. Here return stroke is faster than its normal

- speed. Here the DA cylinder is operated by a 5/2 both side pilot operated DCV".
- (c) Explain an air regulator used in pneumatic circuits. [04]

OR

Q.5 Answer the following questions.

- (a) Explain the different actuation methods of a direction control valve. [03]
- (b) A single acting air cylinder with a 6 cm diameter piston and 30 cm stroke operates at 700 kPa(g) pressure and reciprocates at 80 cycles/min. Compute the air consumption in standard m^3/min . [04]
- (c) A pneumatic cylinder is needed to press-fit a pin to a hole. Design a circuit diagram with a precondition that while actuating, both the hands of the operator should be engaged. [04]

Q.6 Answer the following questions. (Any Three)

12

- (a) Make a pneumatic circuit for a given sequence: START $A^+B^+B^-A^-$ STOP. Draw the timing diagram of the given sequence also.
- (b) Explain the quick exhaust valve with a pneumatic circuit.
- (c) Explain (i) through rod cylinder, and (ii). Tandem cylinder
- (d) Operating double acting pneumatic cylinder automatically.

End of Paper