

Instructions to candidates

Duration: Two (02) hour

Number of questions: Four (04) Essays

Mark allocation: 100 marks

Answer all questions.

1.
 - a. What do you mean by automation? Give 5 advantages of automation. (10 marks)
 - b. What are the components of Industrial Automation? Explain by giving examples (08 marks)
 - c. Explain different points of comparison between open loop and closed loop control systems. (04 marks)
 - d. Is it suitable to automate apparel industry in Sri Lanka? Justify your answer. (08 marks)
2.
 - a. What are the types of industrial relays? (05 marks)
 - b. Briefly explain the operation of relay using suitable sketches (05 marks)
 - c. Explain input adjustment interface and output adjustment interface using suitable sketches (05 marks)
 - d. Draw the forward reverse control diagram for three phase induction motor. And explain the importance of Interlock circuit in forward reverse motor controller circuit. (10 marks)
3.
 - a. Write down five factors that you need to consider when starting automation in a factory (10 marks)
 - b. Briefly explain
 - i. On-delay timer
 - ii. Off-delay timer
 - iii. Retentive timer
 - iv. Non-retentive timer (08 marks)
 - c. Differentiate between pneumatic and hydraulic working media (04 marks)
 - d. Draw a ladder diagram for a three motor system having the following conditions:

Motor 1 (M1) starts as soon as the start switch is ON, after 10 seconds M1 goes OFF and motor 2 (M2) starts. After 5 seconds M2 goes OFF and Motor 3 (M3) starts. After 10 seconds M3 goes OFF and M1 starts and the cycle is repeated.

(08 marks)

4. Figure 01, given overleaf, shows an automated apple packing system controlled by a PLC.

Problem: When PB1 (Start Push Button) is pressed, the box conveyor moves. Upon detection of the presence of the box, the box conveyor stops and 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.

- Select suitable sensors for above system. Give reasons for your selections.
- Draw a ladder diagram suitable to program the PLC for above operation.

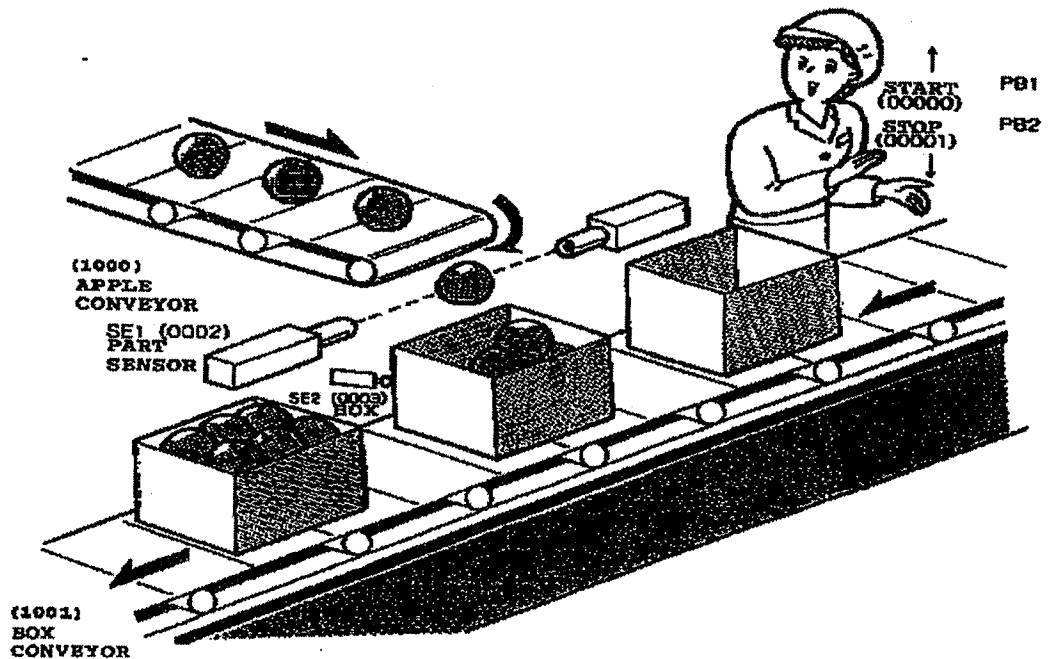


Figure 01

Input	Devices
00000	START Push Button (PB1)
00001	STOP Push Button (PB2)
00002	Part Present (SE1)
00003	Box Present (SE2)

Output	Devices
01000	Apple Conveyor
01001	Box Conveyor

(15 marks)