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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	:	2013/14
Date	:	26th August 2014
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) State the difference between steel and cast iron, with respect to their compositions. *(05 marks)*

(b) Define the following as related to engineering materials and explain the methods of their measurement.

(i) Hardness (ii) Ductility *(06 marks)*

(c) Sketch and explain the behavior of mild steel when it is subjected to a tensile load. *(05 marks)*

(d) State the reason why white cast iron is more brittle than grey cast iron. *(04 marks)*

Question 02

(a) What are the main advantages and disadvantages of welding compared to other types of fastening methods ? *(05 marks)*

(b) Sketch and briefly explain the various types of equipment used in gas welding. *(04 marks)*

(c) What are the types of welding flames used in gas welding?
Explain their usages. *(06 marks)*

(d) What are the differences between oxy-acetylene cutting and oxy-acetylene welding with respect to their torch and nozzle? *(05 marks)*

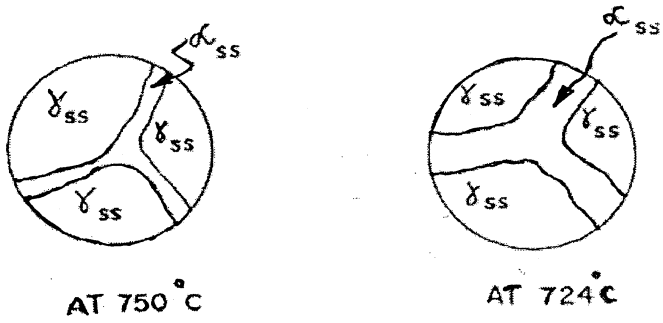
Question 03

(a) Briefly describe the action of coke and limestone during the smelting of iron in a blast furnace. *(04 marks)*

(b) Explain the importance of iron carbon diagram in engineering applications.

Make a neat sketch of the complete iron carbon diagram for carbon steel and identify each and every point and region of this diagram. *(08 marks)*

(c) The microstructures of hypoeutectoid steel on cooling under equilibrium conditions at two different temperatures are as shown in the figure below.



Explain why the α_{ss} region is larger at 724 °C than at 750 °C. *(03marks)*

(d) Briefly explain the processes and applications of the following.
(i) Case hardening (ii) Annealing *(05 marks)*

Question 04

(a) What factors do you generally consider in ascertaining the amount of current for arc welding operation? *(04 marks)*

(b) Briefly explain the following welding processes.
(i) MIG welding (ii) TIG welding *(06 marks)*

(c) Describe the functions of a flux during soldering operation. *(05 marks)*

(d) What are the advantages of brazing over other joining methods? *(05 marks)*

Question 05

(a) List the main advantages of the casting process over other manufacturing processes. *(04 marks)*

(b) Briefly describe the following terms used in metal casting.

(i) Sprue (ii) Gate (iii) Runner (iv) Riser *(08 marks)*

(c) What are the materials that are commonly used for preparation of mould patterns? *(03 marks)*

(d) What is meant by core prints? Explain how they are to be provided. *(05 marks)*

Question 06

(a) Give advantages and disadvantages of permanent mould casting compared to sand casting. *(04 marks)*

(e) Name different methods of taper turning?
Describe one method using neat sketches. *(04 marks)*

(c) Identify and explain three desirable properties of a cutting-tool material. *(04 marks)*

(d) The index plate used on Cincinnati and Parkinson milling head is of larger diameter than the Brown and Sharpe plate 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) $7^0 20'$ (ii) $28^0 30'$ (iii) 36^0 (iv) $55^0 10'$ *(08 marks)*

Question 07

(a) Calculate the drilling speeds for following holes on the components given below.
(i) 20 mm diameter hole on a 1″ (one inch) thick brass plate
(ii) 35 mm diameter hole on a 1″ (one inch) thick Medium Carbon steel plate
Use following information for the above calculation

Material	Cutting Speed (m/min)
Aluminum	70 – 100
Brass	35 – 50
Mild steel	30 – 40
Medium Carbon steel	20 – 30

(05 marks)

(b) Define the terms 'CAD' and 'CAM'. What are the advantages of using a CAM System? *(05 marks)*

(c) What do you understand by 'Unconventional or Non-traditional machining methods'?
Why do you consider them as important? *(05 marks)*

(d) What are the advantages and disadvantages in metal forming? *(05 marks)*

Question 08

(a) What are the advantages of hot working over cold working of metals? *(05 marks)*

(b) How do you compare forged components with cast components? *(04 marks)*

(c) Give examples of typical products manufactured by the following forging processes.
(i) Smith forging (ii) Drop forging (iii) Machine forging *(06 marks)*

(d) Distinguish between bending and drawing in sheet metal operations. *(05 marks)*

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