The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Diploma in Technology/Bachelor of Technology (Engineering)
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX3233 Workshop Technology**
Academic Year	:	2012/13
Date	:	13rd August 2013
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 8 questions. All questions carry equal marks.
3. Answer any 5 questions only.

Question 1

(a) What is a "Phase Diagram"? (06 marks)

(b) Sketch a simplified form of Iron-Carbon equilibrium phase diagram and mark the important points and areas. (08 marks)

(c) What is an alloy? Discuss the effects of each of the following alloying elements when added to plain carbon steel.

(i) Nickel (ii) Chromium (iii) Manganese (06 marks)

Question 2

(a) Give two reasons and explain why steel produced by the electric arc process is more refined but expensive? (06 marks)

(b) Explain and contrast the important temperatures represented on the 100% iron line in the iron carbon phase diagram. (04 marks)

(c) Why are metals heat treated? Identify the important reasons for annealing metals. (06 marks)

(d) What is work hardening? (04 marks)

Question 3

(a) What are the main functions of a blowpipe in the gas welding process? (04 marks)

(b) Briefly explain the following welding processes.

(i) Friction welding (ii) Forge welding (06 marks)

(c) Identify some of the important welding defects, explaining them briefly. (04 marks)

(d) What are the three basic categories of inspection and testing techniques used for welding? Identify some typical inspections and/or tests employed under each category. (06 marks)

Question 4

(a) What are the functions of flux (coating material) in arc welding process? (05 marks)

(b) What are the advantages of using submerged arc welding over other welding methods? (05 marks)

(c) "Pouring temperature is a very important factor in casting process" verify above statement clearly. (05 marks)

(d) Compare and contrast the differences between soldering and brazing. (05 marks)

Question 5

(a) What properties determine the quality of a sand mold for sand casting? (05 marks)

(b) What are the possible ways to keep a core inside a mould so that a hole or recess is made in casting? (05 marks)

(c) Briefly state the functions of a die casting machine. (05 marks)

(d) List some of the general defects encountered in casting processes? Name and briefly describe three. (05 marks)

Question 6

(a) A cylindrical workpiece 200 mm in diameter and 700 mm long is to be turned in an engine lathe. Cutting speed = 2.30 m/s, feed = 0.32 mm/rev.

Determine, (a) the speed of the spindle,

(b) Cutting time. (06 marks)

(b) Identify three desirable properties of a cutting-tool material. (06 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?

(i) 19 (ii) 26 (iii) 33 (iv) 56 (08 marks)

Question 7

(a) With suitable sketches explain the following drilling machine operations

(i) Counter sinking
(ii) Counter boring
(iii) Spot facing
(iv) Trepanning (06 marks)

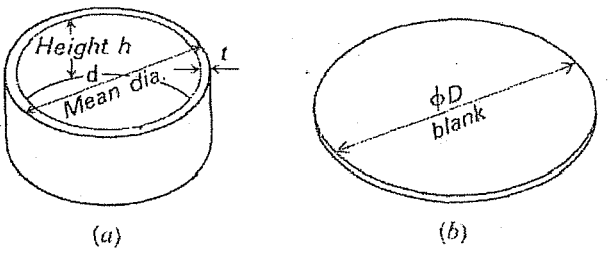
(b) What are the important angles of a single point cutting tool? Use sketches to explain your answer. (04 marks)

(c) In what sense the slotting operation is different from the planning operation. (05 marks)

(d) Name two non-traditional machining processes. Explain one of them briefly. (05 marks)

Question 8

(a) Using the following figure, find an expression for diameter D of the blank in part (b) to produce the item shown in part (a) in terms of the given variables. If d=75mm and h=25mm, find the value of diameter (D).



Blank drawn to form a cup

(07 marks)

(b) What is the best metal forming operation that can be employed to draw a regular cup? Sketch and explain the function of the press used for this operation. (07 marks)

(c) Explain the importance of hot forging. Is it suitable as a production method? (06 marks)

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