



UNIVERSITY COLLEGE TATI (UCTATI)

FINAL EXAMINATION QUESTION BOOKLET

|                  |                            |
|------------------|----------------------------|
| COURSE CODE      | : DMT 1052                 |
| COURSE           | : PNEUMATICS AND HYDRAULIC |
| SEMESTER/SESSION | : 1-2022/2023              |
| DURATION         | : 3 HOURS                  |

Instructions:

1. This booklet contains 4 questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO**

**THIS BOOKLET CONTAINS 7 PRINTED PAGES INCLUDING COVER PAGE**

- a) State the function of each component below.
- i) 3/2 way push button valve. (2 marks)
  - ii) 3/2 way single air pilot valve. (2 marks)
  - iii) 5/2 way selector switch valve. (2 marks)
  - iv) Two pressure valve. (2 marks)
  - v) 5/2 way double air pilot valve. (2 marks)
- b) i) Describe how air flows from one point to another in pneumatic system. (2 marks)
- ii) Describe six (6) characteristics that affect air flow in pneumatic system. (6 marks)
- c) The piston rod of a double acting cylinder 1 is to extend, when both of the two 3/2 way normally closed pushbutton valves (**PB1 AND PB2**) are actuated and will only retract when one of two 3/2 way pushbutton normally closed valves (**PB3 OR PB4**) is/are pressed.
- Hint: 5/2 double air pilot (memory) valve should be used.
- i) List all the components to be used. (4 marks)
  - ii) Illustrate a diagram of a pneumatic circuit to solve the above problem and label all lettering/numbering for pneumatic system. (14 marks)

## QUESTION 2

- a) Find and complete Table 1 with the values of extend and retract forces for each of the given pressures.

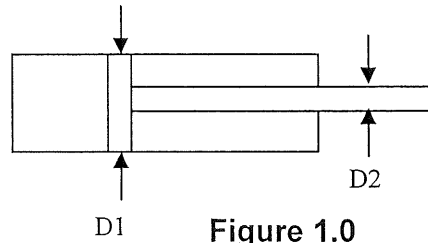


Figure 1.0

Table 1.0

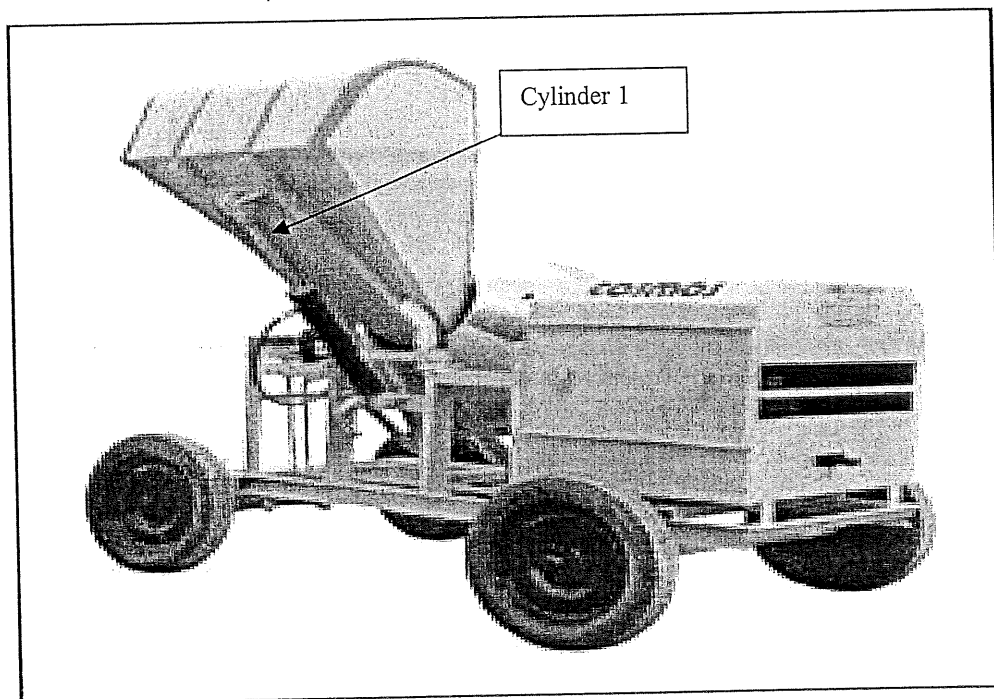
| Pressure in PSI | Extend Force in lbs | Retract Force in lbs |
|-----------------|---------------------|----------------------|
| 40 PSI          |                     |                      |
| 60 PSI          |                     |                      |
| 80 PSI          |                     |                      |

(10 marks)

- b) The piston rod of a double acting cylinder 1 is to extend, when three of 3/2 way pushbutton valves (**PB1 AND PB2 AND PB3**) are actuated and will only retract when the cylinder fully extend, confirm by Roller limit switch valve, it will remain extend for 30 seconds , After that it will retract immediately.
- i) List all the components to be used. (2 marks)
- ii) Illustrate a diagram of a pneumatic circuit to solve the above problem and label all lettering/numbering for hydraulic/pneumatic system. (12 marks)

**QUESTION 3**

- a) ANSI (**American National Standards Institute**) is the primary organization for fostering the development of technology standards in the United States. ANSI works with industry groups and is the U.S. member of the International Organization for Standardization (ISO) and the International Electro technical Commission (IEC). Give four (4) significances important of ANSI symbols for pneumatic and hydraulic systems. (4 marks)
- b) Figure 2 shows a hydraulic cement mixture machine. When the 4/3 way valve is activated to the right the cylinders 1 will extend and if the 4/3 way valve is activated to the left, cylinder 1 will be retracted. If the 4/3 way valve is centered position, cylinders 1 will stop at any positions. The purpose of using a 4/3 valve neutral at mid position is to allow the machine to stop at the desired position.

**Figure 2**

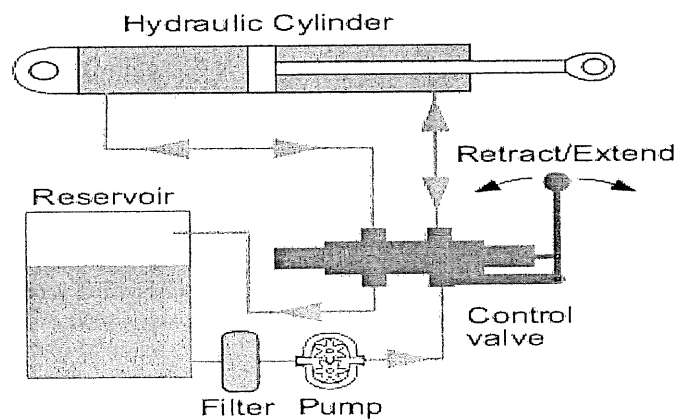
- i) List all the components to be used. (2 marks)
- ii) Produce a hydraulic circuit diagram to solve the above problem and label all lettering/numbering for hydraulic system. (12 marks)

**QUESTION 4**

a)

- i) Explain the main function of PRV (Pressure Relieve Valve). (2 marks)
- ii) Describe how PRV (Pressure Relieve Valve) work in hydraulic system. (6 marks)

b) Figure 3 shows a real hydraulic system, Based on the figure;

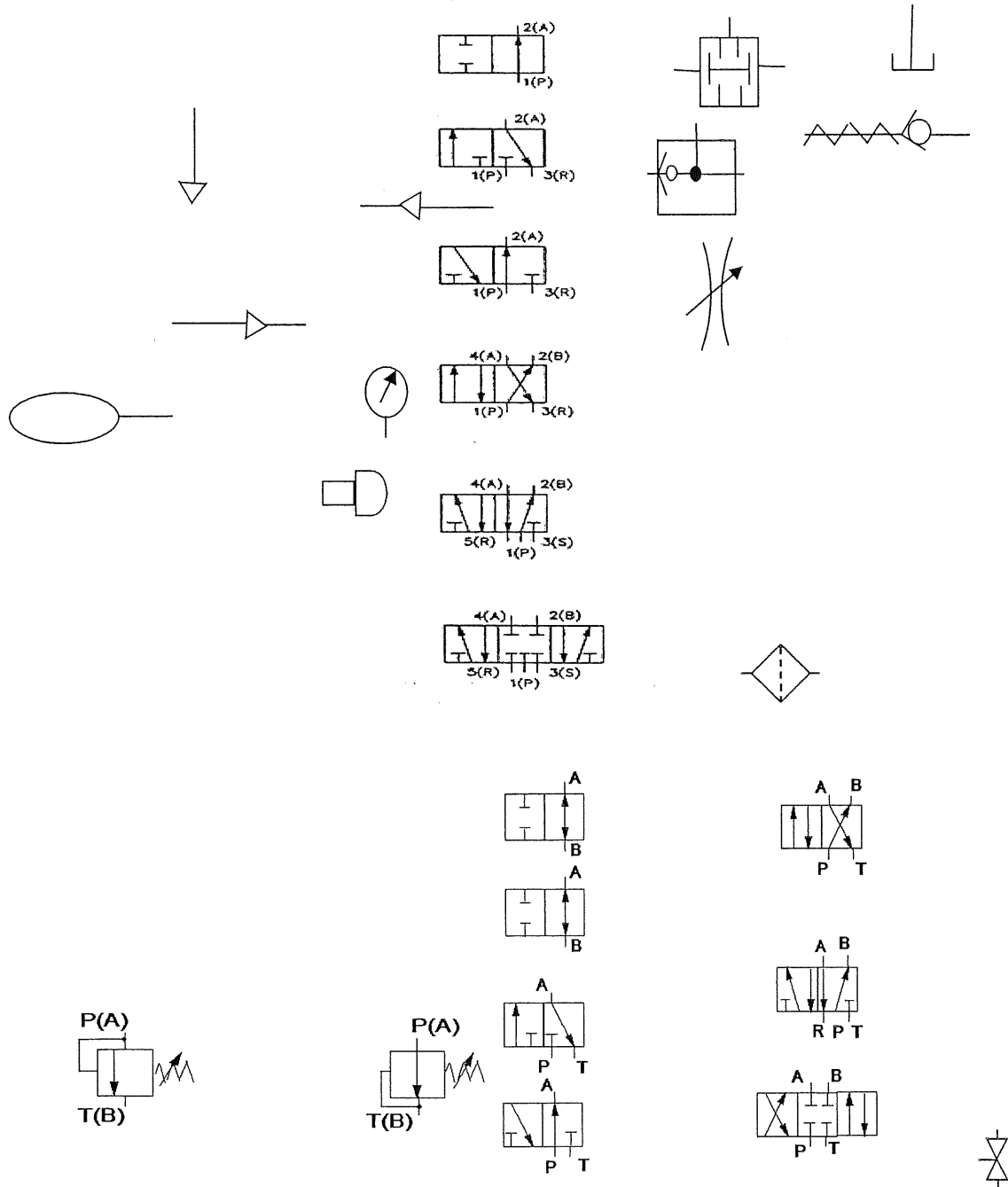
**Figure 3**

- i) List all the components to be used. (2 marks)
- ii) Produce a hydraulic circuit diagram, complete with label and numbering for hydraulic system. (12marks)

-----End of question-----

PNEUMATICS AND HYDRAULIC (DMT 1052)

ATTACHMENTS:



PNEUMATICS AND HYDRAULIC (DMT 1052)

