



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

COURSE NAME : MANUFACTURING TECHNOLOGY

COURSE CODE : BDA 31403

PROGRAMME CODE : BDD

EXAMINATION DATE : JUL / AUG 2023

DURATION : 3 HOURS

INSTRUCTION :
1. PART A : ANSWER ALL QUESTIONS
2. PART B : ANSWER **THREE (3)**
FROM FOUR (4) QUESTIONS.
3. THIS FINAL EXAMINATION IS
CONDUCTED VIA **CLOSED**
BOOK.
4. STUDENTS ARE **PROHIBITED**
TO CONSULT THEIR OWN
MATERIAL OR ANY EXTERNAL
RESOURCES DURING THE
EXAMINATION CONDUCTED
VIA CLOSED BOOK

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

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PART A : ANSWER ALL QUESTIONS

- Q1** (a) Powder metallurgy (PM) is a metal processing technology in which parts are produced from metallic powders. PM parts can be mass-produced to net shape or near net shape, eliminating or reducing the need for subsequent processing.
- (i) Distinguish between net shaped and near net shaped manufacturing. (4 marks)
- (ii) Differentiate between true density and bulk density. (4 marks)
- (b) Compaction is the step in which high pressure is applied to the powders to form them into the desired shapes. The purposes of compaction are to obtain the required shape, density, and particle-to-particle contact. With the aid of an illustration, discuss the stages of powder compaction. (6 marks)
- (c) Porosity is a unique and inherent characteristic of PM technology. It can be exploited to create special products by filling the available pore space with oils, polymers, or metals. Elaborate on the difference between infiltration and impregnation in powder metallurgy. Explain **TWO (2)** examples of each. (6 marks)

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- Q2** (a) During the welding operation, the region of base material adjacent to the welding zone does not fuse but is affected by the welding heat input. Examine with sketches what is the heat-affected zone (HAZ) in a fusion weld.

(8 marks)

- (b) Scrutinize the differences between welding, brazing, and soldering with their characteristic depicted in the **Table Q2(b)** below.

Table Q2(b)

	WELDING	BRAZING	SOLDERING
MATERIALS			
REQUIRED TEMPERATURE			
FILLER MATERIAL			
STRENGTH OF JOINING			

(12 marks)

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PART B : ANSWER **THREE (3)** FROM **FOUR (4)** QUESTIONS.

- Q3** (a) By referring to **Figure Q3(a)**, 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)

- (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 has 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)

- Q4** (a) Between **Figure Q4(a)-i** and **Figure Q4(a)-ii**, determine which one is the Process Layout and Product Layout, and explain your answer

(4 marks)

- (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) **Figure Q6(a)-i** and **Figure Q6(a)-ii** classified the defect occurs on the parts during extrusion process and justify why the both defects occur during the extrusion process. (10 marks)
- (b) Main structure labelled A of the DVD components shown in **Figure Q6(b)** was made from metal forming processes. By the help of label and sketches, which process does it involved and explain each of the stated process. (10 marks)



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- END OF QUESTION -

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Figure Q3(a)

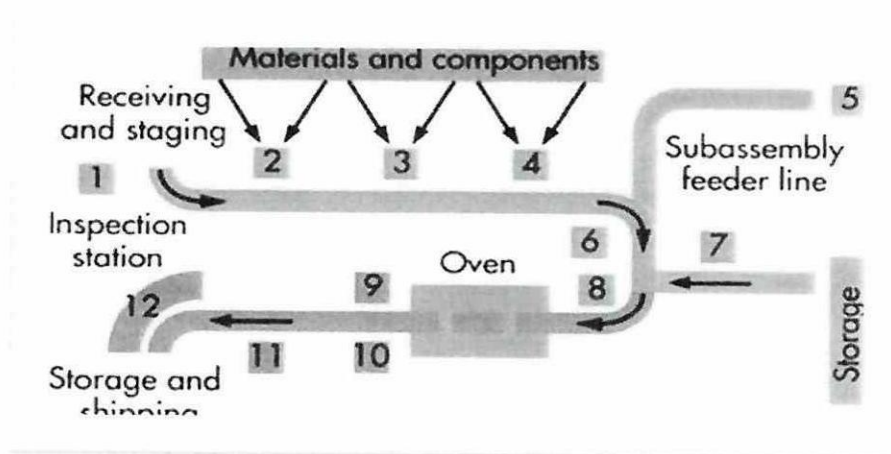


Figure Q4(a)-i

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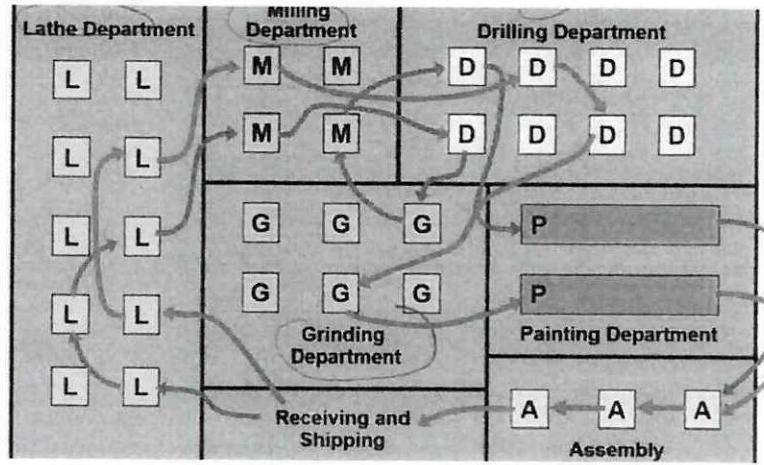


Figure Q4(a)-ii

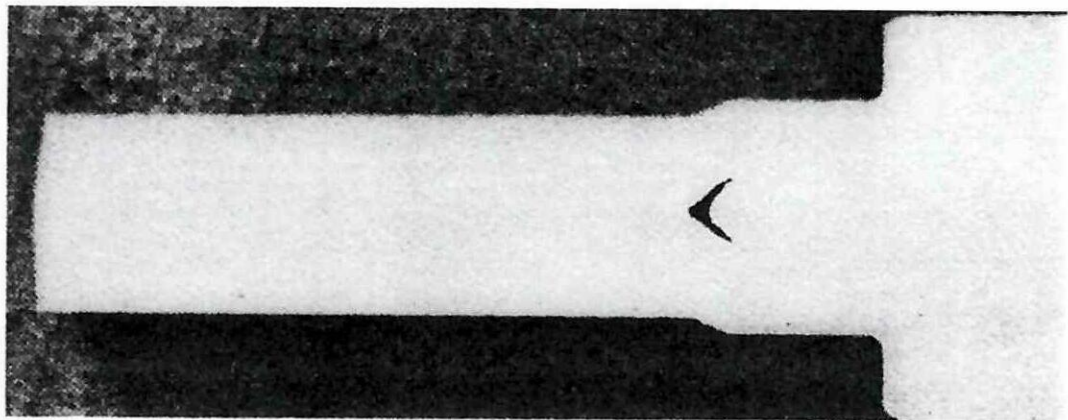


Figure Q6(a)-1

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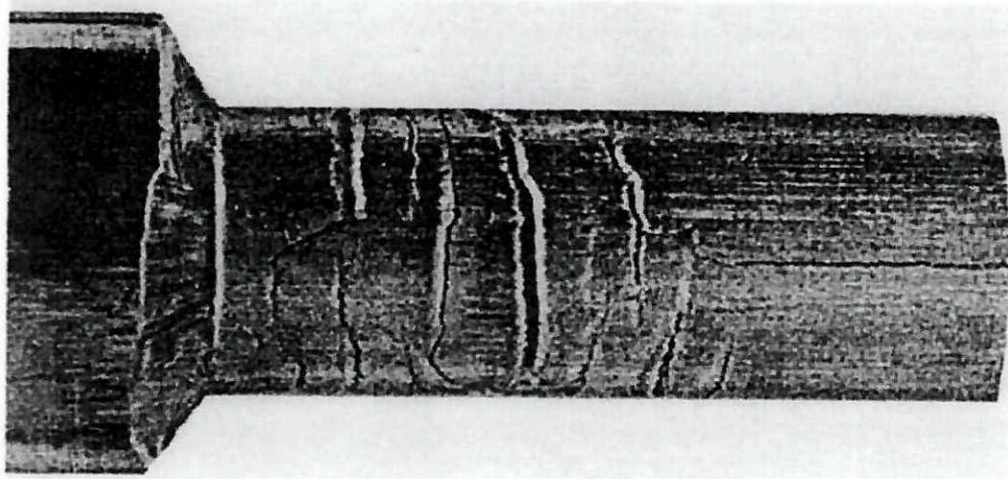


Figure Q6(a)-ii

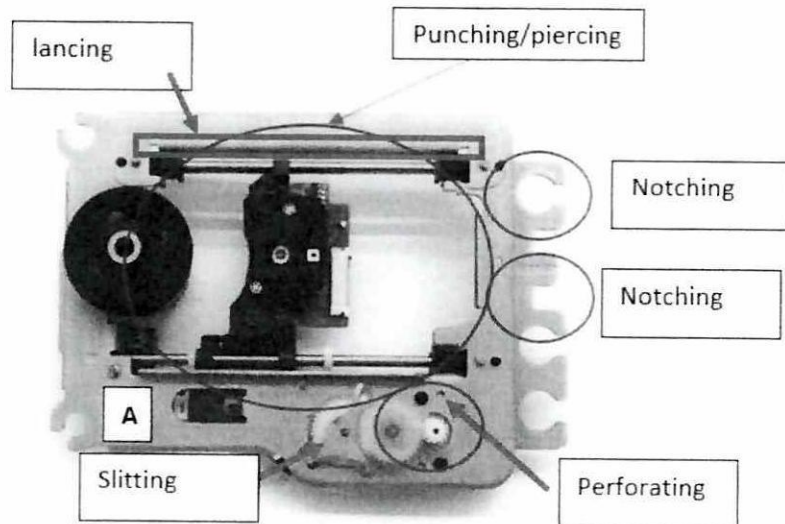


Figure Q6(b)