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	:	**DMX3533/ MEX3233 Workshop Technology**
Academic Year	:	2019/20
Date	:	03rd October 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 three (03) 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 – *(20 marks)*

(a) Explain the principle behind the modern hardness tests?

(b) Name three common hardness tests.

(c) Among the tests named above in part (b), explain the test in which two loads called major and minor loads are applied.

(d) Explain importance of following testing methods with neat sketches.

i. Tensile test
ii. Impact test

Question 02 – *(20 marks)*

(a) What are the processes available for manufacturing of steel?

(b) Explain the process of steel making in an electric arc furnace with the help of a sketch.

(c) What is the purpose of refining molten metal?

(d) What are the major uses of copper? Explain about the alloying elements in brass and bronze, respectively.

Question 03 – *(20 marks)*

(a) What is a "Phase Diagram"?

(b) Sketch a simplified form of Iron-Carbon equilibrium diagram and mark the important points and areas.

(c) What is the difference between an Eutectic reaction and a Peritectic reaction?

(d) What are the changes of physical and mechanical properties of steel when Nickel and Chromium are alloyed with steel? Give a common application of the alloy of Nickel-Chromium steel and state why this alloy is mostly used in this application.

Question 04 – *(20 marks)*

(a) Define the following terms used in casting

i) Blow hole ii) Drag iii) Gate

(b) Write down the procedure followed, when making a casting.

(c) What are the factors that you have to consider in designing the pattern?

(d) "Pouring temperature is very important factor in casting process" verify above statement clearly.

Question 05 – *(20 marks)*

(a) Explain the Friction Welding process.

(b) Explain the gas cutting process.

(c) What are the differences between the oxy-acetylene cutting torch and oxy-acetylene welding torch?

(d) Write short notes of followings.

- Submerged arc welding
- MIG welding

Question 06 – *(20 marks)*

(a) What factors needed to be taken into account when selecting the amount of current for a welding operation?

(b) Explain the significance of arc length in relation to weld performance in Electric Arc Welding.

(c) Explain three types of general defects in welding

(d) i) Distinguish between soft soldering and brazing.

ii) What is the purpose of a flux used in soft soldering?

Question 07 – *(20 marks)*

(a) Name the cutting tool profiles that are used in the centre lathe.

(b) Describe the function of the chasing dial used in thread cutting in the centre lathe.

(c) Calculate the time taken to turn a brass component of 49 mm in diameter by 70 mm in length if the cutting speed is 44 m/min and the feed rate is 0.5 mm/revolution. Only one cut is taken (take π as $22/7$).

(d) i) What do you mean by dressing in related to grinding wheels?

ii) What are the important of having nontraditional material removal processes?

Question 08 – *(20 marks)*

(a) What are the surfaces that can be generated on a shaping machine?

(b) Calculate the number of cycles (double strokes) per minute for shaping cast iron at a cutting speed of 25 m/min, if the stroke length is 250 mm.

(c) The 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?

i) 20 ii) 38 iii) 46 iv) 66

(d) i) Indicate some of the advantages of cold working relative to warm and hot working.

ii) What is the difference between deep drawing and bar drawing?