



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024**

- COURSE NAME : MANUFACTURING TECHNOLOGY
- COURSE CODE : BDA 31403
- PROGRAMME CODE : BDD
- EXAMINATION DATE : JULY 2024
- DURATION : 3 HOURS
- INSTRUCTION :
1. PART A : ANSWER ALL QUESTIONS
 2. PART B : ANSWER **THREE (3)** QUESTIONS FROM FOUR (4) QUESTIONS
 3. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - Closed book
 4. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

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CONFIDENTIAL**PART A**

- Q1** Powder metallurgy (PM) is a manufacturing process used to produce metal parts and components from metal powders. powder metallurgy is a versatile and cost-effective manufacturing process that enables the production of high-quality metal components with tailored properties to meet specific application requirements.
- (a) Describe the sintering process, including the mechanisms of particle bonding, densification, and grain growth. (3 marks)
- (b) Compare and contrast powder metallurgy with conventional metalworking methods such as casting, forging, and machining. Discuss the advantages and limitations of powder metallurgy over these traditional techniques, considering factors such as material utilization, dimensional accuracy, and complexity of part geometry. (9 marks)
- (c) Explore the applications of powder metallurgy in modern industries. Provide specific examples of components and products manufactured using powder metallurgy techniques. Discuss the advantages of powder metallurgy in meeting the performance requirements of these applications. (8 marks)
- Q2** Joining processes are manufacturing techniques used to connect two or more separate components to form a single structure or assembly. These processes are essential in various industries, including automotive, aerospace, construction, electronics, and more.
- (a) The weld joint is the junction of the edges or surfaces of parts that have been joined by welding. With aid of diagram, identify **FIVE (5)** types of joint in welding process. (5 marks)
- (b) Explain **FOUR (4)** drawback of welding process. (5 marks)
- (c) Differentiate **TWO (2)** categories of welding processes. With the aid of diagram elaborate the followings;
- (i) Definitions and example of each welding categories. (6 marks)
- (ii) The advantages and disadvantages of each process. (4 marks)

CONFIDENTIAL**PART B**

- Q3 (a)** By referring to **Figure Q3.1**, recommend the appropriate casting process to produce this aluminum castings component with high accuracy of dimension and mass quantity. Use illustration to explain the processes involved to make the component.

(10 Marks)

**Figure Q3.1**

- (b) (i) A steel rectangular plate with dimensions of 650 mm length x 105 mm width x 15 mm thick, will be produced using sand-casting. If the mold constant is 3.26 min/cm^2 , calculate the total solidification time required for the casting to solidify after pouring.

(4 marks)

- (ii) After the plate solidified, it was found that the plate had defects. By the aid of sketch, distinguish **FOUR (4)** common types of defects that might occurred in sand casting. State the cause of each defect.

(6 marks)

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Q4 (a) Between **Figure Q4.1** and **Figure Q4.2**, determine which one is the Process Layout and Product Layout, and explain your answer

(4 marks)

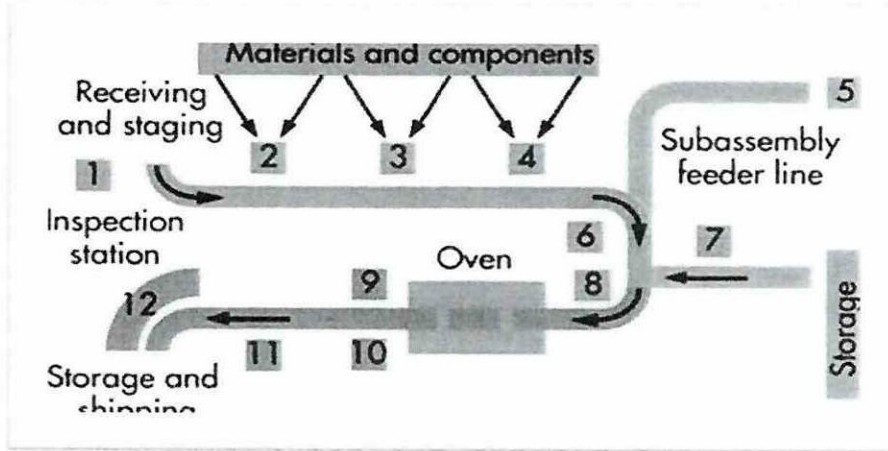


Figure Q4.1

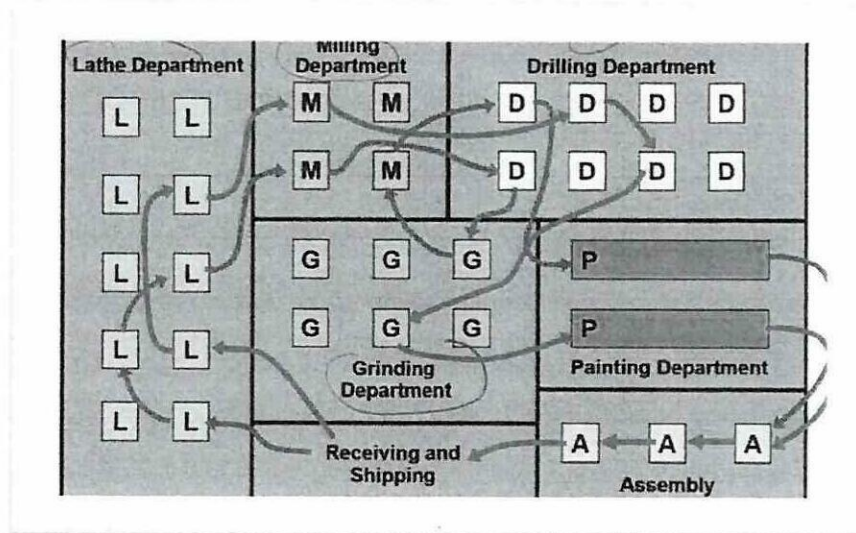


Figure Q4.2

(b) Elaborates the important of knowing the material specification in manufacturing technologies,

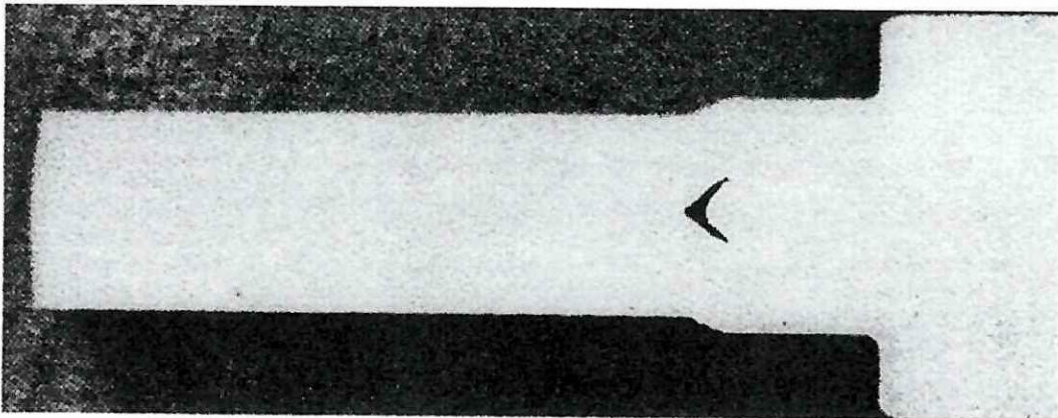
(6 marks)

(c) With the aid of appropriate diagram, illustrate the steps of blown calendaring (Blown-film) process and list **ONE (1)** example of products that are normally made by that technique.

(10 marks)

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- Q5** (a) (i) Non-traditional machining processes such as EDM, ECM and laser beam machining has advantages compared with conventional metal cutting. Elaborates this finding. (10 marks)
- (ii) “Manufacturing industry has been slow in adopting such advanced machining processes”. Support this statement. (4 marks)
- (b) Name and briefly describe the four types of chips that occur in metal cutting. (6 marks)
- Q6** (a) Classified the defect occurs on the parts in **Figure Q6.1** and **Figure Q6.2** during extrusion process and justify why both defects occur during the extrusion process. (10 marks)

**Figure Q6.1**

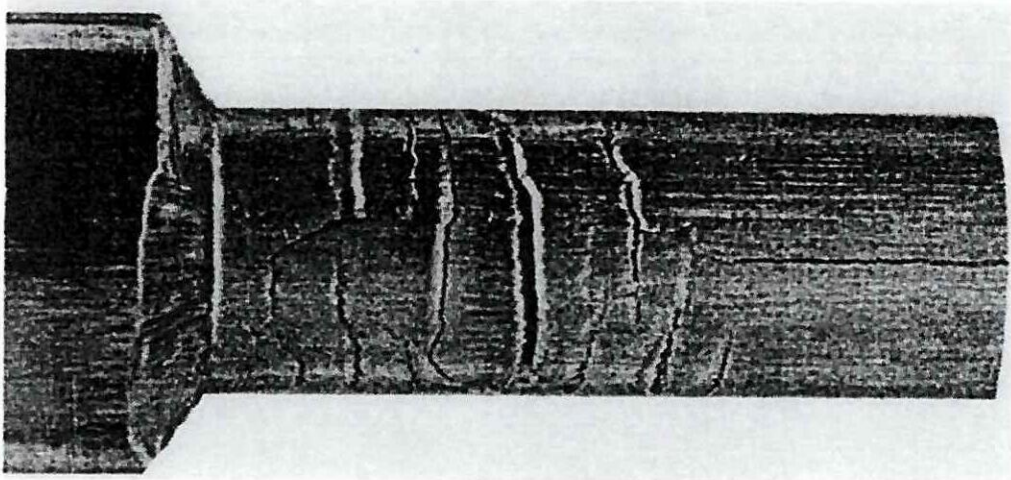
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Figure Q6.2

- (b) Main structure labelled A of the DVD components shown in **Figure Q6.3** was made from metal forming processes. With the help of label and sketches, which process does it involved and explain each of the stated process.

(10 marks)

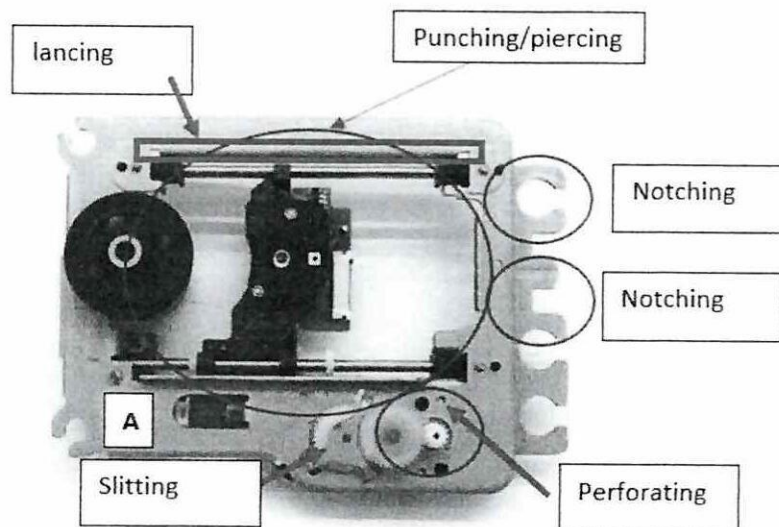


Figure Q6.3

- END OF QUESTION

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