The Open University of Sri Lanka
Faculty of Engineering Technology

00093

Study Programme	:	Diploma in Technology/Bachelor of Technology (Engineering)
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX3233Workshop Technology**
Academic Year	:	2014/15
Date	:	08th September 2015
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 08 questions. All questions carry equal marks.
3. Answer any 05 questions only.

Question 01

(a) i) What is the essential difference between steel and wrought iron?
ii) How is wrought iron produced?
iii) Why is it expensive? *(05 marks)*

(b) Define the following as related to engineering materials and explain the methods of their measurement.
(i) Toughness (ii) Strength *(06 marks)*

(c) i) Why are alloying elements added to steel?
ii) Identify four alloying elements added to steel and explain their effects on the properties of steel. *(05 marks)*

(d) Define the following abbreviations and explain their applications with respect plastic materials.
- PMMA
- HDPE *(04 marks)*

Question 02

(a) What are the three common types of ductile failure? Explain them briefly. *(06 marks)*

(b) i) What is a "Phase Diagram"?
ii) Sketch a simplified form of the Iron-Carbon equilibrium diagram and mark the important points and regions. *(07 marks)*

(c) State why metals are heat treated. Identify the four important heat treatment methods. *(04 marks)*

(d) What is work hardening? *(03 marks)*

Question 03

(a) Explain the manual electric arc welding process with the aid of sketches and give its common applications. *(04 marks)*

(b) Under what circumstances would brazing or soldering be preferred over welding? *(04 marks)*

(c) i) Explain the functions of flux in welding.
ii) Identify common welding defects. *(06 marks)*

(d) Write short notes on the followings with respect to oxy acetylene welding:

- Rightward welding
- Leftward welding.
- Linde welding. *(06marks)*

Question 04

(a) Describe the process of submerged arc welding, stating its main advantages and limitations. *(04 marks)*

(b) Briefly explain the following welding processes.

- Spot welding
- Seam welding *(06 marks)*

(c) Describe oxy-acetylene cutting. *(04 marks)*

(d) Explain the following processes clearly distinguishing the main differences among them.

- Welding
- Soldering
- Adhesive bonding *(06marks)*

Question 05

(a) Briefly explain the metal casting process including its capabilities, limitations and the materials used. *(04 marks)*

(b) Briefly describe the following terms used in metal casting with the aid of sketches.

- Core
- Core prints
- Moulding box
- Gating system *(06 marks)*

(c) Identify the types of pattern allowances in mould making and explain the purpose of two such allowances. *(06 marks)*

(d) i) What are the general defects commonly encountered in casting processes?
ii) Briefly describe one of them. *(04 marks)*

Question 06

(a) i) What are the primary requirements for producing a good die casting?

ii) Explain the meaning of the term "investment" with respect to investment casting. *(05 marks)*

(b) What is the most convenient and effective method of carrying out the intended task by using following machines?

- Lathe machine
- Drilling machine
- Milling machine
- Shaping machine *(05 marks)*

(c) What are the materials that are mostly used for lathe cutting tools? *(02 marks)*

(d) 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?

- 20
- 38
- 46
- 66 *(08 marks)*

Question 07

(a) In a production turning operation, the foreman has directed the machinist that a single pass must be completed on a cylindrical workpiece in 5.0 min using a feed of 0.30 mm/rev. The piece is 400 mm long and 150 mm in diameter.

What cutting speed must be used to meet this machining time requirement? *(04 marks)*

(b) i) Calculate the traverse rate for a shaping machine equipped with a 6 mm lead traverse screw and a 40 teeth ratchet wheel, when set to an increment of two teeth per double stroke.

ii) What is the function of flutes on a twist drill bit? *(06 marks)*

(c) Why are the nontraditional material removal processes important? *(04 marks)*

(d) What is the importance of cutting tools in CNC operations? Identify four types of cutting tool materials in CNC operations. *(06 marks)*

Question 08

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(a) Write short notes on the following.

- EDM
- Ultrasonic Machine *(06 marks)*

(b) What are the main differences among the positive mould, semi-positive mould and open flash mould? *(04 marks)*

(b) i) Identify the hand tools used in hot forging and explain their use.

ii) Write down the steps of operations required when drawing down a round bar. *(06 marks)*

(d) Hot metal spray method is largely used in maintenance applications. Explain this process with a suitable example. *(04 marks)*

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