

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESI 2012/13**

COURSE NAME : MANUFACTURING TECHNOLOGY
COURSE CODE : BDA 30502
PROGRAMME : 3 BDD
EXAMINATION DATE : JUNE 2013
DURATION : TWO HOURS
INSTRUCTION : ANSWER **FOUR (4)** FROM **FIVE (5)**
QUESTIONS

THIS QUESTION PAPER CONSIST OF FIVE (5) PAGES

- Q1** (a) Material removal processes are desirable and necessary in manufacturing operation. Discuss **THREE (3)** reasons why material removal processes are important.

(6 marks)

- (b) By the aid of sketch, define **TWO (2)** methods of milling process.

(4 marks)

- (c) In an orthogonal cutting operation, the cutting tool has a rake angle of 10° . The lathe is set so that the thickness before the cut is 0.6 mm. Meanwhile the measured chip thickness after the cut is 2.5 mm.

Calculate:

- (i) the chip thickness ratio.
(ii) the angle of the shear plane.

If the cutting tool with a rake angle of 13° is used in this cutting process, determine:

- (iii) the new chip thickness ratio value if the measured chip thickness is 1.8 mm.
(iv) the new angle of the shear plane.

By referring to all of above results, explain the relation of increasing the rake angle with the shear plane and thickness of chip in the orthogonal cutting operation.

(8 marks)

- (d) Four blind holes with a diameter of 10 mm and depth of 60 mm were produced on the drilling machine. The material removal rate during the operation is $23,500 \text{ mm}^3/\text{min}$. If the time for the drill to move from one hole to the other is neglected and the feed is 0.3 mm/rev, determine the appropriate

- (i) cutting speed for this drilling operation and
(ii) the total time to drill all the holes.

(7 marks)

- Q2**
- (a) State **FOUR (4)** factors that affect the metal forming process. (4 marks)
 - (b) Sketch and briefly explain **THREE (3)** types of die forging. (6 marks)
 - (c) In metal forming process, a 3 mm thickness of aluminum sheet metal is used to produce a round blank with a specific diameter hole. Outline in detail the procedure to have an appropriate punch and die size for the blank and hole. (7 marks)
 - (d) Discuss the differences between forward and backward extrusion assisted with figures. (4 marks)
 - (e) What is HERF? List out **THREE (3)** types of processes involved in HERF and the source of energy applied. (4 marks)
- Q3**
- (a) Define **THREE (3)** basic steps in the casting processes (6 marks)
 - (b) How to define whether cavities in a casting process are due to shrinkage or porosity? (8 marks)
 - (c) Figure Q3c shows the fan blade. As an engineer in the production department, you are requested to propose in details a production step to produce the product. You may provide a figure to support your answer. (11 marks)
- Q4**
- (a) Give **TWO (2)** reasons on how to define whether a part is made from a thermoplastic by providing **TWO (2)** types of thermoplastic polymer. (6 marks)
 - (b) Compare between extrusion and injection molding processes with the aid of figure. (8 marks)
 - (c) Figure Q4c shows a water bottle made from polymer material. As an engineer in the production department, you are required to propose the steps in producing the product with the aid of figure. (11 marks)

- Q5**
- (a) Define production steps involved in making the powder metallurgy parts?
(5 marks)
 - (b) Name and sketch **TWO (2)** basic types of joints in manufacturing?
(3 marks)
 - (c) Define **FIVE (5)** reasons why mechanical fastening is often preferred over other joining processes.
(5 marks)
 - (d) Define consumable and non consumable electrode in arc welding process. Figure Q5d shows the distortion of warping in the fusion welding and solid state welding processes. As an engineer in the production department, you are required to propose **SEVEN (7)** techniques for minimizing the distortion of warping in the welding processes.
(12 marks)

- END OF QUESTIONS -

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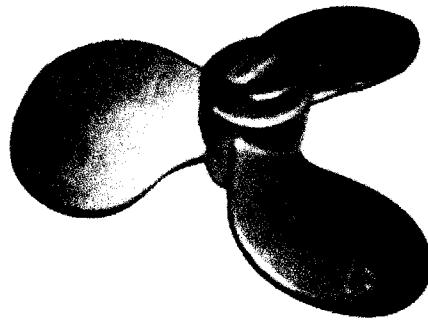


FIGURE Q3c



FIGURE Q4c

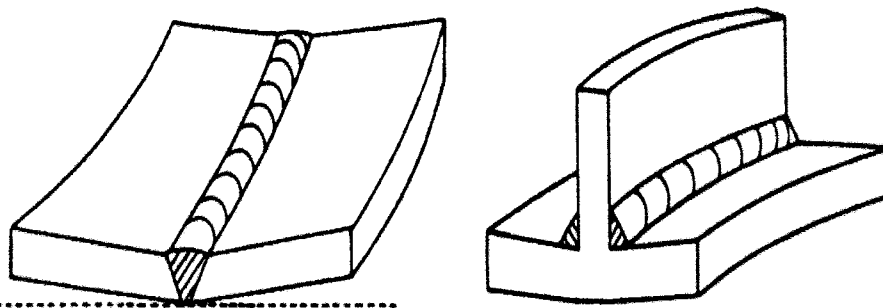


FIGURE Q5d