00094

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

Study Programme	:	Bachelor of Technology Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**DMX3206 Introduction to Manufacturing Processes**
Academic Year	:	2019/20
Date	:	13rd August 2020
Time	:	0930 hours -1230 hours
Duration	:	**3 hours**

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **eight (08) questions and four (04) pages.**
3. **Answer any 05 questions only.** All questions carry equal marks.
4. Answer for each question should commence from a new page
5. Relevant charts/ equations are provided.
6. This is a Closed Book Test (CBT).
7. Answers should be in clear handwriting.
8. Do not use Red colour pen.

Question 01

(a) i) Define the term manufacturing and explain its importance in your own wards. *(02 marks)*
ii) What are the future trends in manufacturing? *(02 marks)*

(b) i) Distinguish each cast iron, steel and wrought iron from one another *(03 marks)*
ii) Briefly explain the processes normally used to convert iron ore into the above three types of metals. *(06 marks)*

(c) What are the main purposes of refining the molten metal? *(03 marks)*

(d) i) What is Metrology? *(02 marks)*
ii) State the advantages and disadvantages of destructive test than nondestructive test. *(02 marks)*

Question 02

(a) Discuss the effects of the following alloying elements when added to plain carbon steel.
- Chromium
- Nickel
- Titanium *(06 marks)*

(b) i) What is the difference between Annealing and Quenching? *(02 marks)*
ii) Explain the purpose of the age hardening or precipitation hardening operations. *(02 marks)*

(c) i) What are the functions of Nickel and Chromium in stainless steels? *(02 marks)*
ii) Explain why metal components are zinc coated or galvanized? *(03 marks)*

(d) i) What are the types of coating processes for applying thermal spray metals? *(02 marks)*
ii) Differentiate the physical vapor deposition and chemical vapor deposition processes. *(03 marks)*

Question 03

(a) The melting temperatures of common engineering metals and alloys are in the range 1200°C – 1800°C. Why is it necessary to use a high temperature of the order 3100°C or 3500°C for fusion welding? *(03 marks)*

(b) i) Briefly explain characteristic and uses of three Oxy acetylene welding flame types. *(03 marks)*
ii) Distinguish between low pressure and high-pressure Oxy acetylene welding. *(03 marks)*

(c) '*You may have come across the welding rods (electrodes), used in electric arc welding*'.
i) How is electric arc welding electrode classified? *(02 marks)*
ii)What is the function of this coating material in the electrode? *(02 marks)*

(d) i) State the fundamental difference between fusion welding and pressure welding? *(03 marks)*
ii) Write short notes in followings welding techniques.
- MIG/MAG Welding
- TIG Welding *(04 marks)*

Question 04

(a) i) What are the types of general defects in welding? *(02 marks)*
ii) Briefly describe three defects in welding. *(04 marks)*

(b) i) Explain the soldering and brazing process. *(03 marks)*
ii) What are the requirements of brazing joints? *(02 marks)*

(c) i) Why a flux is necessary in the soldering process? *(02 marks)*
ii) Name two types of fluxes commonly used in soldering. *(02 marks)*

(d) i) Explain the sequence for the adhesive application. *(03 marks)*
ii) What is the technical difference between a screw and a bolt? *(02 marks)*

Question 05

(a) i) Why metal removal process is costly? *(02 marks)*
ii) What are the types of cutting tool materials? *(02 marks)*
iii) State the important properties of cutting tool materials. *(02 marks)*

(b) A mild steel rod having 50mm diameter and 500mm length is to be turned on a lathe. Determine the machining time to reduce the rod to 45mm diameter in one pass when cutting speed is 30m/min and a feed rate of 0.7mm/rev is used. *(04 marks)*

(c) Briefly explain the following operations performed in a lathe machine with neat sketch.

- Turning
- Thread cutting
- Knurling *(06 marks)*

(d) i) State the advantages of Turret Lathe Machine over the Center Lathe Machine. *(02 marks)*
ii) What are the differences between shaper machine and planner machine? *(02 marks)*

Question 06

(a) i) What are the operations performed on a milling machine? *(02 marks)*
ii) Explain different types of drilling operations with their specific features. *(04 marks)*

(b) i) What is meant by dressing of grinding wheel? *(02 marks)*
ii) List the advantages and disadvantages of CNC machining systems. *(02 marks)*

(c) Brown and Sharpe milling head is provided with the following index plates.
Plate No. 1: 15, 16, 17, 18, 19 and 20 holes
Plate No. 2: 21, 23, 27, 29, 31 and 33 holes
Plate No. 3: 37, 39, 41, 43, 47 and 49 holes
How do you index the following divisions on a Brown and Sharpe head? *(06 marks)*
(i) 16 (ii) 24 (iii) 38 (iv) 62

(d) i) What is the approximate size scale in microsystem technology? *(02 marks)*
ii) Why is silicon a desirable work material in microsystem technology? *(02 marks)*

Question 07

(a) i) What is "Sand Casting"? *(02 marks)*
ii) Write down the procedure followed, when making a casting. *(02 marks)*

(b) Briefly explain following items used in casting with neat sketches. *(06 marks)*

- Pattern
- Mould
- Core

(c) i) Identify the origin of plastic materials to prepare plastic moulding. *(01 marks)*
ii) What are the types of plastic moulds? Explain two of them. *(03 marks)*

(d) i) Name reasons for the commercial importance of powder metallurgy technology. *(02 marks)*
ii) Briefly describe the production steps involved in making powder-metallurgy parts. *(04 marks)*

Question 08

(a) i) Is it the elastic region or the plastic region which is more significant in the process of metal forming? *(02 marks)*

ii) Why brittle material is not suitable for metal forming? *(02 marks)*

(b) i) What are the advantages of forging over the other manufacturing processes such as machining and casting? *(02 marks)*

ii) Explain in brief the hot and cold working process. *(02 marks)*

(c) i) List out sheet metal cutting and forming operations. *(02 marks)*

ii) Briefly explain two operations listed in (i) (one from each) *(04 marks)*

(d) A wire with circular section of 6mm diameter is bent round to form a U-shaped clip in the middle. Bending circle of the U is 38 mm diameter. The bend radius near the flange is 3 mm inside. The clip is shown by the Figure Q08(d). (dimensions in mm)

Find the length of the wire needed to do this bending. *(06 marks)*

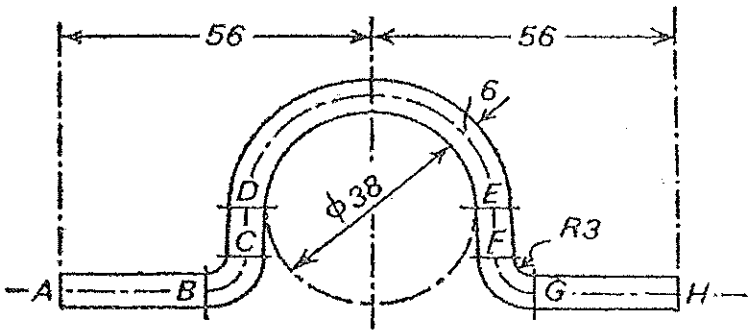

Figure Q08(d)