



**SCHOOL OF ELECTRICAL & ELECTRONIC
ENGINEERING**

**DIPLOMA IN ELECTRICAL/ELECTRONICS ENGINEERING
(RENEWABLE ENERGY)
STAGE 4/5**

EED550– PROGRAMMABLE LOGIC CONTROLLER- SUPPLEMENTARY EXAMINATION

*Quarter 3 - 2019. Total [100marks]
Duration: 3hours 10minutes*

DAY/DATE: As per Timetable TIME: As per Timetable ROOM: As per Timetable.

INSTRUCTIONS TO STUDENTS

1. *You are allowed 10 minutes Extra reading time during which you are NOT to write.*
2. *Begin each answer on a fresh page and use both sides of the sheet.*
3. *Write your candidate-number at the top of each attached sheet.*
4. *Insert all written sheets in their correct sequence and secure with string.*
5. *For all sheets of paper on which rough/draft work has been done, cross it though and you MUST ATTACH to your answer scripts.*
6. *Write clearly the number(s) of the question(s) attempted on the top of each sheet.*
7. **ANSWER ALL QUESTIONS.**
8. *Show all workings where necessary.*
9. *Do not use programmable calculators, especially the ones that does the conversions of number systems.*
10. ***ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!***

SECTION A: **Instruction:** Answer all questions.

Total (10 marks)

Question 1

List down 5 programming rules for designing PLC coding.

(5marks)

Question 2

What are the three elements of a PLC? Illustrate your answer with a diagram and label accordingly.

(5marks)

SECTION B: **Instruction:** Answer all questions.

Total (40 marks)

Question 1

Define the term SCADA?

List down 3 Manufacturing Company that use this system.

(5marks)

Question 2

Design a program that starts a timer. The timer will time for 20 seconds and then increment the counter. There are 4 motors which will come on one at a time i.e.: 1st motor at 10 sec, 2nd at 20 and so on. There should be a stop button which will de-energizers all the outputs when pressed. This circuit is for Multi – Conveyor startup system

Description	Address
Start Button	0.00
Stop Button	0.02
Motor 1	100.01
Motor 2	100.02
Motor 3	100.03
Motor 4	100.04
Timer	100.05
Counter	T0000
	00002 - 00005

(15 marks)

Question 3

Design a program that will enable the car park attendant to monitor the car park space. Include the following:

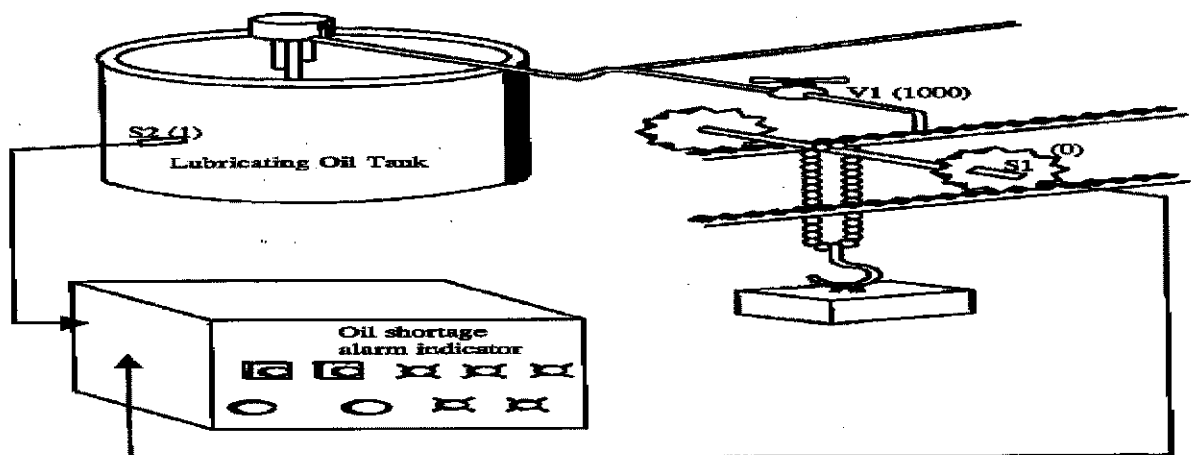
- I. A sensor which detects cars entering;
- II. A sensor which detects car exiting;
- III. Two indicator lights – one indicating when the car park is in full capacity;
- IV. Another to indicate when there are space available; and
- V. A reset switch for resetting the counter

(10marks)

Question 4

Automatic Lubrication of Gear

Apply a PLC program when the gear is moved towards S1, the sensor S1 will detect the gear and signal the electromagnetic valve for oil supply on the gear. The valve (V1) will open for a short period of time supplying a predetermined quantity of oil. When sensor S2 sense that the lubricating tank oil level is low, the oil shortage alarm indicator will be ON.



Inputs	Device	Inputs	Device
0.03	Position detection S1	100.02	Electromagnetic valve for oil supply
0.05	Lower limit of oil S2	100.03	Oil shortage alarm indicator

(10marks)

SECTION C

Instruction:

Answer all questions.

Question 1

Design a circuit that will run the motor in forward direction when the forward push button is pressed. Also include when the reverse push button is pressed the conveyor runs in reverse direction. Lastly, interlock the auxiliary contacts to prevent the motor from being energized simultaneously. Illustrate with a hard wiring

(15 marks)

Question 2

When PB1 (START Push Button) is pressed, the box conveyor moves. Upon detection of box present, the box conveyor stops and the Apple conveyor starts. Part sensor will count for 10 apples. Apple conveyor stops and box conveyor starts again. Counter will be reset and operation repeats until PB2 (STOP Push Button) is pressed.

Input	Devices
0.00	START Push Button (PB1)
0.01	STOP Push Button (PB2)
0.02	Part Present (SE1)
0.03	Box Present (SE2)

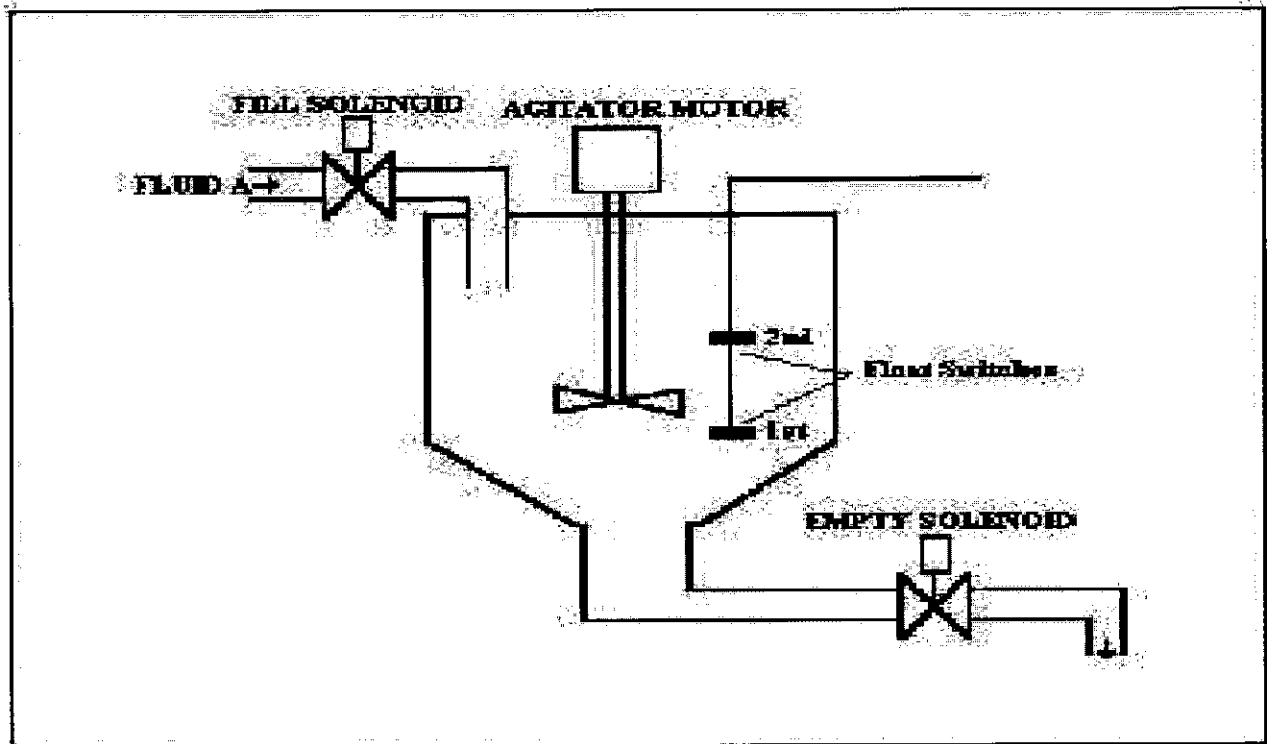
Output	Devices
100.00	Apple Conveyor
100.01	Box Conveyor

(15 marks)

Question 3

WATER TANK APPLICATION

The sequence of the given process needs to be controlled. The process should be started by pressing a START switch and can be stopped by pressing a STOP switch. Both start and stop switches are momentary contact type switch. The float switches are both normally opened (NO) and both the solenoid is energized to open. The sequence of the process should be as follows: First the FILL SOLENOID will open as soon as the start switched is pressed allowing fluid A to flow into the tank. As soon as the fluid level reaches 2nd (upper) float switch FILL SOLENOID must close and an AGITATOR motor will start and the agitator should run for 2 minutes. As soon as the agitator stops, EMPTY solenoid will open and empty the process fluid from the tank. The EMPTY SOLENOID remains open until the tank level comes down to 1st (lower) float switch. Once the tank is empty, the process should wait for another manual start of the process. Implement using the PLC control. Use the appropriate software to draw control and power circuit.



(20 marks)

THE END