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The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Bachelor of Technology Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX3233Workshop Technology**
Academic Year	:	2016/17
Date	:	29th November 2017
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) Draw a typical load elongation curve for a ductile material and mark the following on the curve.
- Limit of proportionality
- Yield point (upper and lower)
- Fracture point *(03 marks)*

ii) Illustrate how this curve differs from that of the brittle material. *(02 marks)*

(b) i) What are low, medium and high carbon steels? *(03 marks)*
ii) Give three applications of above steels. *(02 marks)*

(c) Define the following abbreviations and explain their applications with respect plastic materials
- PMMA
- PVC *(04 marks)*

(d) i) What are the various processes available for manufacturing of steels? *(03 marks)*
ii) Explain the functions of the followings in metal manufacturing.
- Ore
- Coke
- Limestone *(03 marks)*

Question 02

(a) Discuss the effects of the following alloying elements when added to plain carbon steel.
- Vanadium
- Manganese
- Silicon *(06 marks)*

(b) i)Explain the importance of iron carbon equilibrium diagram. *(02 marks)*

ii) Sketch the Iron-Carbon diagram for the range of 0 – 3.0% of carbon in steel by weight. Identify clearly each and every phases that carbon in steel and indicate all critical temperatures. *(05 marks)*

(c) Compare and contrast a brittle fracture and a ductile fracture. *(03 marks)*

(d) Write brief notes on the followings.

- Annealing
- Quenching *(04 marks)*

Question 03

(a) Name and briefly explain two methods used for the protection of metal surfaces from corrosion. *(04 marks)*

(b) i) What are the functions of Nickel and Chromium in stainless steels? *(03 marks)*

ii) Name two common metals used for electro plating. *(03 marks)*

(c) '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? *(04 marks)*

(d) 'You may have come across the welding rods (electrodes), used in electric arc welding'.

i) How is electric arc welding electrode classified? *(03 marks)*

ii) What is the function of this coating material in the electrode? *(03 marks)*

Question 04

(a) i) Distinguish between high pressure and low pressure oxy acetylene systems in welding. *(02 marks)*

ii) Explain the working principle of high pressure and low pressure welding torches with the aid of clearly drawn sketches. *(04 marks)*

(b) Write short notes in followings welding techniques with comparing of merits and demerits of each process.

- MIG Welding.
- Spot Welding. *(04marks)*

(c) i) What are the factors to be considered when selecting a solder? *(02marks)*

ii) Why a flux is necessary in the soldering process? *(02marks)*

iii) Name two types of fluxes commonly used in soldering *(02 marks)*

(d) Explain three types of general defects in welding. *(04 marks)*

Question 05

(a)Identifyfive separate processes in sand casting operation. *(02 marks)*

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

- Runner
- Risers
- Cope & Drag
- Air vent *(08 marks)*

(c) i) Describe in briefly how a core is made? *(02 marks)*
ii) Explain importance of core prints *(02 marks)*

(d) i) Name the types of pattern materials used in casting. *(02 marks)*
ii) Write short notes on the following pattern allowances.
- Pattern draft allowance
- Shrinkage allowance *(04 marks)*

Question 06

(a) i) Identify the defects appear in casting processes? *(02 marks)*
ii) Briefly explain two of defects. *(04 marks)*

(b) A cylindrical workpiece 60 mm in diameter and 500 mm long is to be turned in a center lathe. Cutting speed = 2.30 m/s, feed = 0.32 mm/rev. Determine followings.
- Spindle speed
- Cutting time *(05 marks)*

(c) In milling operation "up cut" style of working is accepted as best practice for normal usage. Explain the reason. *(03 marks)*

(d) i) A cylindrical work piece of 40mm in diameter and 60mm in length is to be machined to a square bar (30 x 30mm). Name the machine that can be used for this operation. *(02 marks)*
ii) Explain briefly how the stroke of the particular machine to be used is changed. Calculate the depth of metal to be removed. *(04 marks)*

Question 07

(a) i) How is grinding wheel classified? *(02 marks)*
ii) What are the types of grinding operations and explain two of them. *(04 marks)*

(b) 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) 15 (ii) 26 (iii) 38 (iv) 60 *(08 marks)*

(c) Briefly explain following welding processes.
- Counter boring
- Counter sinking *(04 marks)*

(d) What are the types of cutting tool materials used in CNC operations? *(02 marks)*

Question 08

(a) 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 01.
Find the length of the wire needed to do this bending. *(06 marks)*

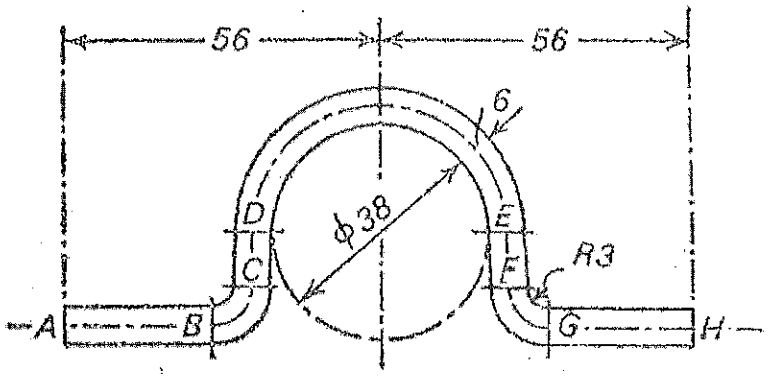


Figure 01

(b) i) What are the three main categories of plastic used in the plastic industry? *(02 marks)*
ii) Give examples of each category. *(02 marks)*

(c) i) What is blanking process? *(02 marks)*
ii) Why is it economical in the industry? Explain *(02 marks)*

(d) i) Identify the types of destructive tests (DT) and nondestructive tests (NDT). *(02 marks)*
ii) Explain one of test from each type. *(04 marks)*

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