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FINAL EXAMINATION**

COURSE NAME : INDUSTRIAL AUTOMATION
COURSE CODE : DKE 3053
EXAMINATION : DECEMBER 2022
DURATION : 2 HOURS 30 MINUTES

INSTRUCTION TO CANDIDATES

1. This question paper consist of **ONE (1)** part: (100 Marks)
2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator.
3. Please check to make sure that this examination pack consist of:
 - i. The Question Paper
 - ii. An Answering Booklet

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of 6 printed pages including front page

This part consist of **FOUR (4)** questions.
Answer ALL questions in Answering Booklet.

QUESTION 1

- a. Define the following terms.
- i. Material Handling
 - ii. Industrial Robot
 - iii. Flexible Manufacturing systems
 - iv. Computer Aided Manufacturing
 - v. Lean Production
- (5 marks)
- b. State **five(5)** situations in which manual labor is preferred over automation.
- (5 marks)
- c. Sketch a block diagram of Automated System.
- (5 marks)
- d. Explain briefly the Automated Guided Vehicle(AGV) system using an appropriate diagram.
- (10 marks)

QUESTION 2

- a. Define **five(5)** typical features of Programmable Automation.
- (5 marks)
- b. Explain briefly applications of carousel in storage systems.
- (8 marks)

c. Define the **four(4)** spesification and selection of sensor.

(4 marks)

d. Show **four(4)** comparison of actuating systems.

(8 marks)

QUESTION 3

a. Sketch the symbol of the following directional control valves:

i. Solenoid actuating 4/2 way.

ii. Push button actuating 3/2 way.

iii. One way control valve.

(6 marks)

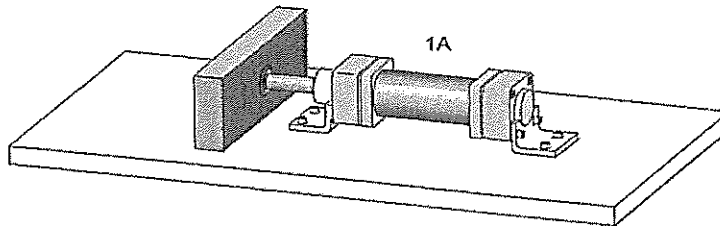


Figure Q3(b) (source: Pneumatics Basic Level, Festo)

b. By referring to Figure Q3(b), construct a pneumatic circuit.

(6 marks)

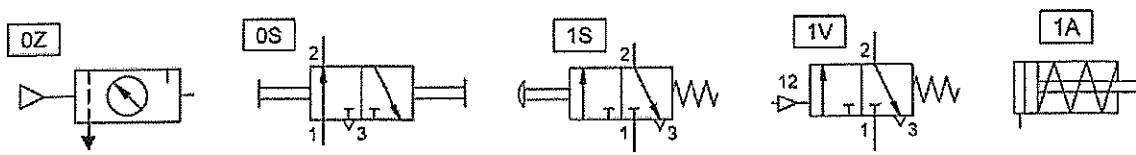


Figure Q3(c) (source: Pneumatics Basic Level, Festo)

c. The Figure Q3(c) above is using an indirect control of a single-acting cylinder. Rearrange the symbol of the devices and make it a system and complete diagram in answer booklet.

(8 marks)

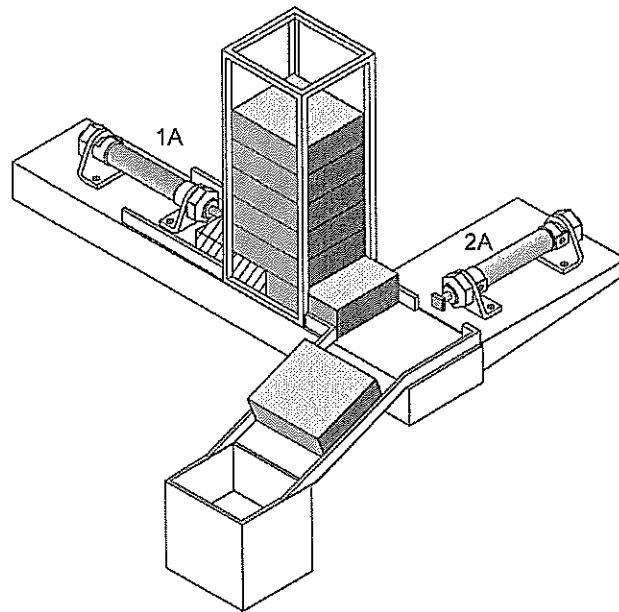


Figure Q3(d)(i) (source: Pneumatics Basic Level, Festo)

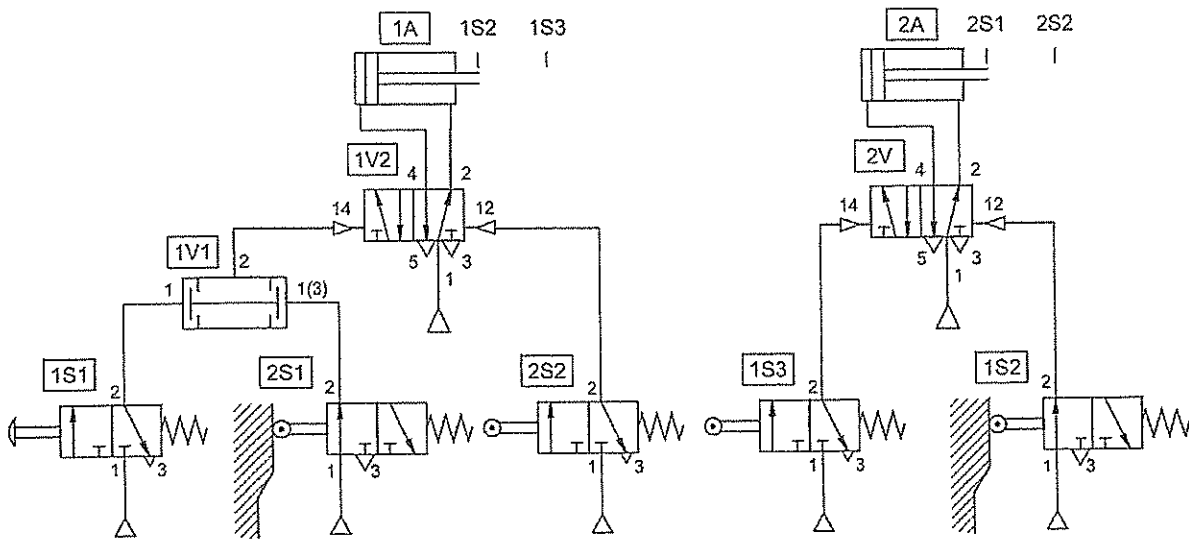


Figure Q3(d)(ii) (source: Pneumatics Basic Level, Festo)

d. The Figure Q3(d)(i) and Q3(d)(ii) above is application of two cylinders are used to transfer parts from a magazine onto a chute. Give a step-by-step explanation of how this application works.

(5 marks)

QUESTION 4

a. Define five(5) features of CNC.

(5 marks)

b. Identify five(5) advantages of using FMS.

(5 marks)

c. Define CAM Applications in Manufacturing Control.

(5 marks)

d. Solve the OEE for the production setup as follows:

Item	Data
Shift length	8 hrs = 480 min.
Short Breaks	2 @ 30 min. = 60 min
Meal Break	2 @ 20 min = 40 min
Down Time	95 min
Ideal Run Time	60 pieces per min
Total Pieces	53456 pieces
Reject Pieces	879 pieces

(10 marks)

END OF QUESTION PAPER