Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019

COURSE NAME	:	MANUFACTURING CONTROL TECHNOLOGY
COURSE CODE	:	BDD 40803
PROGRAMME CODE	:	4 BDD
EXAMINATION DATE	:	DECEMBER 2018/JANUARY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER ONLY **FIVE (5)** QUESTIONS FROM **SIX (6)** QUESTIONS PROVIDED

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

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Q1 (a) Industrial Revolution 4.0 is a name given to the current trend of automation and data exchange in manufacturing technologies. However, most Malaysian SME companies are still stuck at the level industrial revolution 2.0 where major human workforce are still needed. Discuss the description of fully-automatic machineries used and give **ONE (1)** idea on how to help SMEs to improve their efficiencies.

(4 marks)

(b) Manufacturing system is a collection of integrated equipment and human resources, whose function is to perform one or more processing and assembly operation. Sketch the position of the manufacturing system in the larger production system in complete with the appropriate labels of correspond enterprise and factory level.

(7 marks)

(c) Differentiate and compare **THREE (3)** different factory layout in Job Shop, batch production and cellular manufacturing systems by discussing the working principle, advantages and disadvantages.

(9 marks)

Q2 (a) Compare and explain **TWO (2)** differences between an open and closed loop systems. Give the examples to explain your answer.

(4 marks)

(b) A PID is widely used in feedback control of indsutrial process on the market and has remained the most widely used controller in process control until today. How does PID controller work? Briefly explained with helping of sketching, **THREE (3)** modes of controllers gain response to the error reaction by changing the controller settings.

(11 marks)

(c) Waze application are widely used in the smartphone in helping users to navigate during driving in the city. As an engineer in a startup company, you are required to propose and design an assist signaling system that automatically turn the car signal depending to the car direction based on Waze application. Evaluate the **FIVE (5)** steps require in designing this control system.

(5 marks)

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Q3 (a) Numerical control(NC) is a form of programmable automation in which the mechanical actions of a machine tool are controlled by program. Define and sketch of **TWO (2)** different types of movement are accomplished by the motion of NC system.

(5 marks)

(b) Body and arm robot configurations can be defined with five types of joints combination. Evaluate with aid of sketching the robot body arm configuration listed below.

(i) Polar coordinate body and arm
(ii) SCARA body and arm

(5 marks)

(c) A pick and place robot require to performs a loading and unloading operation for moving part from P2 to P3 according to **Figure Q3(c)**. Initial program need to set with maximum of movement speed. Hand gripper need to wait 2 seconds for the completion of arrival and after grasps of workpiece. Evaluate with aid of textual robot programming language to accomplish this movement.

(10 marks)

Q4 (a) Flexible manufacturing system (FMS) consist of several machine tools along with part and tool handling devices. Briefly explain **TWO (2)** FMS components and give the example on each compnents to perform several function.

(2 marks)

(b) Structured text programming language need to be select to transform the combining of AND LOAD and OR LOAD function from ladder programme according to **Figure Q4(b)**.

(6 marks)

(c) **Figure Q4(c)** illustrates a paint spraying system when boxes fed by gravity through a feeder magazines are delivered one at a time into moving conveyor belt. Boxes are pushed towards the conveyor by the cylinder A which extend and retract operation is controlled by switch S1 and S2. A spraying nozzle paint each box as it passed y and detector D1 counts each box being sprayed. When 20 boxes have been painted the valve V2 shuts off and cylinder A stops operations.

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(i) Choose according to IEC sysmbol with I/O modul to sketch an electrical diagram for the system

(4 marks)

(ii) Support with the necessary lines of ladder logic to operate the system.

(8 marks)

Q5 (a) Evaluate the **THREE (3)** phases of shop floor control (SFC) and provide a brief definition for each activity . Support with appropriate sketching of the three integration phases in SFC.

(10 marks)

(b) Inventory control attempts to compromise in keeping inventory at minimum level, in the extreme, zero inventory. Differentiate the **THREE (3)** major sources of costs in holding inventory.

(6 marks)

(c) A workpart costing RM90 is processed through a factory. The manufacturing lead time for the part is 10 weeks, and the total time spent in processing during lead time is 25 hours for all operations at a rate of RM30 perhour. Non operation costs total RM60 during the lead time. The holding cost rate used by the company for work in process is 25%. The plant operates 40 hours per week processed through the factory. Determine the holding cost per part during the manufacturing lead time.

(4 marks)

Q6 (a) In logistic industry, material handling is a crucial activity. In designing material handling system, several factors need to be considered. Evaluate in detail design considerations in material handling system design in the aspect of:

(i) Material Characteristics
(ii) Flow Rate
(iii) Plant Layout
(iv) Unit load principle

(12 marks)

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(b) There are several industry standards with regards to identification technology. Describe and distinguish the working principle, the advantages and disadvantage of IEC 14443 and IEC 18092 technology.

(8 marks)

END OF QUESTION

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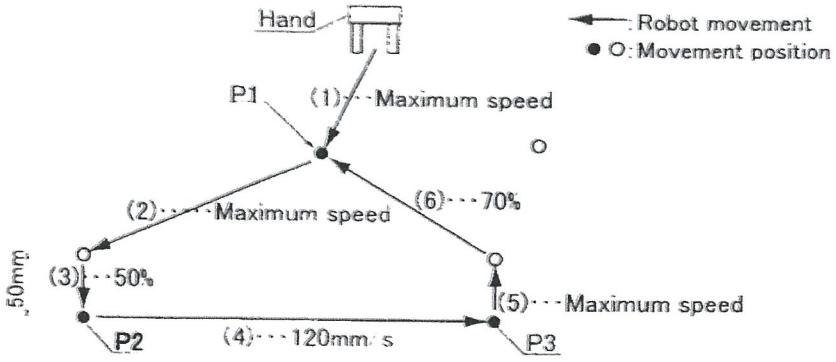

Figure Q3(c)

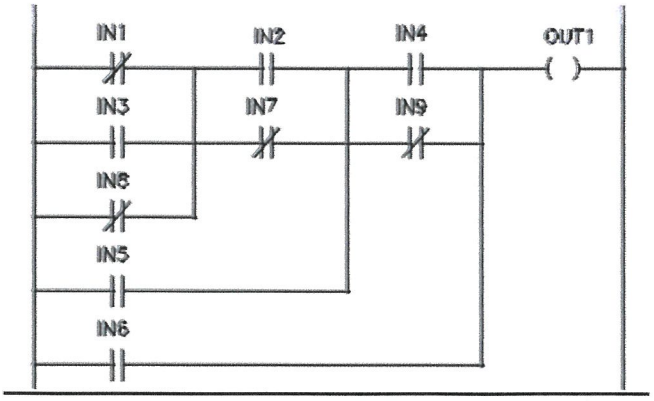

Figure Q4(b)

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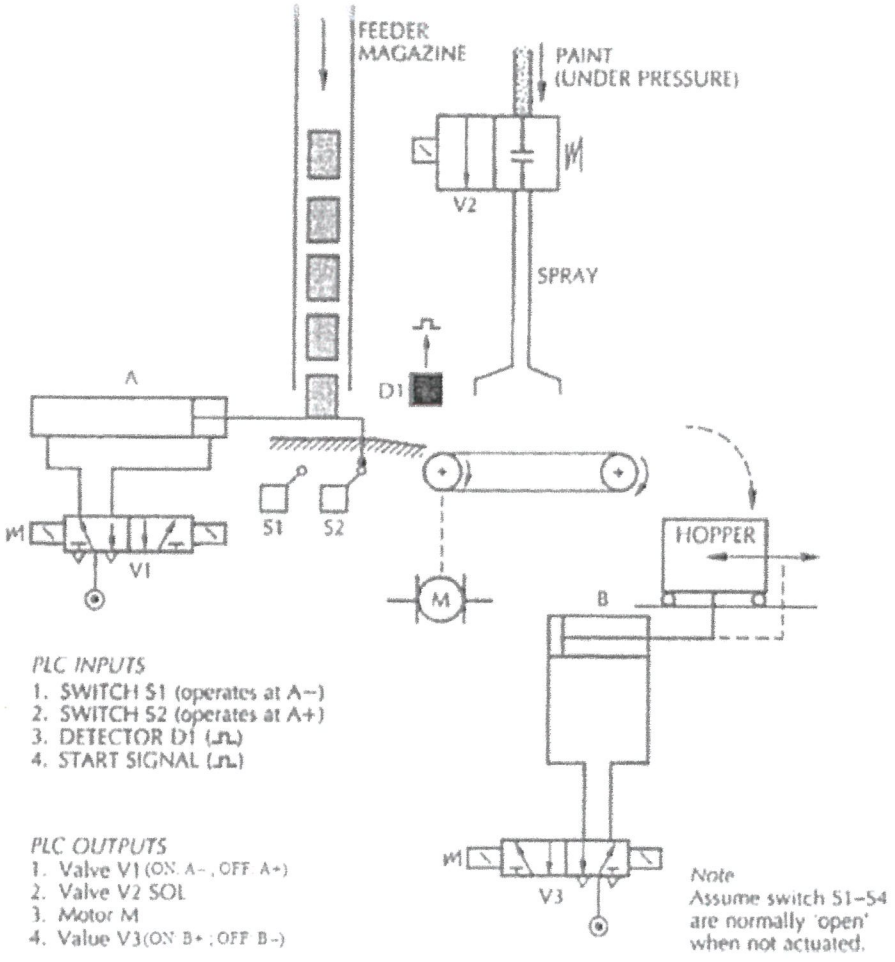

FIGURE Q4(c)

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