



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

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

COURSE NAME : WELDING TECHNOLOGY  
COURSE CODE : BNM 30703  
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) Define the importance of welding. (5 marks)
- (b) A fusion welding defines as any welding process that uses fusion of the base metal to make the weld. Explain **FOUR (4)** essential factors for fusion welding and gives **ONE (1)** example of the factors (5 marks)
- (c) Solid State Welding (SSW) is a welding process, in which two work pieces are joined together under a constant pressure providing an intimate contact between them and at a temperature essentially below the melting point of the parent material.
- (i) List **FIVE (5)** advantages of Solid State Welding (SSW).
- (ii) For each of your answer in (i), explain their advantages for mechanical industries. (10 marks)
- Q2** (a) Define the welding metallurgy. (2 marks)
- (b) One advantage of applying heat treatment before welding is to improve mechanical properties of the metal. Pre-heating was one of the method in heat treatment use in welding process. Analyze **FOUR (4)** advantages of pre-heating. (8 marks)
- (c) Solidification cracking is the formation of shrinkage cracks during the solidification of weld metal. This phenomenon occurs in almost all metals and it should be avoided. Explain the methods to avoid the solidification cracking with the aid of sketches. (10 marks)
- Q3** (a) The **Figure Q3(a)** shows American Welding Society (AWS) welding symbol. Illustrate the as built diagram complete with measurement for the welding symbol shown. (4 marks)
- (b) The **Figure Q3(b)** shows British Standard EN 22553 as built diagram. Illustrate the welding symbol of the diagram shown. (4 marks)
- (c) Mr. Desmond owns a metal fabrication company. Currently, his company received an order of 30 units of steel shoe racks with the size of 1m (length) x 2m (width) x 2m (height) dimension. Before production, Mr. Desmond has to come out with a proper design for the product. Recommend suitable welding joints to be used for the steel shoe rack and support with the aid of sketches.

(12 marks)

- Q4** (a) Undercut as shown in **Figure Q4(a)** is a groove at the weld toe produced by the base material exiting weld. Discover **TWO (2)** factors of undercut in welding and make a suitable prevention plan to prevent undercut during the welding process. (10 marks)
- (b) Mr. John wants to set-up welding inspection company. For starter, he wants to focus on two types of Nondestructive Testing (NDT) techniques, which are the Dye Penetrant Inspection and Magnetic Particle Inspection. You are required to help Mr. John by differentiating both the NDT techniques. Your answer should include brief definition of each welding technique, both its advantages and disadvantages (10 marks)
- Q5** (a) Nowadays, many manufacturers, especially in automotive industries switch over to automated welding system. The systems promise quality improvement, higher productivity, subsequently increase in profit. Before being implemented into the production line,
- (i) Draw the automation decision network  
(ii) Evaluate the automated welding system (10 marks)
- (b) Computer simulation is important for a wide range of industries. In welding industries, simulations were used to produce accurate estimation on the capability to perform various challenges in welding process such as welding of thin sheets, new materials, high welding speeds and produce good weld quality. However, in developing computer simulation for welding process, a number of physical phenomena should be taken into consideration.
- (i) Draw the physical phenomena  
(ii) Analyze the physical phenomena. (10 marks)

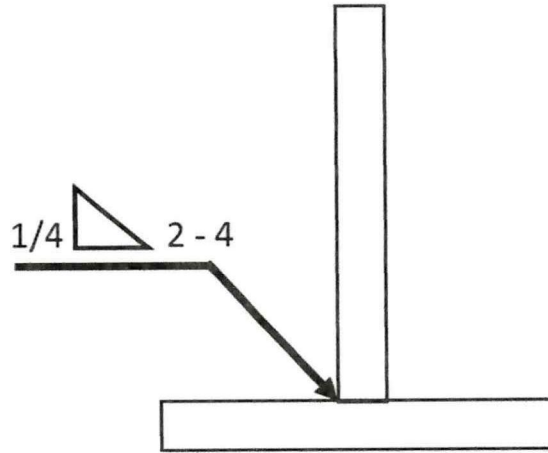
-END OF QUESTIONS -

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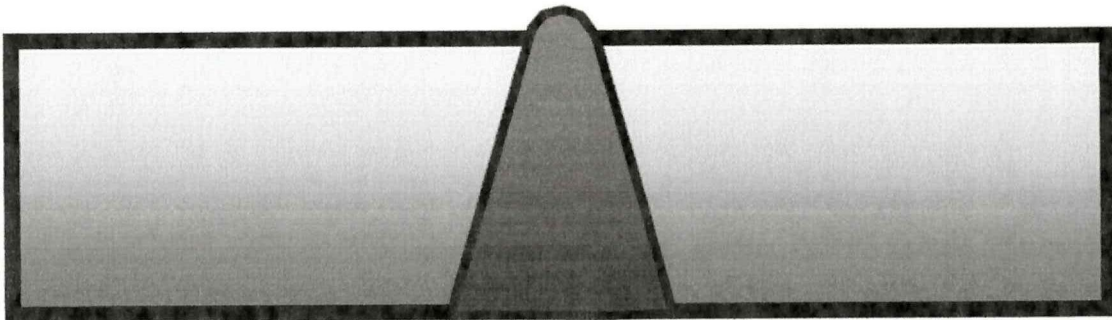
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Symbol

**Figure Q3(a)**



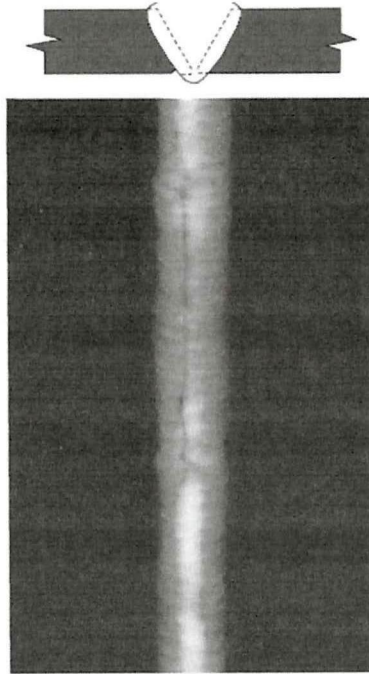
**Figure Q3(b)**

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**Figure Q4(a)**

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