# The Open University of Sri Lanka
# Faculty of Engineering Technology

00059

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| Study Programme | : | Bachelor of Technology Honours in Engineering |
| Name of the Examination | : | Final Examination |
| **Course Code and Title** | : | **MEX3233 Workshop Technology** |
| Academic Year | : | 2015/16 |
| Date | : | 07th December 2016 |
| 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.

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**Question 01**

(a) i) What is an impact test in Materials?
ii) Which characteristic of a material is tested by using this test?
iii) Explain the importance of this characteristic with reference to stress/strain diagram? *(06 marks)*

(b) i) Explain the action of coke and limestone during the smelting of iron in the blast furnace? *(03 marks)*

(c) i) Why is a cupola lined with refractory bricks?
ii) What are the purposes of refining the molten metal? *(05 marks)*

(d) Discuss the effects of the following alloying elements when added single to plain carbon steel.
- Nickel
- Vanadium
- Chromium

*(06 marks)*

**Question 02**

(a) i) What are the importance of an iron carbon equilibrium phase diagram?
ii) Explain what is mean by FCC and BCC structures with the aid of sketches. *(04 marks)*

(b) Consider the steel with carbon composition of 1.0% and referring to the iron-carbon diagram; explain its phase transformations when it is cooled down from $1147^0$ C to $0^0$ C under equilibrium conditions. *(04 marks)*

(c) i) What is the difference between annealing and tempering?
ii) What is strain hardening *(06 marks)*

(d) i) Surface treatment is important in many engineering applications. Why?
ii) Name and explain two methods used for the protection of metals from corrosion. *(06 marks)*

**Question 03**

(a) Identify the requirements that an arc welding supply source should satisfy? *(04 marks)*

(b) What factors do you consider in selecting the amount of current for a particular welding operation? *(04 marks)*

(c) Write short notes on followings welding techniques while comparing advantages and limitations of each process.

- Submerged Arc Welding
- MIG Welding.
- TIG Welding. *(06marks)*

(d) i) Explain three types of defects in welding.
ii) What are the three basic categories of inspection and testing techniques used in welding? *(06 marks)*

**Question 04**

(a) What are the different edge preparations in welding practice? *(04 marks)*

(b) Briefly explain the following welding processes.

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

(c) Oxy-acetylene flames are sometimes used for metal cutting. Explain the difference between the welding torch and the cutting torch with neat sketches? *(04 marks)*

(d) i) Describe the functions of a flux during soldering operation.
ii) What are the advantages of brazing over other joining methods? *(06marks)*

**Question 05**

(a) Briefly explain why casting is an important manufacturing process. Give your own reflective. *(03 marks)*

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

- Sprue
- Runner
- Risers
- Gating system *(08 marks)*

(c) What are the factors that have to be considered, in designing the pattern of a casting? *(03 marks)*

(d) i) Name the types of patterns used in casting.

ii) Write short notes on the following pattern allowances.

- Shrinkage allowance
- Machining allowance *(06 marks)*

**Question 06**

(a) i) What are the defects encountered in casting processes?

ii) Briefly explain two defects. *(06 marks)*

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

ii) What are the five types of cutting tool materials used in lathe machine? *(06 marks)*

(c) Calculate the main spindle speed in rev/minutes for the following stock of material to be turned on the lathe machine. *(8 marks)*

i) A brass shaft with diameter of 50mm.

ii) A cast iron bar with a diameter of 100 mm.

Use following information

| Material | Approximate Cutting Speed ( m/min) |
|---|---|
| Carbon Steel | 12 – 18 |
| Cast iron | 18 – 25 |
| Mild steel | 20 – 28 |
| Brass | 45 – 90 |
| Aluminum | up to 300 |

**Question 07**

(a) What is the function of the "dividing head" used in a milling machine?

(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) 18° (ii) $28^0\,30'$ (iii) $34^0$ (iv) $56^0\,30'$

*(08 marks)*

(b) State the four conditions required for successfully drill a hole using a drilling machine.

*(04 marks)*

(c) i) What are the five principal parameters of a grinding wheel?

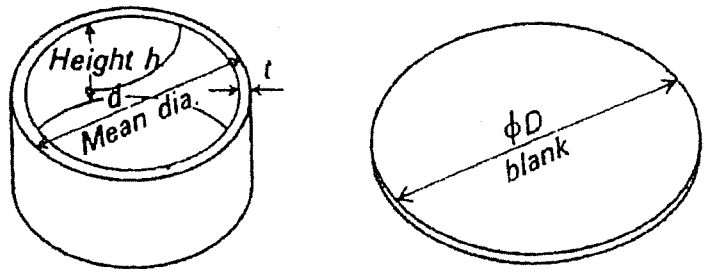
ii) Why is dressing important, with reference to grinding wheels? *(05 marks)*

(d) i) Describe the difference between Conventional and Non-conventional machining in manufacturing industry. *(03 marks)*

**Question 08**

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(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=100mm and h=40mm, find the value of diameter (D).




(a) (b)

Blank drawn to form a cup

*(06 marks)*

(b) i) Identify the origin of plastic materials to prepare plastic moulding.
ii) What are the types of plastic moulds and explain two of them. *(06 marks)*

(c) Explain the importance of hot forging? Is it suitable as a production method? *(04 marks)*

(d) Describe the functions of pressure pads in a deep drawing? *(04 marks)*

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| | | |
|---|---|---|
| Study Programme | : | Diploma in Technology/Bachelor of Technology (Engineering) |
| Name of the Examination | : | Final Examination |
| **Course Code and Title** | : | **MEX3234 – Engineering Drawing** |
| Academic Year | : | 2015/16 |
| Date | : | 18-11-2016 |
| Time | : | 9.30 – 13.30hrs |
| Duration | : | 4 hours |

**General instructions**

1. Clarify any doubts with the supervisor/invigilator in your examination hall.
2. **The Question 01 in Section A is compulsory**. Answer this question and one other of your choice from **Section B**.
3. It is strongly advised to prepare a sketch of the solution on a rough paper, before drawing it on the drawing paper. If you wish, you could attach the sketch to your answer script.
4. **Spend approximately three hours for Question 01** and the remaining time for the other question.
5. Use both sides of the drawing paper.
6. Draw the Standard cage, Title block, Projection symbol, etc. only for Question 01. **(Marks will be deducted if the Title block is not properly placed)**
7. All construction details, centerlines, etc. should be clearly shown.
8. You are strictly advised to write your Index Number, Registration Number and Course Code only on the drawing paper. Do not write your name or provide any other information.

## SECTION A (COMPULSORY)

### Q 01.

Figure 01 shows the pictorial view of an **object** which is symmetrical with respect to the vertical plane passing through A-B. Sketch the following views to a scale of full size in first angle projection.

**(a) Sectional Front Elevation on A-B, looking from direction "X".**

**(b) End Elevation looking from the left side.**

(c) **Plan.**

Note:

1. Assume any missing dimensions.
2. Radii of casting curves may be taken suitably.
3. Print the main title, sub title and scale.
4. Give a minimum ten main dimensions.
5. Indicate the symbol of the projection.
6. All dimensions are in mm.

**(70 Marks)**

## SECTION B

**(Answer only one question from this section)**

### Q 02.

**Figure 02** shows the Front Elevation and the Plan of **a hollow cylinder with a through hole**, made of a thin metal sheet.

(a) Draw the given **Front Elevation** and **Plan** in first angle projection to a scale of full size.

(b) Draw the **development of the hollow cylinder** taking the **seam as B-B.**

**(30 Marks)**

### Q 03.

**Figure 03**, shows orthographic views of an object. Draw the isometric view of the object to a scale of full size taking the **near point as shown by two arrows.**

**An isometric scale need not be used.** Do not show hidden details and dimensions in your answer

**(30 Marks)**

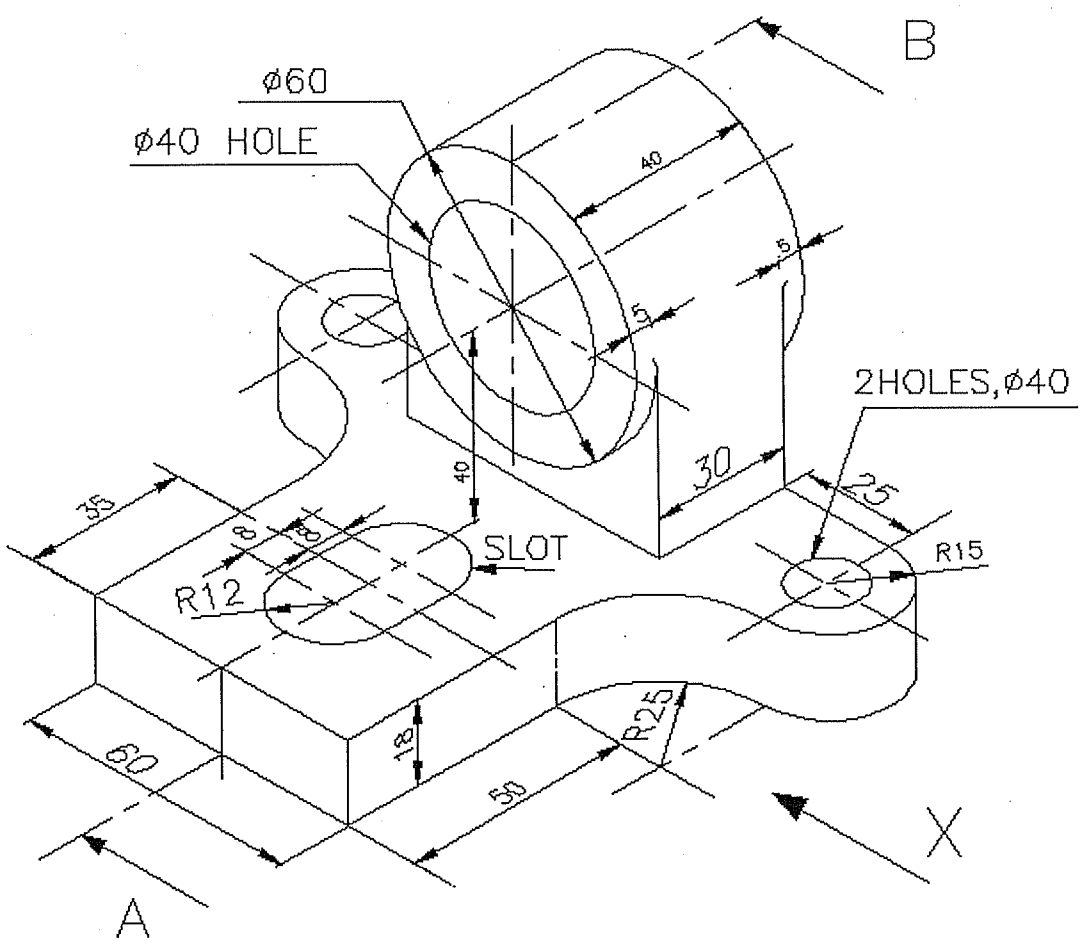

B
ø60
ø40 HOLE
40
5
5
2HOLES,ø40
40
30
25
35
8
16
SLOT
R15
R12
18
R25
60
50
X
A

**Figure 01**

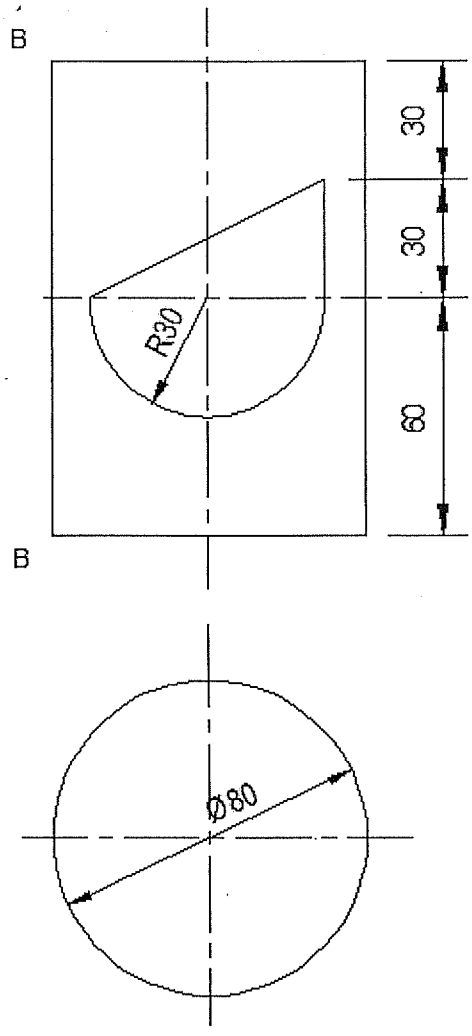
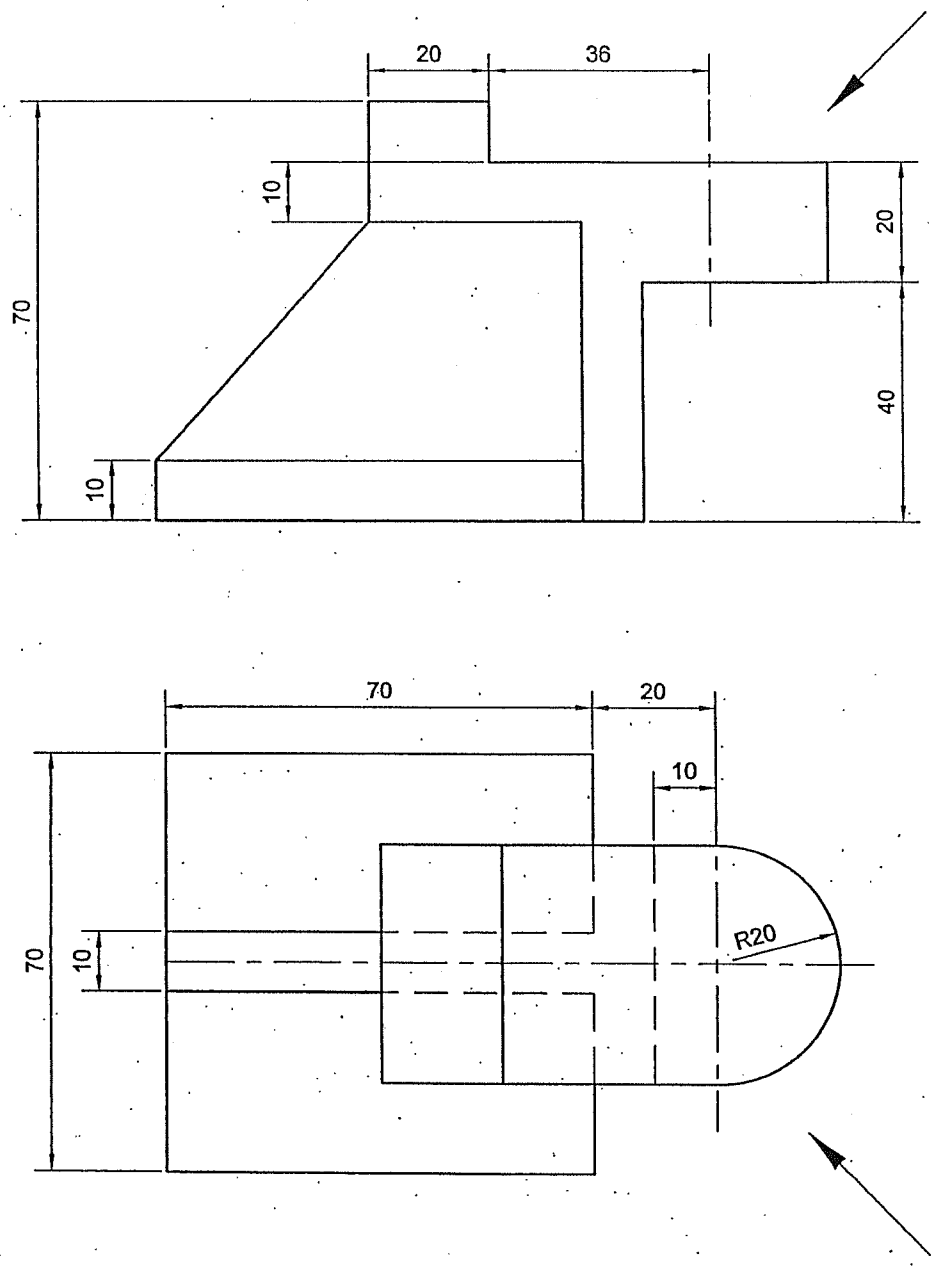



**Figure 02**




All Dimensions in mm

Not to scale

Fig. Q3