

The Open University of Sri Lanka  
Faculty of Engineering Technology  
Department of Mechanical Engineering



00118

Study Programme	:	Bachelor of Technology Honors in Engineering
Name of the Examination	:	Final Examination
<b>Course Code and Title</b>	:	<b>DMX3206 Introduction to Manufacturing Processes</b>
Academic Year	:	2020/21
Date	:	08 <sup>th</sup> February 2022
Time	:	0930 hours -1230 hours
Duration	:	<b>3 hours</b>

### General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Eight (08)** questions in **Three (03)** pages.
3. Answer any **Five (05)** questions.
4. Answer for each question should commence from a new page.
5. This is a Closed Book Test (**CBT**).
6. Answers should be in clear handwriting.
7. Do not use Red colour pen.

### Question 01

- (a) i) Explain why the understanding of manufacturing processes is essential for better products? *(04 marks)*  
ii) Why is it necessary for all engineers to be familiar with manufacturing processes? *(03 marks)*  
iii) What are the broad classifications of the manufacturing processes? *(03 marks)*
- (b) i) Differentiate between steel and cast iron with reference to their carbon percentage, tensile strength, hardness and toughness. *(04 marks)*  
ii) Why cast iron is used in machine foundations? *(02 marks)*
- (c) i) There are two important ores of iron: haemetite ( $\text{Fe}_2\text{O}_3$ ) and magnetite ( $\text{Fe}_3\text{O}_4$ ). Which contains more iron? *(02 marks)*  
ii) How does silicon affect cast iron? *(02 marks)*

## Question 02

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- (a) State how the properties of alloy steels are affected by following alloying elements: Manganese, chromium and tungsten. (06 marks)
- (b) Distinguish between the following:
- Quenching and tempering
  - Normalizing and annealing
- (04 marks)
- (c) i) Why low carbon steels do not respond to hardening by quenching process? (04 marks)  
ii) Explain why tempering follows the quenching process in the heat treatment of steels. (06 marks)

## Question 03

- (a) i) Why is welding extensively used? (02 marks)  
ii) What is the purpose of using a filler metal? (02 marks)
- (b) i) What are the kinds of joints that are normally employed for welding purposes? Give their sketches. (05 marks)  
ii) Discuss the need for edge preparation in welding. (05 marks)
- (c) What are the three flames used in gas welding? Which one is most preferred and why? (06 marks)

## Question 04

- (a) i) What is flux? Why is it essential to use it in some welding situations? (04 marks)  
ii) What are the defects that are generally found in welding? (03 marks)
- (b) 'Two plates were welded together and then the strength of the joint was tested. It was found that the weld was stronger than either of the plate'. Do you think that the above statement is incorrect? Comment, giving valid reasons. (05 marks)
- (c) i) What is the necessity and importance of metrology? (03 marks)  
ii) Distinguish between the destructive tests and nondestructive tests. (05 marks)

## Question 05

- (a) i) How do you classify the various machine tools based on the motions used for generating the surfaces? Explain with the help of suitable block diagram. (05 marks)  
ii) What are the advantages and disadvantages of ceramics as cutting tool materials? (03 marks)  
iii) Give the significance of various tool angles with a neat sketch. (02 marks)
- (b) While turning a taper using taper turning attachment, the setting was done for  $4^\circ$ , but the tool is set 3 mm below the centre. If the work piece diameter at the small end is 40 mm, calculate the actual taper produced. (05 marks)
- (c) What type of work holding devices are generally used in lathe machines? Give the typical applications, advantages and disadvantages for each type of work holding device. (05 marks)

### Question 06

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- (a) i) What are the applications of shaping machines in a typical machine shop? (02 marks)  
ii) Explain the following principal parts of a mechanical shaper.  
  - Ram
  - Tool post
  - Quick return motion (06 marks)
- (b) i) What is the difference between drilling and milling operations? (03 marks)  
ii) How does non-traditional machining differ from conventional machining? (03 marks)
- (c) The index plate used on Cincinnati and Parkinson milling head is of large diameter than the Brown and Sharpe plates and is reversible. It is provided with the following hole circles.  
On one side : 24,25,28,30,34,37,38,39,41,42, and 43 holes.  
On the reverse side : 46,47,49,51,53,54,57,58,59,62 and 66 holes.  
How do you index the following angles on a Cincinnati head?  
(i)  $18^\circ$  (ii)  $280^\circ 30'$  (iii)  $340^\circ$  (06 marks)

### Question 07

- (a) i) List the main advantages of the casting process. (03 marks)  
ii) State the typical applications of casting process as used in automobile sector. (03 marks)
- (b) Briefly explain following items used in casting with neat sketches. (06 marks)  
  - Sprue
  - Gate
  - Runner
- (c) i) Briefly discuss why draft allowance is important for patterns. (04 marks)  
ii) What is meant by core prints? Explain how they are to be provided. (04 marks)

### Question 08

- (a) i) What are the advantages of hot working over cold working of metals? (03 marks)  
ii) State the significance of recrystallisation temperature in metal working. (03 marks)
- (b) i) How are sheet metal working operations differ from bulk deformation processes? (03 marks)  
ii) Why is crankshaft usually made by forging rather than casting? (04 marks)
- (c) i) List various operations generally performed in a sheet metal shop. (03 marks)  
ii) Distinguish between spinning and cup drawing with reference to the processes and components produced. (04 marks)

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