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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

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

- COURSE NAME : MANUFACTURING PROCESSES
- COURSE CODE : BPC 22203
- PROGRAMME CODE : BPB
- EXAMINATION DATE : JULY 2024
- DURATION : 3 HOURS
- INSTRUCTIONS :
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 FIVE (5) PAGES

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TERBUKA

- Q1** (a) Discuss **TWO (2)** functions of shape rolling. (4 marks)
- (b) A 318 mm-wide strip 34 mm thick is fed through a rolling mill with two powered rolls with radius of 290 mm. The work thickness is to be reduced to 33.15 mm in one pass at a roll speed of 80 rev/min and average flow stress of 480 MPa.
- Calculate the roll force. (4 marks)
- (c) Engr. Syazwan works as a process engineer at Samson Ptd. Ltd., a company that manufactures large curved aluminium sheets as shown in **Figure Q1.1** for various industrial applications including aerospace, automotive and architectural projects.



Figure Q1.1: Large curved aluminium sheets.

Propose a suitable bending method that the company could apply in production with the aid of diagram.

(12 marks)

- Q2** (a) Explain the working principle of through hole and blind hole drilling. (4 marks)
- (b) Explain the following turning processes with the aid of diagram.
- (i) Taper turning (2 marks)
- (ii) Chamfering (2 marks)
- (iii) Boring (2 marks)
- (c) Loshini Ptd. Ltd. received an order to create precise internal pockets in an aluminum block for an aerospace jet engine component. The pockets are part of a complex assembly that requires high accuracy and strict adherence to industry standards.
- Propose a suitable material removal process to create these complex cavities while maintaining high accuracy and smooth surface finishes. (6 marks)
- (d) Differentiate **TWO (2)** functions of coolant and lubricant in the metal removal processes. (4 marks)
- Q3** (a) Differentiate **TWO (2)** functions of fuel-fired furnace and electric furnace. (4 marks)
- (b) Explain **TWO (2)** functions of carburising surface treatment. (4 marks)
- (c) A manufacturing plant needs to clean metal components that have accumulated oils and light oxides on the surface. These residues can affect the quality and performance of the components, leading to issues in subsequent manufacturing stages.
- Propose an effective cleaning treatment process to remove these contaminants. (10 marks)
- (d) Illustrate **ONE (1)** type of lay surface patterns with description. (2 marks)

Q4 (a) Compare **TWO (2)** function of fusion welding and solid-state welding. (4 marks)

(b) Explain the working mechanism of welding processes illustrated in **Figure Q4.1** and **Figure Q4.2**.

(i)

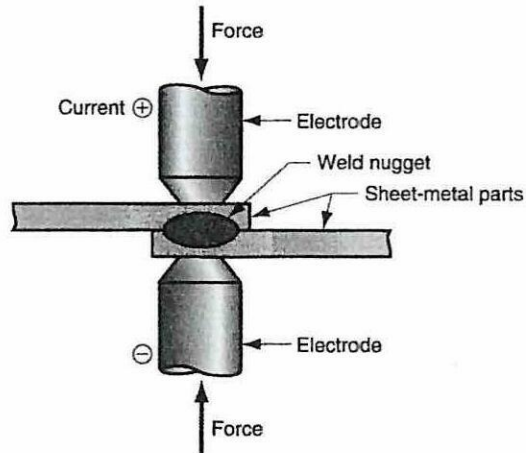


Figure Q4.1: Schematic diagram of resistance welding.

(3 marks)

(ii)

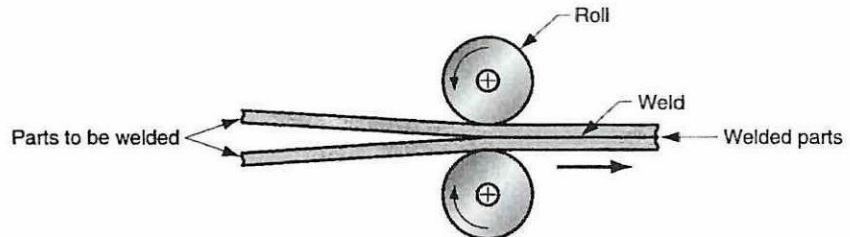


Figure Q4.2: Schematic diagram of roll welding.

(3 marks)

(c) Illustrate **TWO (2)** types of weld joints.

(6 marks)

(d) Discuss **TWO (2)** functions of flux in wave soldering process.

(4 marks)

- Q5** (a) Explain the working principle of material extrusion-based 3D printer with illustration. (6 marks)
- (b) Discuss the **TWO (2)** impacts of 3D printing technology in manufacturing industries. (4 marks)
- (c) A medical device company specializes in producing intricate metal parts for implant as shown in **Figure Q5.1**. The production process demands high precision, tight tolerances and the use of materials like stainless steel and titanium.



Figure Q5.1: Titanium hip replacement implants.

Propose a suitable advanced manufacturing process for fabricating these complex medical components with accuracy and efficiency.

(10 marks)

-END OF QUESTIONS -