



**UNIVERSITI TUN HUSSEIN ONN  
MALAYSIA**

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

COURSE NAME : MANUFACTURING TECHNOLOGY I  
COURSE CODE : BDX 10902  
PROGRAMME : BDX  
EXAMINATION DATE : JANUARY/FEBRUARY 2021  
DURATION : 2 HOURS  
INSTRUCTION : 1. ANSWER ALL QUESTION  
FROM SECTION A  
2. ANSWER THREE (3)  
QUESTIONS FROM SECTION B

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THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

SECTION A

- Q1 (a) Major application of formed extrusion includes wing stiffeners, channel vents, spar chords, fuselage frames and body chords. With the help of sketches, distinguish **THREE (3)** fundamentals involve in stretch forming. (9 marks)
- (b) “Hot forming processes including superplastic forming (SPF), either alone or in combination with diffusion bonding (DB), and hot die forming processes commonly used to fabricate titanium sheet metal parts. These will enhance the performance of aircraft”. Defend and support this statement. (6 marks)
- (c) “In aerospace manufacturing, there are always demand for producing metal aircraft panels with improved performance including enhanced strength, lower weight, reduced fabrication costs, and increased resistance to fatigue and corrosion”. Evaluate the Creep age forming (CAF) technique to meet the aerospace demand. (6 marks)
- (d) Sheet metal products are available both in flat pieces and also in the form of coil stock produced by the primary sheet metal producers. Aerospace designers select the sheet products according to the type of part designed for the aircraft including geometry. To satisfy the design requirements for a prospective new metal alloy, classify the consideration factors. (4 marks)

A red rectangular stamp with the word "TERBUKA" written in bold, uppercase letters inside.

**SECTION B**

- Q2** (a) The mold in casting process contains a cavity whose geometry determines the shape of cast part.
- (i) With the help of sketches, differentiate between open molds and closed molds. (6 marks)
- (ii) Explain the function of a core in casting process and how to implement it. (2 marks)
- (b) Select the casting process required to produce the casting component shown in **Figure Q2(b)** with high accuracy of dimension and quantity. (5 marks)
- (c) (i) A steel rectangular plate with a dimension of 650mm length x 105mm width x 15mm thick, will be produced using sand casting. If the mold constant is  $3.26 \text{ min/cm}^2$ , calculate the total solidification time required for the casting to solidify after pouring. (6 marks)
- (ii) After the plate was solidified, it was found that the plate has defects. By the aid of a sketch, distinguish **FOUR (4)** common types of defects that might be occurred in sand casting with the cause of each defect. (6 marks)
- Q3** (a) Impression die forging and flashless forging are among two important process in metal forming practice. With the aid of diagram, compare these two process. (8 marks)
- (b) **Figure Q3(b)** shows a metal forming product that crucial to get a uniform wall thickness on the side wall.
- (i) Select the suitable metal tooling forming process for the product (2 marks)
- (ii) Sketch and label the process with explanation. (6 marks)
- (c) Springback is a phenomenon happened in sheet metal bending operation. Write the phenomenon. (3 marks)

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- (d) Differentiate between the bulk deformation processes and sheet metal processes. (6 marks)
- Q4** (a) Manufacturing in its comprehensive sense, is the process of converting raw materials into finished products. Every industry has been designed to have specific manufacturing capabilities to fulfill the production requirement. Write and explain **TWO (2)** main manufacturing capabilities that typically involved in the manufacturing company. (3 marks)
- (b) Injection moulding is a manufacturing process for producing parts by injecting molten material into a mould.
- (i) Write the characteristics and limitations of an injection moulding product. (5 marks)
- (ii) List **TWO (2)** examples of products that is normally made by such technique. (2 marks)
- (c) Compare the differences between the mold for injection molding and the mold for compression molding process. (6 marks)
- (d) Describe the die swell phenomenon in extrusion. (3 marks)
- (e) Differentiate the functions of the screen pack and breaker plate at the die end of the extruder barrel. (4 marks)
- Q5** (a) Explain in general major manufacturing process of metal components of an aircraft. Provide **ONE (1)** example of aircraft component for each manufacturing process.
- (i) Forming  
(ii) Welding or joining process  
(iii) Metal cutting and machining  
(iv) Abrasives metal removal and cutting processes  
(v) Chemical metal removal and chemical processing of metals
- (10 marks)

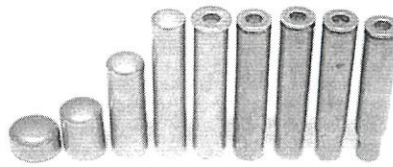
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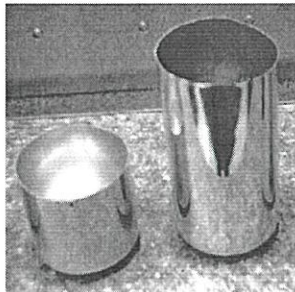
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**Figure Q2 (b)**



Parts courtesy of Remington Arms.



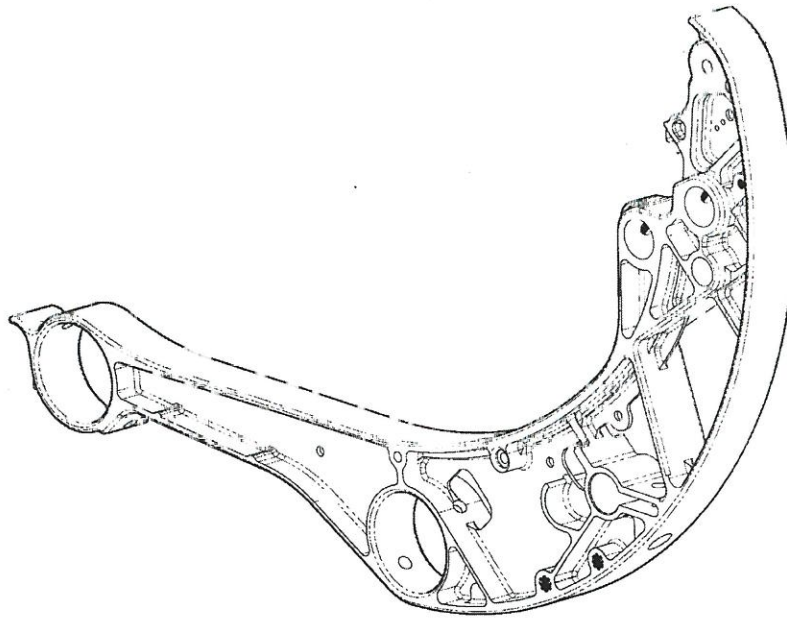
**Figure Q3 (b)**

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**Figure Q5 (b)**

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