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	:	**DMX3533 Workshop Technology**
Academic Year	:	2017/18
Date	:	08th February 2019
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 in Six (04) pages.
3. Answer any 05 questions only. All questions carry equal marks.

Question 01

(a) i) What is the relation between toughness and brittleness of material? *(02 marks)*
ii) Why is aluminum used largely for aircraft and automobile applications? *(02 marks)*

(b) i) What are the major applications of wrought iron? *(02 marks)*
ii) Explain in briefly production process of wrought iron. *(04 marks)*

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

(d) i) What is the process used for manufacturing of cast iron? *(02 marks)*
ii) Explain above process with a neat sketch. *(04 marks)*

Question 02

(a) i) What is meant by 'brittle failure'? *(02 marks)*
ii) Identify the types of brittle materials with their applications. *(02 marks)*

(b) Discuss the effects of the following alloying elements when added to plain carbon steel.
- Chromium
- Nickel
- Titanium *(06 marks)*

(c) i) What is the Iron-Carbon equilibrium diagram? *(02 marks)*
ii) Sketch the Iron-Carbon equilibrium diagram and identify clearly each and every phases that carbon in steel and indicate all critical temperatures. *(06 marks)*

(d) What are the three basic methods used to strengthen the metals? *(02 marks)*

Question 03

(a) What are the methods used for the protection of metal surfaces from corrosion? *(04 marks)*

(b) Write brief notes on the followings.

- Normalizing
- Tempering
- Precipitation hardening (aging) *(06 marks)*

(c) i) Why does tempering occurs much faster at 600°C than at 150°C? *(02 marks)*

ii) What are the elements introduced to the surface layer in the process of cyaniding? *(02 marks)*

(d) i) State the fundamental difference between fusion welding and pressure welding? *(02 marks)*

ii) Name and briefly explain the various components used in manual metal arc welding with neat sketch. *(04 marks)*

Question 04

(a) i) What factors need to be considered when selecting current in arc welding? *(02 marks)*

ii) Explain in briefly the importance of arc length in electric arc welding with sketch. *(04 marks)*

(b) Identify the types of flames used in oxy acetylene welding with their applications. *(03 marks)*

(c) Write short notes in followings welding techniques.

- TIG Welding.
- Seam Welding. *(04 marks)*

(d) i) Identify the difference between gas cutting nozzle and welding torch nozzle. *(02 marks)*

ii) Explain three types of general defects in welding. *(05 marks)*

Question 05

(a) i) Write the advantages and disadvantages of casting process than with manufacturing processes. *(03 marks)*

ii) What are the main materials used in sand moulding? *(03 marks)*

(b) "Pouring temperature is very important factor in casting processes" verify above statement clearly. *(03 marks)*

(c) Briefly explain the following terms with neat sketch.

- Spure
- Gate
- Blind riser *(06 mark*

(d) Describe following terms in brief.

- Pattern making
- Core making *(05 marks)*

Question 06

(a) Name and explain three types of defects appear in casting processes? *(06 marks)*

(b) A cylindrical workpiece 50 mm in diameter and 600 mm long is to be turned in a center lathe. Cutting speed = 1.75 m/s, feed = 0.32 mm/rev. Determine the followings.

- Spindle speed
- Cutting time *(05 marks)*

(c) Differentiate between up milling and down milling with neat sketch. *(04 marks)*

(d) i) Sketch and state the types of milling cutters. *(02 marks)*
ii) Describe the working principle of dividing head. *(03 marks)*

Question 07

(a) i) State the factors to be considered in selecting a grinding wheel for a given application. *(03 marks)*

ii) What are the differences between shaper and planner *(03 marks)*

(b) The index plate used on Cincinnati and Parkinson milling head is of large diameter than the Brown and Sharpe plates 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) 20° (ii) 30°40' (iii) 40° (iv) 60°30' *(08 marks)*

(b) Briefly explain following welding processes.

- Spot facing
- Trepanning *(04 marks)*

(c) What are the type of non-traditional machines and explain their importance. *(02 marks)*

Question 08

(a) Using the Figure. Q08, 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=100mm and h=40mm, find the value of diameter (D). *(06 marks)*

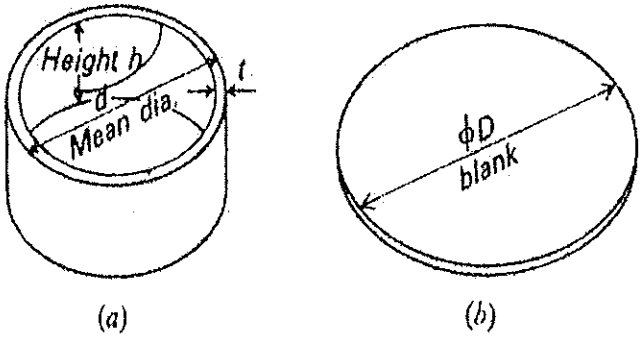

Figure Q08: Blank drawn to from a cup

(b) i) Identify the origin of plastic materials to prepare plastic moulding. *(02 marks)*
ii) What are the types of plastic moulds. Explain two of them. *(02 marks)*

(c) i) What is piercing process? *(02 marks)*
ii) Name the practical applications of piercing *(02 marks)*

(b) i) Explain the hand tools used in hot forging. Describe brief their use. *(02 marks)*
ii) Write down the operation steps of drawing down a round bar *(04 marks)*