FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY

SCHOOL OF ELECTRICAL & ELECTRONIC ENGINEERING

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

EEE547 –PLC & SCADA SYSTEM

TRIMESTER 1 - 2019. Total [100marks]

DAY/DATE: As per Timetable TIME: 3 Hours & 10Minutes 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.

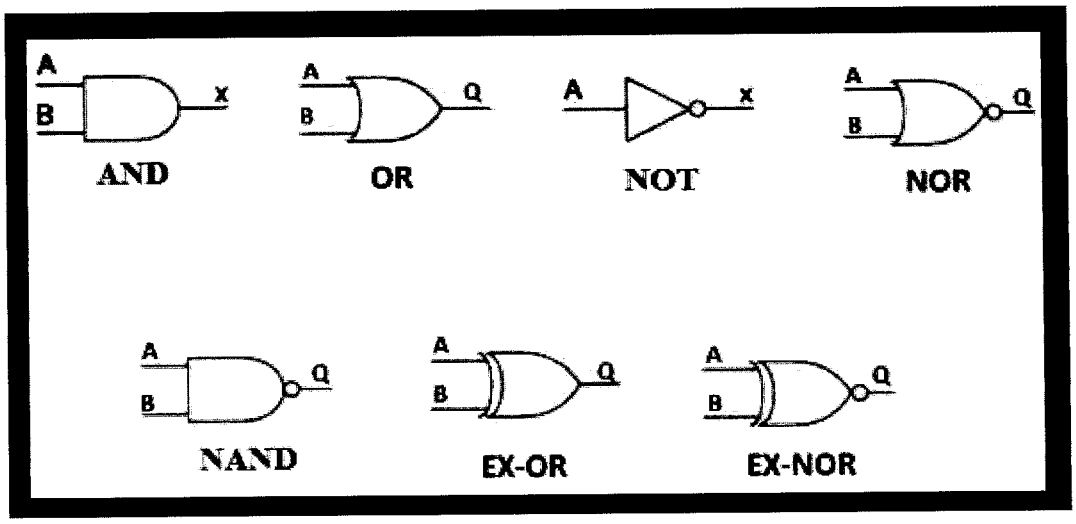
9. Do not use programmable calculators, especially the ones that does the conversions of number systems.

*10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!***

SECTION A: **Instruction:** *Answer all questions.* **Total (14 marks)**

Question 1

Write a ladder logic program to convert various Logic Gates AND, OR, NOT, NOR, NAND, EX-OR and EX-NOR in PLC using Ladder Logic programming.



(14marks)

SECTION B: **Instruction:** *Answer all questions.* **Total (36 marks)**

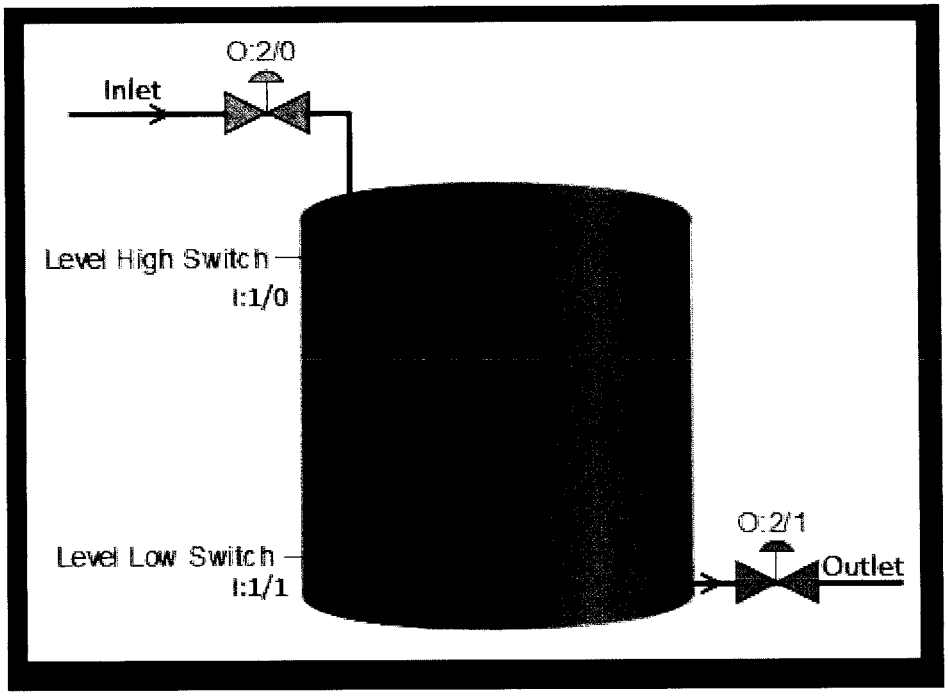
Question 1

Write a Latching and Unlatching program of an output (pilot light, motor, solenoid coil etc.)

(6marks)

Question 2

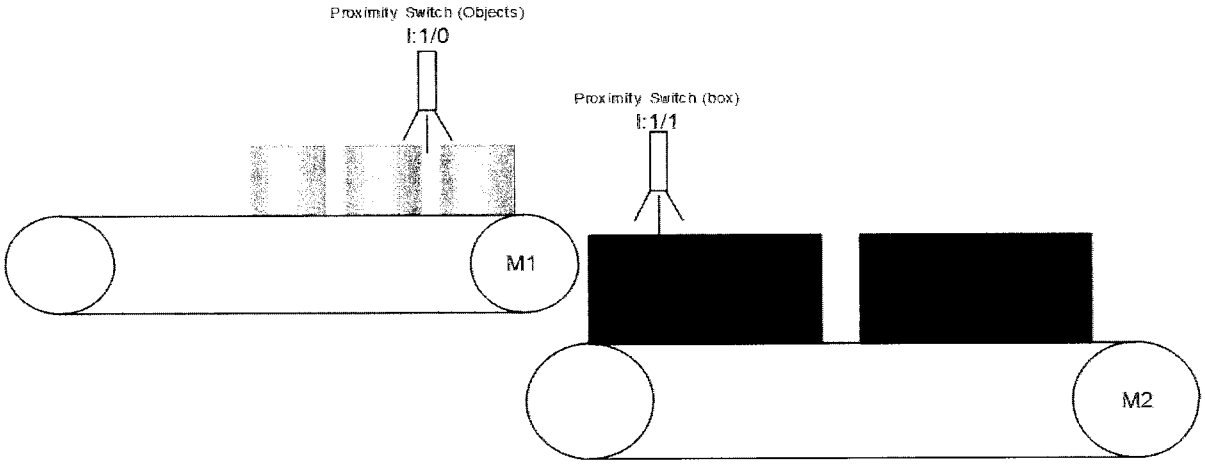
Develop a PLC program to control level of heavy fuel oil in a Single Tank. A tank is installed in the plant of which liquid level is to be controlled. When level reaches low level (20%), Outlet flow is blocked and inlet flow is allowed until high level is achieved. And when high level (90%) is detected, outlet flow is allowed and inlet flow is blocked.



(15 marks)

Question 3

Write a PLC program to count and pack parts from conveyor. Objects are moving on a conveyor belt 1. When an empty box is detected, conveyor belt starts and 5pcs are packed in a box. When box is filled, it is carried to the storage area via conveyor belt 2. Implement automation of this process in PLC.



(15marks)

SECTION C **Total (50 marks)**

Instruction:
Answer all questions.

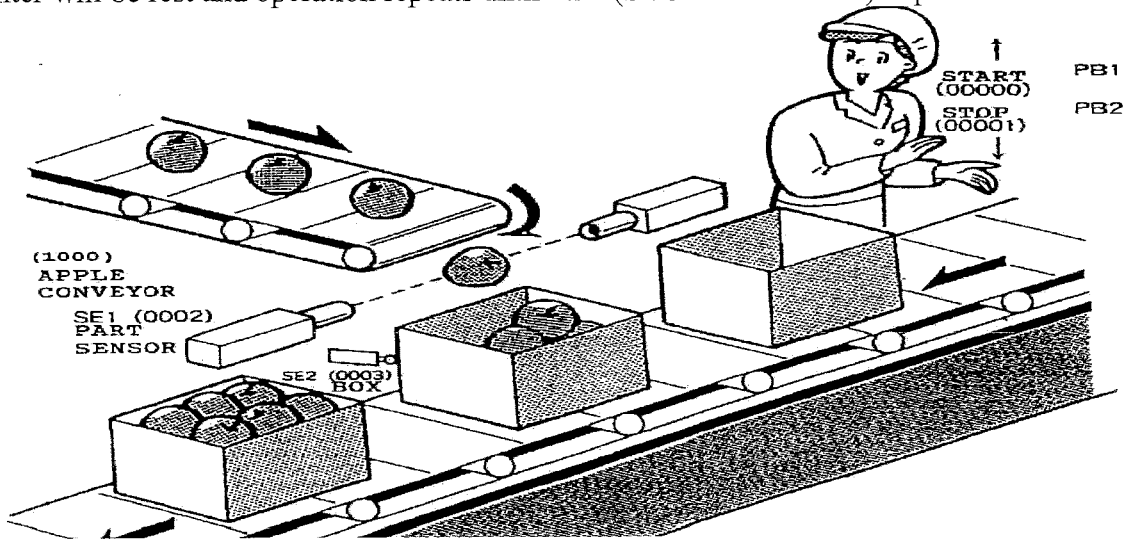
Question 1

Write and apply a PLC program to maintain the capacity of a particular classroom. A classroom has a capacity of maximum 120 students. There are two doors, one for Entry and the other for Exit. When number of students in the classroom is less than 120, Entry door has a Green light on it which remains ON. When number of students in the classroom is 120 or more than that, Red light goes ON turning OFF the Green light which indicates that the classroom has reached its maximum capacity and is full.

(15marks)

Question 2

Write and apply a PLC program 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 rest and operation repeats until PB2 (STOP Push Button) is pressed.



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

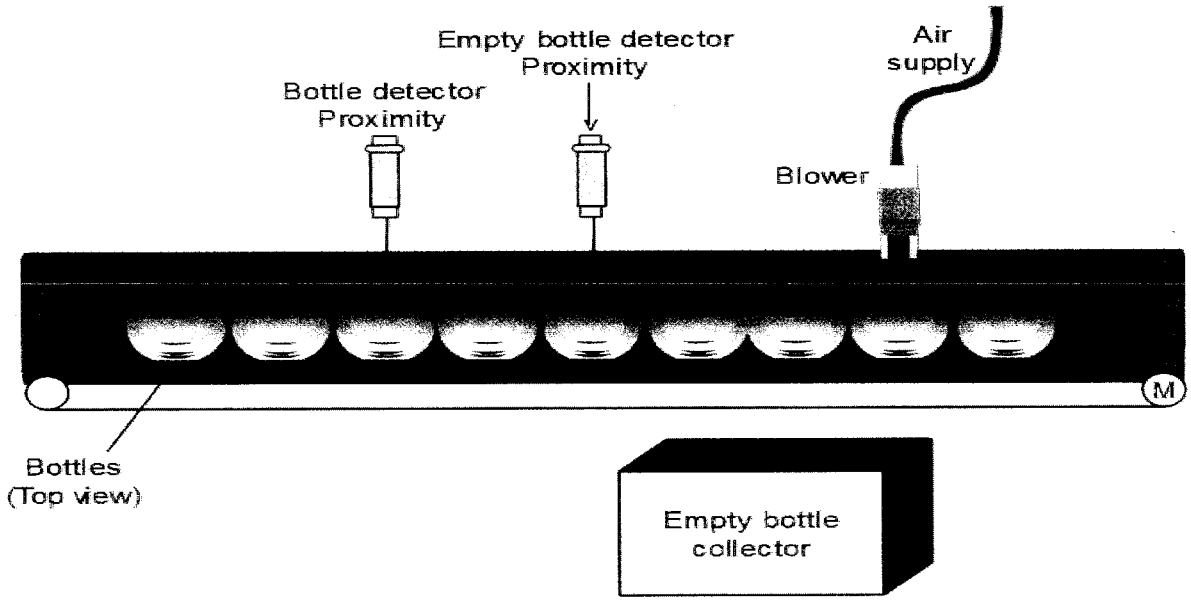
Output	Devices
100.00	Apple Conveyor
100.01	Box Conveyor

(15 marks)

Question 3

Develop a PLC program to remove empty detected bottle on Conveyor. After filling process, bottles are moved on the conveyor belt for packing process. When empty bottle is detected the blower is activated and removes the empty bottle from the conveyor.
Program Description:

- When the system is started, conveyor motor coil with address O:2/1 is energized.
- Rung002 and Rung003 are used to operate bit shift register and blower with address O:2/2.
- Whenever conveyor motor is in run mode, empty bottles detected by the proximity sensor with input I:1/3, it sets B3:0/0 bit and is shifted left every time a bottle is detected by bottle proximity with address I:1/2.
- From proximity to blower, distance is 4 steps. Hence bit B3:0/3 of B3:0 register is used to operate blower.
- When B3:3/0 bit is set that is when empty bottle is detected by input I:1/3, after 4 steps, blower is activated and the empty bottle is removed.



(20 marks)

THE END