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**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2016/2017**

COURSE NAME : MANUFACTURING PROCESS  
COURSE CODE : DAM 32202  
PROGRAMME CODE : DAM  
EXAMINATION DATE : DECEMBER 2016 / JANUARY 2017  
DURATION : 2 HOURS AND 30 MINUTES  
INSTRUCTION : ANSWERS **FOUR (4)** QUESTIONS  
IN SECTION A AND **TWO (2)**  
QUESTION IN SECTION B

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THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

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**CONFIDENTIAL****SECTION A**

- Q1** (a) How do you classify the manufacturing process. (2 Marks)
- (b) Explain **three (3)** types of production facilities that are recognized as the most appropriate for manufacturing. (6 Marks)
- (c) List **five (5)** characteristics of Successful Product Development (5 Marks)
- (d) What do you understand by the term "Plant Layout" (2 Marks)
- Q2** (a) Name **three (3)** operation which can be performed by lathe with neat sketch. (6 Marks)
- (b) List **three (3)** basic type of chip in machining (3 Marks)
- (c) Make a sketch of 3D orthogonal cutting operation and show the essential features such as  $t_0$ ,  $t_c$ , width, tool and chip. (6 Marks)
- Q3** (a) What are ladles and crucibles? How do they differ from each other. (4 Marks)
- (b) Using the neat sketch, describe procedural step to be followed in making investment casting (8 Marks)
- (c) What are all the defects that are likely to occur in casting process? Explain **three (3)** of them. (3 Marks)

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- Q4** (a) Make a sketch of injection molding extruder machine and showed 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 in injection molding system (4 Marks)
- (d) What is shrinkage in molding and how to overcome shrinkage from occur? (4 Marks)
- Q5** (a) Explain powder metallurgy technology and the production sequence in producing the powder metallurgy product. Explain why the final process is required in the sequence. (4 Marks)
- (b) The same product can be either produced using casting or powder metallurgy. List **three (3)** advantages of powder metallurgy compared with casting. (3 Marks)
- (c) Indicate either the following shape in **Figure Q5 (c)** can be produced using powder metallurgy. If the product can be produced, explain the pressing pressure. If the product cannot be product, explain the reason. (8 Marks)

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- Q6** (a) A plastic material maker can either choose to produce thermosetting polymer or thermoplastic polymer. Define both thermosetting and thermoplastic material.  
Explain the advantage of thermosetting polymer over thermoplastic material and vice versa. Provide the example product of each of the polymer.  
(6 Marks)
- (b) The important properties of polymer are viscosity and viscoelasticity. Define both viscosity and viscoelasticity. Provide two (2) methods in which a plastic operator can take advantage using the viscosity property.  
(4 Marks)
- (c) A hot runner mould is widely used to produce large size product compare to two plate and three plate mould
- (i) Explain why it is widely used in producing large size product.
  - (ii) Explain why it is not used in producing small size product.
- (5 Marks)

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**CONFIDENTIAL****SECTION B (40 MARK)**

S7 (a) The shaft shown in the **figure Q7 (a)** is to be machined on a lathe from a  $\emptyset$  25mm bar. Calculate the machining time if speed  $V$  is 60 m/min., turning feed is 0.2 mm/rev, drilling feed is 0.08 mm/rev and knurling feed is 0.3 mm/rev.

(10 Marks)

(b) The part shown in **Figure Q7 (b)** will be turned in two machining steps. In the first step a length of  $(50 + 50) = 100$  mm will be reduced from  $\emptyset$ 100 mm to  $\emptyset$ 80 mm and in the second step a length of 50 mm will be reduced from  $\emptyset$ 80 mm to  $\emptyset$ 60 mm. Calculate the required total machining time  $T$  with the following cutting conditions:

Cutting speed  $V=80$  m/min, Feed is  $f=0.8$  mm/rev, Depth of cut = 3 mm per pass.

(10 Marks)

S8 A single point cutting tool having a rake angle of  $12^\circ$  degree was preferred to machine a shaft having diameter of 50 mm and depth of cut was 1.5 mm. The work piece was rotating at 1200 rpm. The machining produced continuous chips having thickness of 1.8 mm. The forces were measured by dynamometer. The cutting/horizontal force was 450 N and the thrust/vertical force was 325 N. Calculate the following:

- (i) Chip thickness ratio,
- (ii) The shear angle,
- (iii) Resultant force,
- (iv) Coefficient of friction,
- (v) Shear strength of the work material, and
- (vi) If the lathe has a mechanical efficiency = 90%, how much horsepower suppose the drive motor required?

(20 Marks)

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**S9** A slab milling operation is performed to finish the top surface of a steel rectangular workpiece 19.0 in long by 1.5 in wide. The helical milling cutter, which has a 2 in diameter and 5 teeth, is set up to overhang the width of the part on both sides. The cutting speed is 350 ft/min, the feed,  $f$  is 0.010 in/tooth, Determine:

- (i) Rotational speed,  $N$
- (ii) Feed rate,
- (iii) Time to machine
- (iv) Material removal rate (MRR)

(20 Marks)

**S10 (a)** A 50 mm diameter gray cast iron work piece is rough turned with uncoated carbide tool. The feed for the tool is 0.4 mm per revolution (mm/rev), the depth of cut is 4 mm and the recommended cutting speed is 70 m/min. Calculate ;

- (i) The material removal rate and
- (ii) Power and torque required by spindle

(15 Marks)

(b) Calculate the machining time in question 10(a) if the axial length of OD cut is 150 mm.

(5 Marks)

**-END OF QUESTION-**

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PEPERIKSAAN AKHIR

SEMESTER/SESI: SEM I / 2016/2017  
NAMA KURSUS : MANUFACTURING PROCESS

PROGRAM : 3 DAM  
KOD KURSUS: DAM 32202

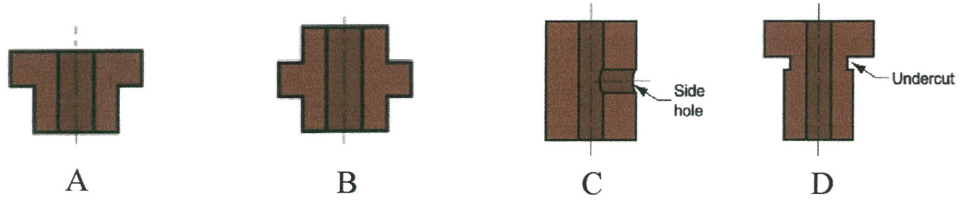


Figure Q5(c)

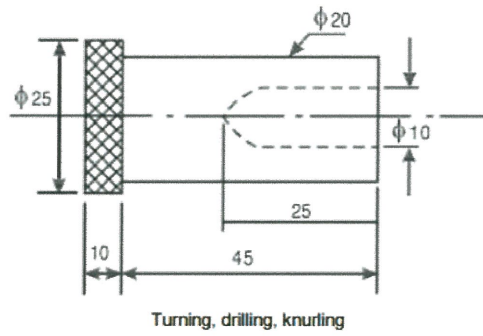


Figure Q7(a)

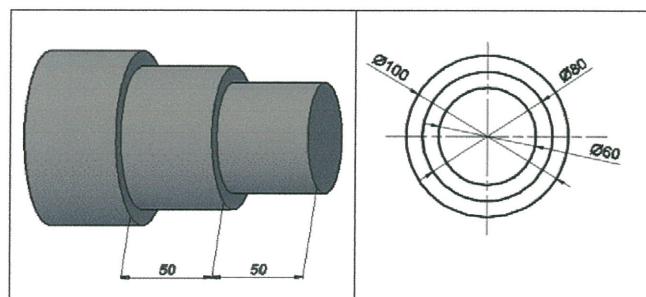


Figure Q7 (b)

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