Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME	:	AUTOMATION SYSTEM
COURSE CODE	:	BNJ 30803
PROGRAM	:	BNK
EXAMINATION DATE	:	JUNE / JULY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

Q1 (a) Describe the meaning of Automation System.

(1 marks)

(b) Explain **THREE (3)** categories in terms of the human participation in the processes performed by the manufacturing system.

(6 marks)

(c) Propose **THREE (3)** phase of how to introduce new products that use automation migration strategy.

(6 marks)

(d) Type of Automation in industry depend on product variety and production quantity. Discuss the classification or types of industrial automation and it features.

(12 marks)

Q2 (a) Pneumatic system and Hydraulic system are familiar in today industry. Differentiate between hydraulic and pneumatic automation system.

(3 marks)

(b) Draw a simple arrangement of hydraulic power unit in heavy duty industry.

(4 marks)

(c) Figure **Q2 (c)** shows the basic circuit hydraulic system of a machine. List the components according to a given letter. Explain the operation of the machine work

(13 marks)

(d) Propose **FIVE (5)** advantage and disadvantage of the hydraulic system in heavy duty industry.

(5 marks)

Q3 (a) Electro pneumatic system is usually used in commissioning PLC system. Outline and explain an example of the pneumatic circuit and electrical circuit for a process used 3/2 way DCV single solenoid with spring return and single acting cylinder. Used relay as indirect control.

(10 marks)

(b) A packaging labeling machine uses two double acting pneumatic cylinders. The first cylinder extends fully and sticks the label on to a medicine bottle when operator push holding type switch. This pneumatic cylinder will return after the full extension is acknowledged. Then, a second double acting cylinder will extend and push the labeled bottle away. Develop the:

i. Sequence motion
ii. Electro pneumatic circuit
iii. Electrical circuit
iv. Step displacement diagram.

(15 marks)

Q4 (a) Describe the meaning of Programmable Logic Control (PLC)

(2 marks)

(b) Discuss **THREE (3)** advantage of PLC usage in industry.

(3 marks)

(c) Figure **Q4 (c)** shows an automatic packaging machine for packing ten apples in one box. A counter use to count the number of apples. Refer the device list as shown in the Table 4 (b), illustrate the ladder diagram (Program control circuit) and working operation.

(20 marks)

Table Q4 (c): Device list

Device	Function
IR000.00	Start button: NO button
IR000.01	Stop button: NC button
IR010.01	Box Sensor: to take the box when motor of an conveyor is activated by start button
IR010.00	Apple Sensor: conveyor with apple starts moving when a box is detected by box sensor
IR000.02	Apple sensor: allow counter to count 10 apples
IR000.03	Box sensor: to resets counter which is again ready to count 10 apples.
CNT010	Counter: to count the numbers of apples depend on setting

Q5 (a) Describe the definition of material Handling (MH) and give **TWO (2)** objective.

(4 marks)

(b) A common approach to the design of Material Handling systems (MH) is to consider a cost to be minimized. List **FIVE (5)** principles of material handling to achieve the approach.

(5 marks)

(c) A unit load is the single item picked up and moved between two locations. Propose the steps that must be taken when design the unit load.

(6 marks)

(d) Good transportation system in industry is mandotary to succes in production. Discuss the transportation system components for material handling below:

(i) conveyors

(ii) industrial vehicles/truck

(iii) monorails, elevator, cranes and hoists

(iv) auxiliary

(10 marks)

Q6 (a) Robot in industry is familiar to replace the human task when there is a challenge in production. Propose the reasons why we need to use robot in the packaging industry.

(5 marks)

(b) Table **Q6 (b)** shows the device list used at a plant and Figure **Q6 (b)** shows a simulation automatic packaging machine. The machine is designed to move a object from P5 →P7, object from P4 →P3, object from P2 →P4 and object from P3→ P6.

Based on the sequence operation of one manufacturing cell which is control by robot, develop:

(i) The programming file of above movement. (MB4 file)

(15 marks)

(ii) The programming file for object back to original position.

(5 marks)

Table Q6 (b): Device list

Num. Item	Device	Num. of Unit
1	Robot arm	1
2	Conveyor	2
3	Table	2
4	CNC Machine (P3)	1

-END OF QUESTION -

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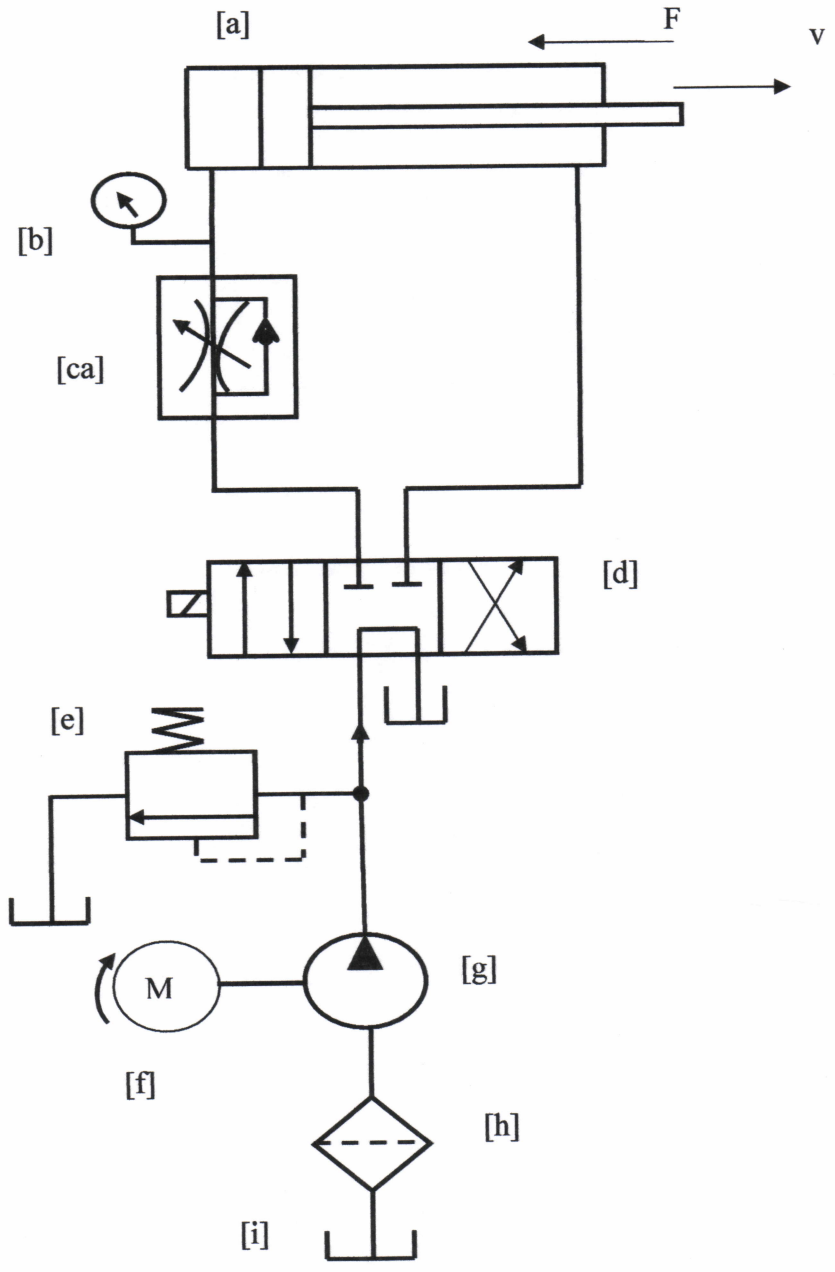

FIGURE Q2 (c)

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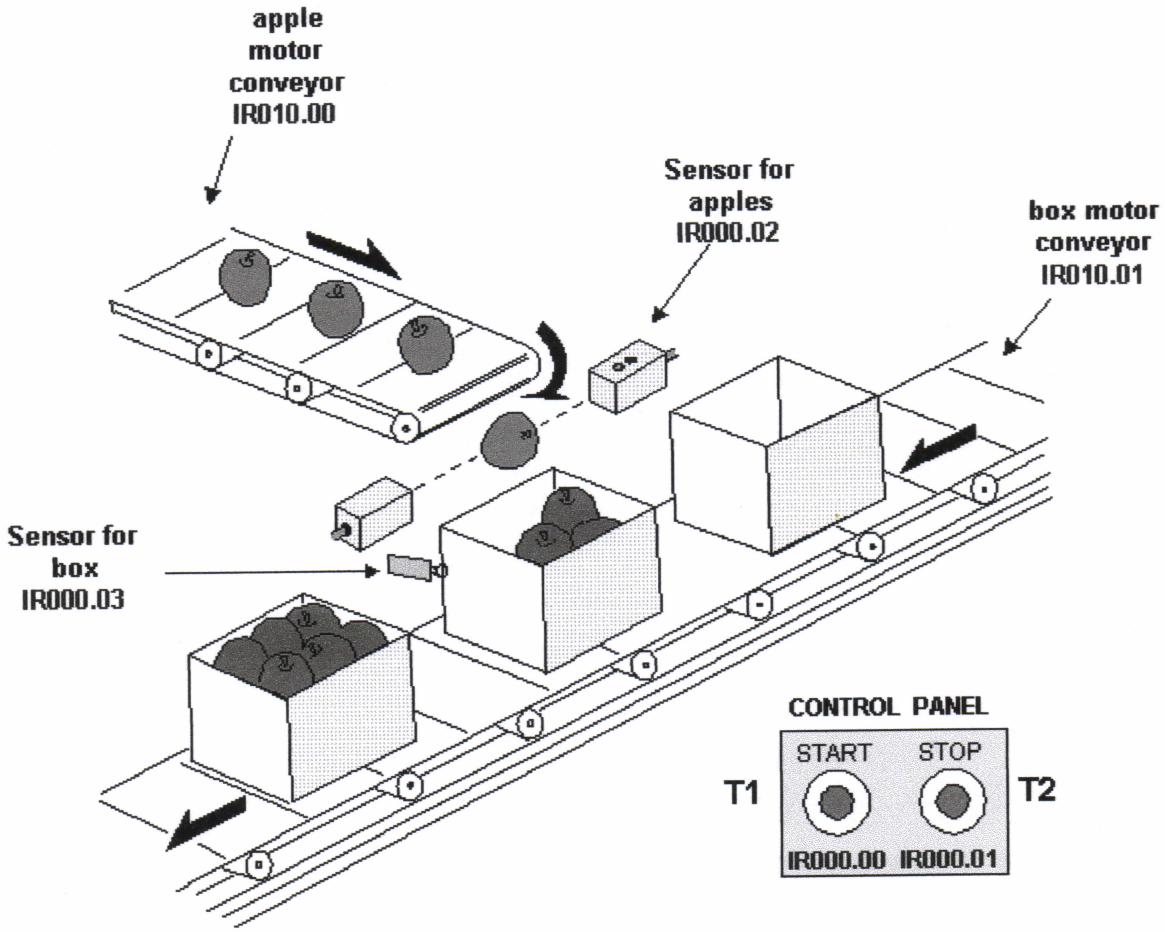

FIGURE Q4 (c)

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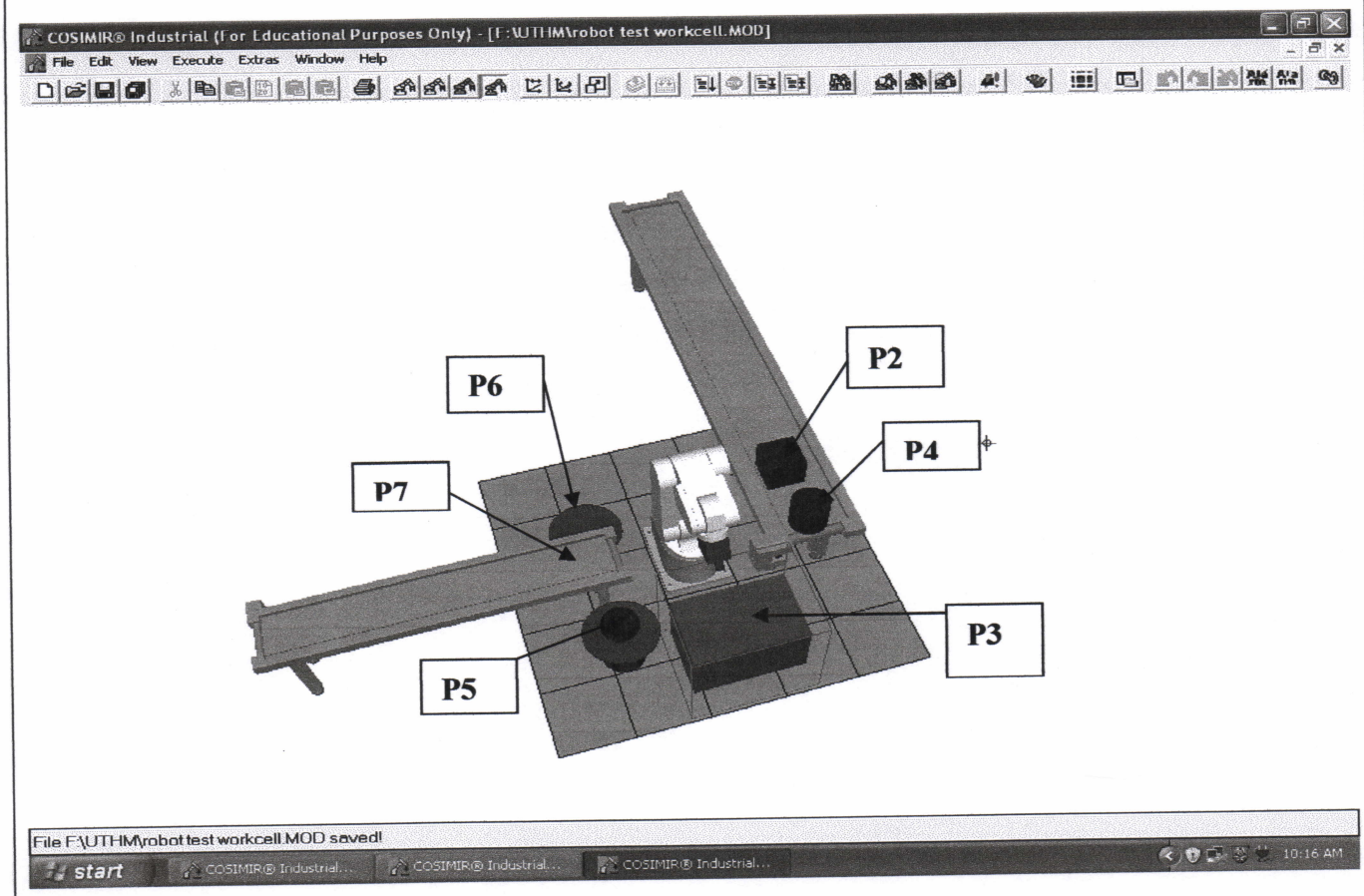

FIGURE Q6 (b)