



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION SEMESTER II SESSION 2023/2024

- COURSE NAME : FURNITURE MANUFACTURING AND PROCESS
- COURSE CODE : BPP 30703
- PROGRAMME CODE : BPP
- EXAMINATION DATE : JULY 2024
- DURATION : 3 HOURS
- INSTRUCTION : 1. ANSWER ALL QUESTIONS
2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 Open book
 Closed book
3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

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

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- Q1** (a) Define a furniture. (2 marks)
- (b) Explain **FOUR (4)** stages of wooden furniture manufacturing process. (8 marks)
- (c) Outline **THREE (3)** departments in the manufacturing processes. (9 marks)
- Q2** (a) Describe the sawmilling machine in engineering process. (4 marks)
- (b) **Figure Q2.1** shows a piece of wooden backrest come out from the exploded view illustration in the basic furniture design.
- (i) **Figure Q2.1** sketch an exploded view with labels. (8 marks)



Figure Q2.1: An incomplete illustration of wooden backrest

- (c) Differentiate **TWO (2)** advantage and disadvantage production system and automated production system of automation systems. (8 marks)
- Q3** (a) Define a hydraulics system. (2 marks)
- (b) **Figure Q3.1** shows simplified hydraulic circuit for the main cylinder actuation, a 4/3-way flow directional control valve is used to change the piston position.
- (i) **Figure Q3.1** sketch the diagram of hydraulics system with labels. (6 marks)

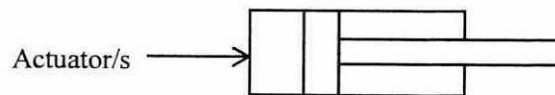


Figure Q3.1: An incomplete a single cylinder actuation in the diagram of hydraulics system

- (c) Illustrate the diagram of hydraulics press with labels. (9 marks)

Q4 (a) In today’s fast-paced, technology-driven environment, there is a drive to shorten product development cycles. Prototyping is a key process to developing new products. However, current methods for manufacturing prototypes are long and expensive. Rapid prototyping involves rapidly producing prototypes of a new product to test out function and form or aesthetic. Experimenting with the aesthetic and functional design choices can risk designs before they go into production. Rapid prototyping with traditional methods requires tooling – just like volume production processes. Tooling slows down and adds cost to product development cycles. 3D printing provides an alternative prototyping production process that removes tooling constraints, giving product designers a flexible, on-demand option for product development and scaling.

(Source: LuxCreo inc., 2024)

- (i) Describe the prototyping making design in manufacturing process. (4 marks)
- (ii) Outline **THREE (3)** consideration of 3D prototyping design challenges in furniture manufacturing process. (8 marks)
- (iii) Justify **THREE (3)** significant of 3D prototyping process. (12 marks)

Q5 (a) To locate and immobilize workpieces for machining, inspection, assembly and other operations fixtures are used. A fixture consists of a set of locators and clamps. Locators are used to determine the position and orientation of a workpiece, whereas clamps exert clamping forces so that the workpiece is pressed firmly against locators. Clamping has to be appropriately planned at the stage of machining fixture design. The design of a fixture is a highly complex and intuitive process, which require knowledge. Fixture design plays an important role at the setup planning phase. Proper fixture design is crucial for developing product quality in different terms of accuracy, surface finish and precision of the machined parts In existing design the fixture set up is done manually, so the aim of this project is to replace with hydraulic fixture to save time for loading and unloading of component. Hydraulic fixture provides the manufacturer for flexibility in holding forces and to optimize design for machine operation as well as process functionality.

(Source: Kumbhar, J. V. and Pandit, H. C., 2015)

- (i) Compare **FOUR (4)** important of jig and fixture (8 marks)
- (b) In business, there are three things that matter to be successful – quality, price, and effectiveness. You need to have a good quality product for your customers to trust you and prefer your brand to the rest. Price is important in product delivery because you need to have a perfect balance between affordability and



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profitability. Lastly, the effectiveness of your product. This is not easy to achieve because it needs time and cost. To achieve all three, you need the right manufacturing technique to deliver your products to customers on time. If you fail to deliver a new part or piece on time, your competitor may capture the market intended for you. Only rapid prototyping services can deliver these essentials to you. The rise of innovative manufacturing techniques using computer-assisted design paves the way for a cost-effective method in developing and testing new parts and products. Rapid prototyping may be the ultimate solution to your dilemma, but like any other processes, it too has some pitfalls. As with other technologies, it is not a one size fits all formula. Here we explore the pros and cons of rapid prototyping and how to use it properly to ensure your success.

(Source: Wilson Lin, 2018)

- (i) Differentiate **THREE (3)** advantages and disadvantages of rapid prototyping.

(12 marks)

- END OF QUESTIONS -