MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

THIRD YEAR **SECOND** SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING

EET320: AUTOMATION TECHNOLOGY

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer Question one and any other two questions.

2. Mobile phones are not allowed in the examination room.

3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Define automation (2marks)

b) Define the PLC and list its components (3marks)

c) List six reasons for automation (3marks)

d) i) explain briefly 'threading' as used in microprocessor (3marks)

ii) Explain pipelining as used in microprocessor systems and its merits (4marks)

e) Explain how current microprocessor systems use 'dirty bit' to control memory data transfer (3marks)

f) Design the ladder diagram for a packing control line as shown in figure 1b where; When PBI(START push button) is pressed, the conveyor stops and apple conveyor starts again. Counter will be reset and operation repeats until PB2 (stop push button) is pressed.

g) What is the ladder diagram equivalent for figure 1g.

SECTION TWO: ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 MARKS)

a) Explain the following as used in microprocessor systems

i. Flags (2marks)

ii. Software (3marks)

b) With the aid of diagram(s), explain how segmentation of virtual memory is achieved for an intel 8086 microprossor based computer. (9marks)

c) Explain the various functions an interface device should have for effective data transfer between a microprocessor and a peripheral device (6marks)

QUESTION THREE (20 MARKS)

a) Define the microcontroller? (1mark)

b) What are the various classification of sensors/transducers and give two example for each classification. (5marks)

c) Design the ladder diagram for project in figure 3 where; at the beginning of the assembly line a certain production line boxes are pushed, provided with a barade and then transferred to a roller conveyor to another part of the operation. With the switch SI on the ON position, the execution is started. If all cylinders are in their initial position rear end, sensor B1 recognizes the existence of a box from the stack and the photoelectric barrier 4 indicatis free passageway, then cylinder 1A pushes the box until sensor 1s2 indicates reaching the stop limit. Then cylinder 2A is moved downwards and remains two seconds in the front end position at 2s2. At this time, the barcode is printed and afterwards cylinder 2A is moved upward. If the sensor 2s1 indicates that cylinder 2A has reached the rear end position, engine M is switched on and the box is carried to the diagonal roller race. If the photoelectric barrier recognizes that the box gas left the limit stop with cylinder 3A is moved forward again. Then the control execution is repeated constantly, until with the key-operated switch s/ is switched off again. If a disturbance appears during the operation, the sequential diagram can be bought with the RESET in the initial position.

QUESTION FOUR (20 MARKS)

a) List the most important blocks used in programming and explain how it works (2marks)
b) What are the types of cylinders and explain how they work (3marks)
c) List the several languages used in PLC programming (2marks)
d) What are the types of memories in PLC (1mark)
e) Design the ladder diagram for project in figure 4e where; open V valve for 8 seconds to fill the pattern. Lamp turns on when the pattern enters the furn and after 5 seconds turns off and the pattern left the furn. Pump gives spray to the pattern only when s4 detects a pattern over it. When three patterns arrive to s5, cylinder B pushes them to fall into the box.