



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : MANUFACTURING
PROCESS TECHNOLOGY

COURSE CODE : BNM 20104

PROGRAMME CODE : BNM

EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

- Q1** (a) Describe **TWO (2)** types of powder metallurgy production sequences. (4 marks)
- (b) Mr Irfan Dany owns a factory making automotive components such as gears, bushes, rotors, and sprockets. He received a new job for making a series of gears for the new Perodua Myvi. The demand is so vast, and he believes that the company needs to implement the powder metallurgy process. As a sales engineer, explain in detail how Mr Irfan Dany can perform the procedure in his factory. (10 marks)
- (c) Based on your answer in **Q1 (b)**, assess the significance of the powder metallurgy process compared to other methods. (6 marks)
- Q2** (a) Compression molding is a precise and potentially rapid process for producing high-quality plastics parts in a wide range of volumes. This process can provide parts with a wide array of lengths, thicknesses, and complexities. The objects it produces are also high in strength, making it an attractive process for several different industries. Based on the statement;
- (i) State the material suitable for this process. (1 mark)
- (ii) Demonstrate **THREE (3)** steps in compression molding with the related sketch and proper label. (6 marks)
- (iii) Determine **FOUR (4)** advantages of compression molding compared to traditional injection molding process. (8 marks)
- (b) Shrinkage is defined as the reduction of size, linearly, during cooling from molding to room temperature. Shrinkage allowance need to be considered when designing a mold. Discuss steps on how shrinkage can be reduced during plastics injection molding process. (5 marks)

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- Q3** (a) Rivets are the primary fastening method in aircraft and aerospace industries. Identify **TWO (2)** advantages of rivets. (2 marks)
- (b) There are various types of joining available. The selection of joining process depends on the application and desired product specifications. Distinguish mechanical assembly and welding in terms of the product specifications. (4 marks)
- (c) Solid state welding is joining processes in which coalescence results from application of pressure alone or a combination of heat and pressure, such as friction welding, ultrasonic welding, and forge welding. Demonstrate friction welding processes with the aid of diagram or sketch. (8 marks)
- (d) **Figures Q3 (d) (i) and Q3 (d) (ii)** shows two types of defect commonly happened in welded joints. Analyse the defect by identifying their types and the most suitable inspection method. (6 marks)
- Q4** (a) The properties of a metal change with an increase in temperature during processing. Therefore, the metal will react differently to the same manufacturing operation if it is performed under different temperatures, and the manufactured part may possess different properties. In industrial metal forming manufacturer, there are three (3) primary temperature ranges at which the metal can be formed; cold working, warm working and hot working. Based on the statement, outline **TWO (2)** disadvantages of hot working process. (2 marks)
- (b) Deformation processes can be conveniently classified into bulk-forming processes and sheet-forming processes. In both cases, the surfaces of the deforming material and the tools are usually in contact, and friction between them has a significant influence. Rolling, forging, extrusion and drawing are bulk forming processes. Based on these statements, compare the process of forging and extrusion in bulk deformation processing methods include the sketch of the process with proper label. (8 marks)
- (c) In engineering application, ceramics can be divided into two major groups which are traditional and advanced ceramics. Differentiate both traditional and advanced ceramics based on their definition, raw material, manufacturing process and application. (10 marks)

- Q5** (a) Based on your knowledge, define “green manufacturing”.
(4 marks)
- (b) Interpret **TWO (2)** challenges upon implementing the green industry policy.
(4 marks)
- (c) Draw a diagram of Pollution Prevention (P2). Correlate and explain how P2 could be an effective means of protecting our environment, eliminating costly waste and promoting sustainable development.
(7 marks)
- (d) Summarize how green innovation in the manufacturing industry can benefit to environmental conservation and sustainability.
(5 marks)

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- END OF QUESTIONS -

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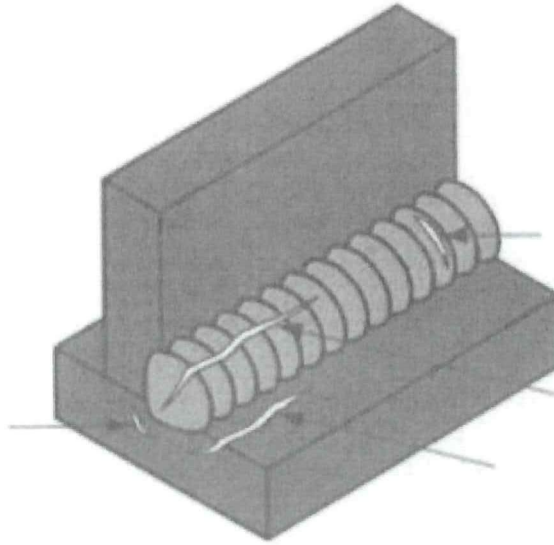


Figure Q3 (d) (i)

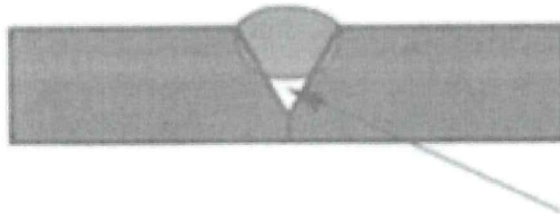


Figure Q3 (d) (ii)

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