UNIVERSITY COLLEGE TATI

# UNIVERSITY COLLEGE TATI (UCTATI)

| FINAL EXAMINATION QUESTION BOOKLET | |
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| COURSE CODE | : DMT 1053 |
| COURSE | : PNEUMATICS AND HYDRAULIC |
| SEMESTER/SESSION | : 1- 2023/2024 |
| 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**

## QUESTION 1

a) i) Give 2 (two) advantages of compressed air system. (2 marks)

ii) Give 2 (two) disadvantages of compressed air system. (2 marks)

iii) Give 2 (two) applications of pneumatic system in industry. (2 marks)

b) Explain 3 (three) safety requirements during handle pneumatic system (3 marks)

c) Explain the functions of each component pneumatic below:

i) One-way flow control valve. (2.5 marks)

ii) Pressure sequence valve. (2.5 marks)

iii) 3/2way single air pilot valve with spring return. (2.5 marks)

iv) 5/2way double air pilot valve. (2.5 marks)

## QUESTION 2

a) i) Give 3 (three) considerations in the preparation of air services unit. (3 marks)

ii) Pipe diameter must be selected so that pressure losses from pressurized reservoir to the consuming device NOT EXCEED 10KPA (0.1BAR), explain how to select pipe diameter? (5 marks)

iii) Explain the function of compressed air regulator valve in the pneumatic system. (5 marks)

b) Give two (two) of linear actuators in pneumatics system. (4 marks)

c) 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 fully extend position of a double acting cylinder is reached, which **detected by a 3/2-way Roller Limit Valve** and after **20 seconds** extension of cylinder 1.

i) List all the components to be used (4 marks)

ii) Produce a pneumatic circuit diagram to solve the above problem and label all lettering/numbering for pneumatic system. (12marks)

d) i) Describe how the time delay normally close works. (6 marks)

ii) Draw the time delay valve normally close symbol. (2 marks)

## QUESTION 3

a) Give the formula for calculating area, force and pressure in a hydraulic system. (3 marks)

b) As shown in figure 1, a conveyor belt transports metal swarf into a tipping container. When the container is full, it is emptied into a truck. A double-acting cylinder is used for this purpose, activated by a manual-actuated 4/2-way valve. The piston rod of the cylinder is advanced while the container is in position to receive swarf.

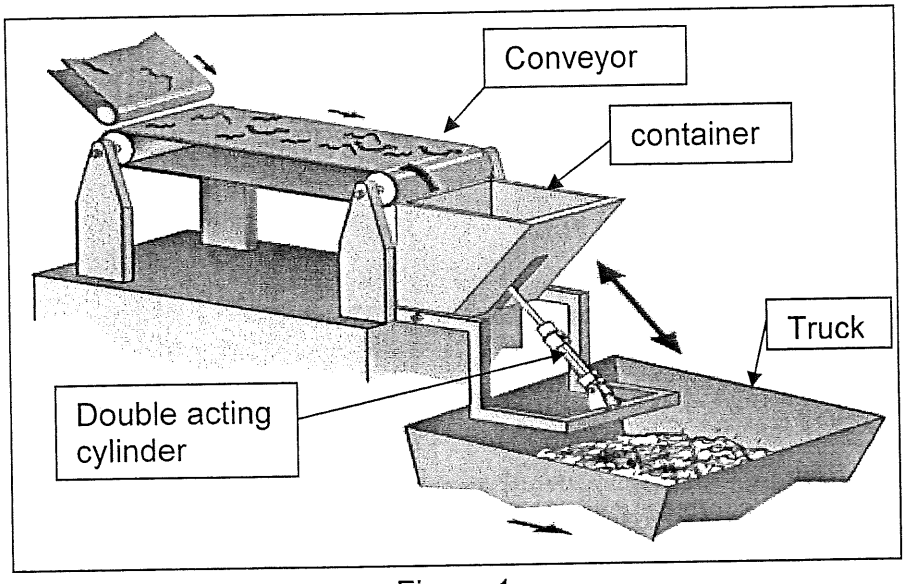



Figure 1

i) List component to be used. (3 marks)

ii) Produce a hydraulic circuit diagram to solve the above problem and label all lettering/numbering for hydraulic system. (10 marks)

iii) Describe the operation of the hydraulic circuit of above in question 3 (b). (10 marks)

## QUESTION 4

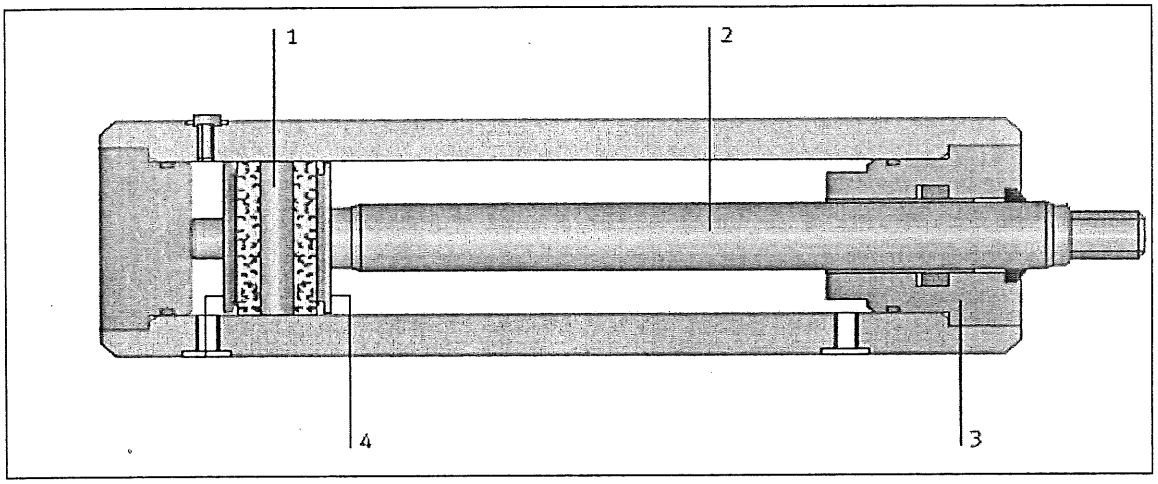



Figure 2

a) i) Give the name of the parts numbered in figure 2. (4 marks)

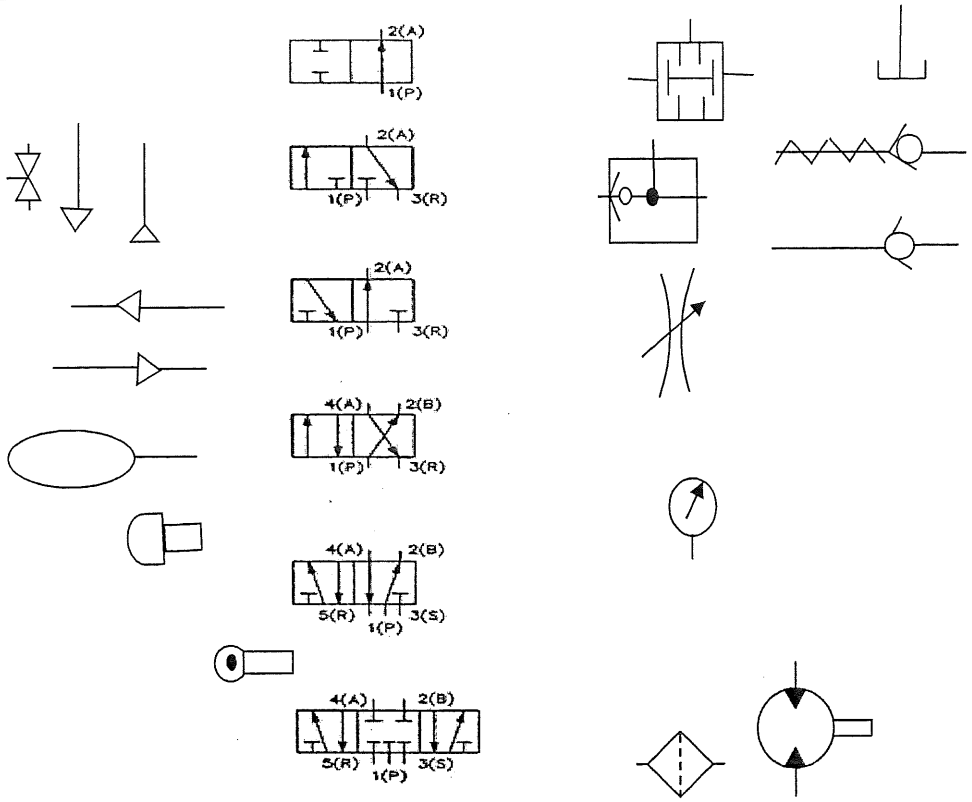
ii) Draw a hydraulic single acting cylinder symbol. (2 marks)

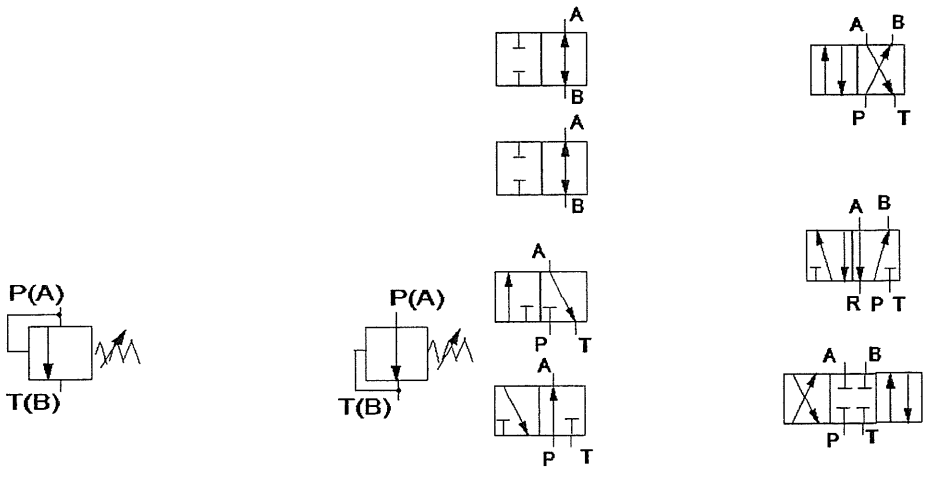
iii) Draw a hydraulic double acting cylinder symbol. (2 marks)

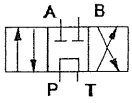
b) i) Describe the function of Pressure Relief Valve (PRV). (3 marks)

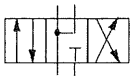
ii) Describe the function of Double acting cylinder. (3 marks)

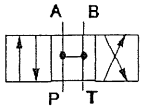
## ATTACHMENTS:

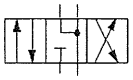


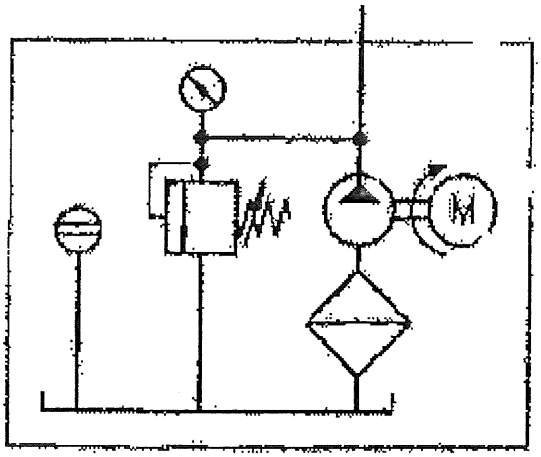







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