UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMAMINATION
SEMESTER I
SESI 2014/2015

COUSE NAME	:	MANUFACTURING PROCESS
COURSR CODE	:	DAM 32202
PROGRAMME	:	2 DAM
EXAMINATION DATE	:	DECEMBER 2014/JANUARY 2015
DURATION	:	2 HOURS 30 MINUTES
ARAHAN	:	A) ANSWER **FOUR (4)** QUESTIONS ONLY
		B) ANSWER **TWO (2)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

SECTION A

Q1   (a)   Explain **three (3)** types of production facilities that are recognized as the most appropriate for manufacturing.

(6 marks)

      (b)   Factors that determine the performance of a manufactured product, other than mechanical and physical properties, include dimension and tolerance. Explain it.

(2 marks)

      (c)   Give **five (5)** characteristics of Successful Product Development

(5 marks)

      (d)   Give **two (2)** types of assembly operation.

(2 marks)

Q2   (a)   Make a sketch of 3D orthogonal cutting operation and show the essential features such as t0, tc, width, tool, and chip.

(8 marks)

      (b)   Give **three (3)** basic type of chip in machining

(3 marks)

      (d)   Explain the main difference between Peripheral Milling and Face Milling with aid of figure

(4 marks)

Q3   (a)   What are the patterns used in a casting process?

(3 marks)

      (b)   Explain any of die casting process of your choice with figure

(5 marks)

      (c)   What are all the defects that are likely to occur in casting process? Explain four (4) of them.

(4 marks)

      (d)   Write the requirements which must be fulfilled by sand used for molding.

(3 marks)

Q4   (a)   Make a sketch of injection molding extruder machine and show the essential features on it.

(4 marks)

(b) Explain a plastic injection molding operation cycle

(3 marks)

(c) Explain briefly how ejector system, cooling system and air vent work

(4 marks)

(d) What is shrinkage in molding and how to overcome shrinkage from occur?

(4 marks)

Q5 (a) What are **three (3)** basics steps involved in the conventional powder metallurgy process?

(3 marks)

(b) What is green strength? Explain briefly why it is important to the manufacture of high-quality powder metallurgy products?

(4 marks)

(c) Why manufacturing is important economically? Name the four (4) elements needed in converting starting material to finished good.

(4 marks)

(d) What are **four (4)** subclasses of shaping processes? Provide an example process for each subclass.

(4 marks)

Q6 (a) Would you use thermosetting plastics for injection molding? Explain

(4 marks)

(b) What are some of the reasons why the plastic shaping processes are important?

(5 marks)

(c) Discuss **three (3)** of the defects that can occur in plastic injection molding.

(6 marks)

SECTION B (40 MARK)

S7   A slab milling operation is performed to finish the top surface of a steel rectangular   workpiece 14.0 in long by 3.0 in wide. The helical milling cutter, which has a 4.0 in   diameter and ten teeth, is set up to overhang the width of the part on both sides. The   cutting speed is 130 ft/min, the chip load is 0.006 in/tooth, and the depth of cut is 0.5   in. Determine:

    a. The time to make one pass across the surface,

    b. The maximum metal removal rate during the cut, and

    c. If there is a need to improve surface finish of the machined part, what would you recommend?

(20 marks)

S8   Two tests were conducted to determine the relationship between cutting speed and tool life. In the first test, a cutting speed of 300 m/min results a tool life of 25 minutes. In the second test, a cutting speed, a cutting speed of 200 m/min which results a tool life 65 minutes. Using Taylor's equation, determine the constant.

(5 marks)

Two tool materials are described by the given tool life equations. Using the equations given below, calculate the corresponding cutting speeds for a recommended tool life for 45 minutes.

(5 marks)

Tool life tests in turning yield the following data: (1) $v = 100$ m/min, $T = 10$ min; (2) $v = 75$ m/min, $T = 30$ min.

    (i) Determine the n and C values in the Taylor tool life equation.

    (ii) Based on your equation, compute the tool life for a speed of 90 m/min.

    (iii) Based on your equation, compute the speed corresponding to a tool life of 20 min

(10 marks)

4

S9 The total solidification times of three casting shapes are to be compared: (1) a sphere, (2) a cylinder, in which the length-to-diameter ratio = 1.0, and (3) a cube. For all three geometries, the volume =1000 cm3. The same casting alloy is used in the three cases.

   a. Determine the relative solidification times for each geometry.
   (4 marks)

   b. Based on the results of part (a), which geometric element would make the best riser?
   (8 marks)

   c. If the mold constant=3.5min/cm2 in Chvorinov's rule, compute the total solidification time for each casting
   (8 marks)

S10 (a) The cutting force and thrust force in an orthogonal cutting operation are 1470 N and 1589 N, respectively. The rake angle = 5°, the width of the cut = 5.0 mm, the chip thickness before the cut =0.6, and the chip thickness ratio = 0.38. Determine :

   (i) the shear strength of the work material and
   (ii) the coefficient of friction in the operation.

   (10 marks)

   (b) An orthogonal cutting operation is performed using a rake angle of 15°, chip thickness before the cut = 0.012 in and width of cut = 0.100 in. The chip thickness ratio is measured after the cut to be0.55. Determine :

   (i) the chip thickness after the cut,
   (ii) shear angle,
   (iii)friction angle,
   (iv)coefficient of friction, and
   (v) shear strain.

   (10 marks)

-END OF QUESTION-