



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
(ONLINE)  
SEMESTER II  
SESSION 2020/2021**

COURSE NAME : MANUFACTURING AUTOMATION  
COURSE CODE : MMV 15003  
PROGRAMME CODE : MBM  
EXAMINATION DATE : JULY 2021  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

**Q1** Industrial automation in manufacturing combines technology, trends, and processes to improve productivity with minimal human intervention. The three basic types of automation used on the factory floor are fixed automation, programmable automation and flexible automation.

(a) The selection of type of automation in a manufacturing operation is driven by the manufacturing requirements. Compare the suitability of all three basic types of automation with product volume and variety. Explain your answer.

(15 marks)

(b) You would like to transform the manual stick welding process and the gas metal arc welding process to fully automated manufacturing operation. Propose the feasibility of transforming each welding process to full automation.

(10 marks)

**Q2** (a) Develop a basic process plan for the component shown in Figure Q2 (*fat brass tremolo*). Assume the manufacturing facility is at basic level (not sophisticated machines).



*Figure Q2 : Fat Brass Tremolo*

(10 marks)

(b) Computer numerical control (CNC) machine is the best and basic example of application of Mechatronics in manufacturing automation. CNC lathe machine, CNC milling machine, CNC welding machine and, etc. In many cases, traditional machine

or conventional machine operated by a trained employee has been replaced by CNC. Thus, explain the reasons of these changes.

(10 marks)

- (c) Discuss the importance of Computer-aided Design (CAD) and Computer-aided Manufacturing (CAM) in product development.

(5 marks)

- Q3** (a) List the importance of advanced handling methods in a factory layout.

(8 marks)

- (b) Discuss the application of handling method in manufacturing automation.

(7 marks)

- (c) The top management of your company is considering the installation of an Automated Storage and Retrieve System (ASRS). You are required to give your opinion in a meeting regarding the installation. Present your opinion.

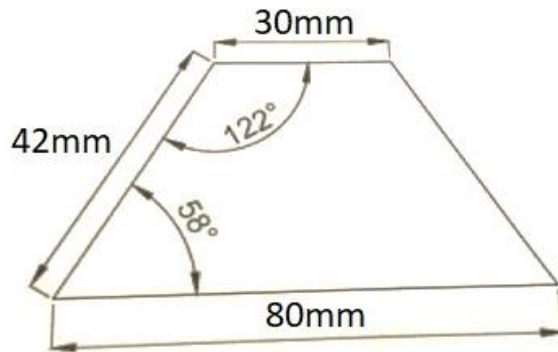
(10 marks)

- Q4** (a) A three-axis CNC machining centre is tended by a worker who loads and unloads parts between machining cycles. The machining cycle takes 4.55 min, and the worker takes 3.60 min using a hoist to unload the part just completed and load and fixture the next part onto the machine worktable. A proposal has been made to install a two-position pallet shuttle at the machine so that the worker and the machine tool can perform their respective tasks simultaneously rather than sequentially. The pallet shuttle would transfer the parts between the machine worktable and the load/ unload station in 15 sec.

- i. Calculate the current cycle time for the operation.
- ii. Calculate the cycle time if the proposal is implemented.
- iii. What is the percentage increase in the hourly production rate that would result from using the pallet shuttle?

(15 marks)

(b) Write a CNC program for the following diagram.



*Figure Q3*

(10 marks)

- **END OF QUESTION** -

# SULIT

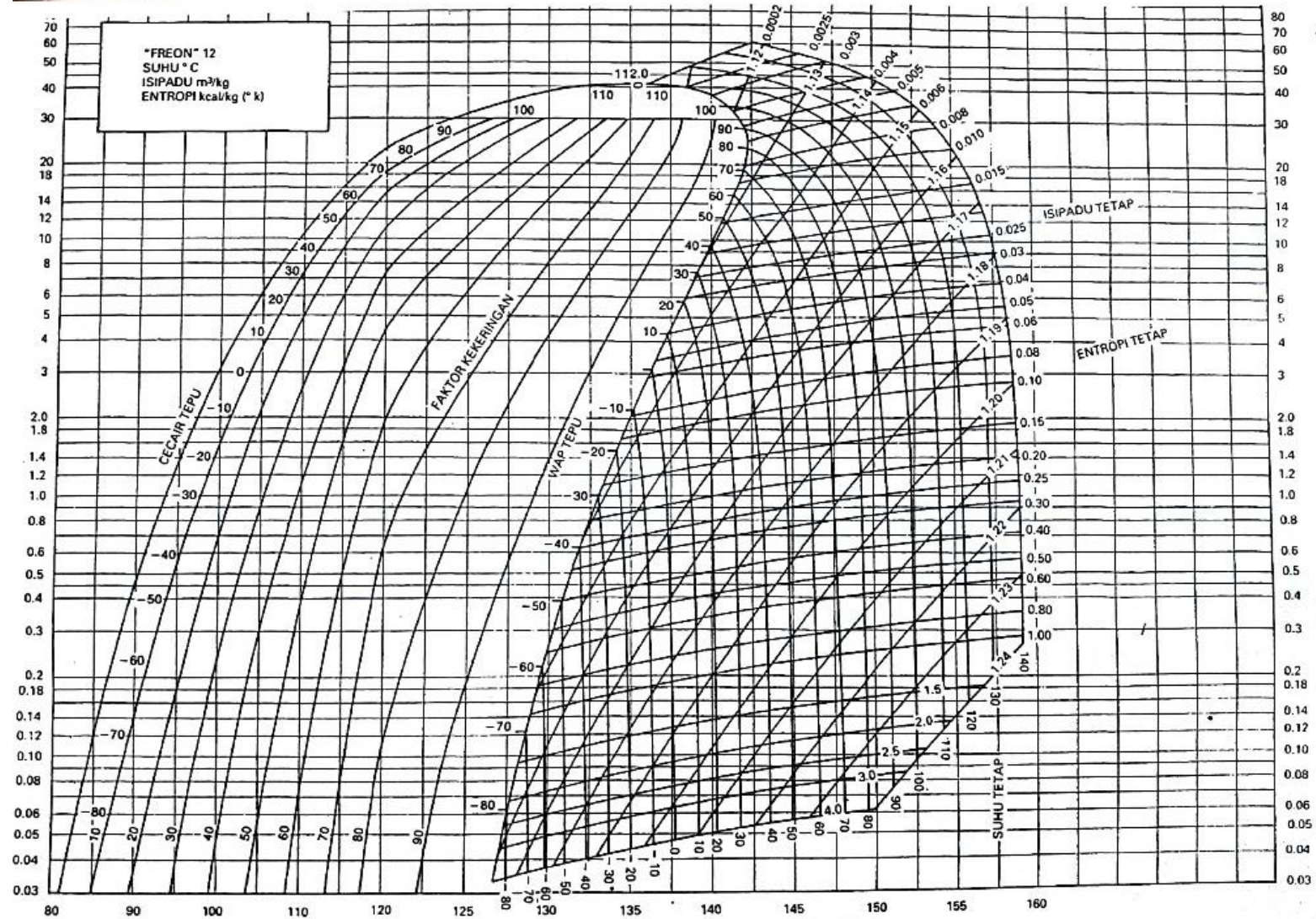
## PEPERIKSAAN AKHIR

SEMESTER / SESI : SEM I / 2018/2019

KOD PROGRAM : BBG

NAMA KURSUS : TEKNOLOGI PENYEJUKBEKUAN DAN PENYAMAN UDARA

KOD KURSUS : BBA 20203



Rajah S5 (a)

**TERBUKA**  
**CONFIDENTIAL**



