



CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

JUNE XXXX

INTERMEDIATE LEVEL

Subject Title	MANUFACTURING PROCESSES
Subject Code No.	5380
Paper No.	TWO

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**THREE HOURS**

**INSTRUCTIONS**

This paper consists of two sections of FOUR questions and TWO questions respectively. You are required to answer THREE questions in Section A and ONE question in Section B.

All questions in section A carry equal marks

In all cases involving calculations, you are advised to show all the steps in your workings.

The time for each section is 1 hour 30 minutes.

*You are reminded of the necessity for good English and orderly presentation of your answers.*

Do not write in pencil except for diagrams or sketches.

Calculators and formulae booklets may be used.

All steps must be shown in your workings.

At the end of your examination, fasten your work together.

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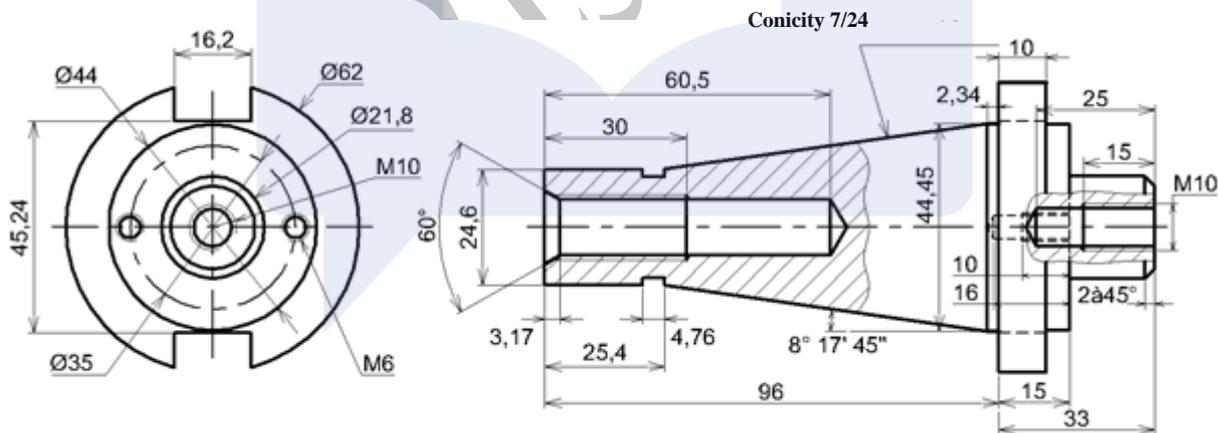
*Turn Over*

**SECTION A  
MANUFACTURING TECHNOLOGY  
ALL QUESTIONS CARRY EQUAL MARKS, ANSWER ANY THREE**

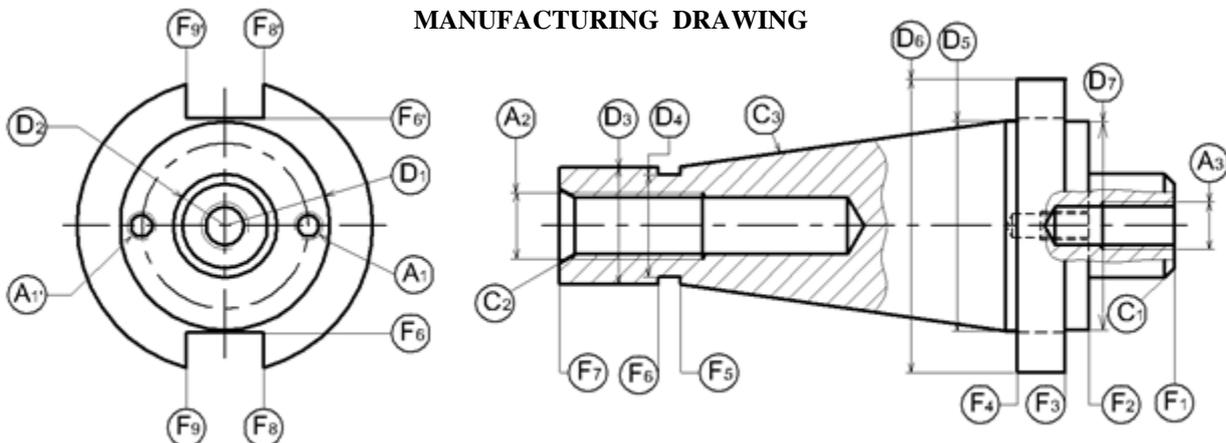
1. Threading is an operation carried out on a lathe machine. You are an intern in a fabrication workshop in Douala, your are asked by the manager to produce a thread of M12x1,75 on a steel rod S235 of  $\varnothing 20$  with a length of 45 mm and threaded length is 30mm.
  - a) Name two type of thread (2marks)
  - b) Calculate the turning diameter of M12x1,75 before threading (2marks)
  - c) Represent on a labelled sketch of the piece in course of machining: your are expected to represent
    - i) The cutting tool (2marks)
    - ii) The holding device of the piece (2marks)
  - d) After the machining of thread the unthreaded side will be welded on a square head nut.
    - i) Which type of welding process is used? (2marks)
    - ii) Give three safety precautions to be taken during welding process. (2marks)

2. The production unit of your school has received the order for the manufacturing of the device used in milling machine which detail drawing is represented above as figure 1 .
  - a) Give the name of the device (2marks)
  - b) Give the name of the tool and machine tool used to machine surfaces F8 and F9 (2marks)
  - c) Give the name of the measuring or control instrument used to control surface C3 (2marks)
  - d) Calculate the taper angle of C3if conicity is 7/24 (2marks)
  - e) Explain with the help of sketch how surface C3 is machined ( 2marks)

DETAIL DRAWING



MANUFACTURING DRAWING



3. A peripheral milling operation is performed on the top surface of rectangular work part which is 80mm long by 60mm wide and 40 mm height. The milling cutter of  $\text{Ø}80\text{mm}$  and has five teeth, the cutting speed is 25m/min, the feed is 0,25mm/tooth and the depth of cut is 5mm
- Define milling; (2marks)
  - Sketch three types of milling cutter (3marks)
  - Calculate the feed rate for the surfacing of the piece (2marks)
  - One operation carried out on a milling machine is indexing. Define indexing (2marks)
  - You are required to mill four flats on a round shaft on a milling machine with a dividing head having a ratio of  $1/40^{\text{th}}$ . Calculate the number of revolutions of the indexing head for the machining of the four flats. (1mark)

4. For the machining of surface F of the **VICE SUPPORT** represented in figure 2 below, one uses a taper shank drill in HSS of diameter 8 mm. With a spindle speed of  $N = 125$  rpm, a feed per revolution of  $a = 0,1$  mm/rev, an engagement  $e = 6$  mm withdrawal  $d = 5$  mm and length  $l = 20$  mm.
- Calculate the cutting speed used (Cs in m/min). (2.5 marks)
  - Calculate the feed rate in mm/min. (2.5 marks)
  - By interpreting Figure 3 below, determine the length (L) to cover by the cutting tool during the machining of the hole knowing that the point angle of the drill is  $118^\circ$ . (2.5 marks)
  - Calculate the cutting time in minute for the machining of F
  - Let's consider the sine bar in figure 4 below to be used to control of flatness the surface F1. Calculate the height X of wedges necessary. (2.5 marks)

**DETAIL AND MANUFACTURING DRAWING**

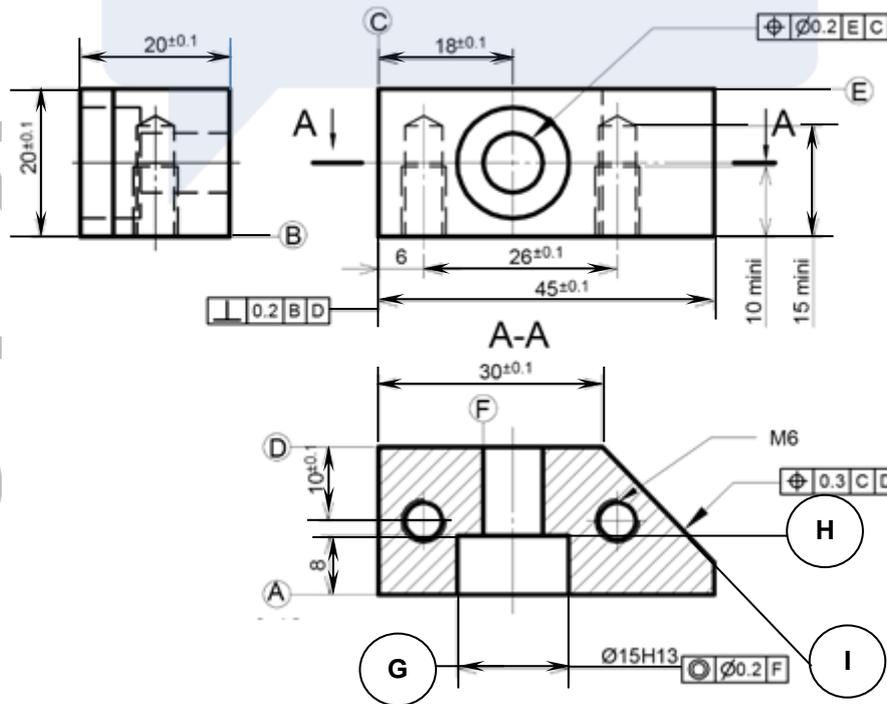


Figure 2

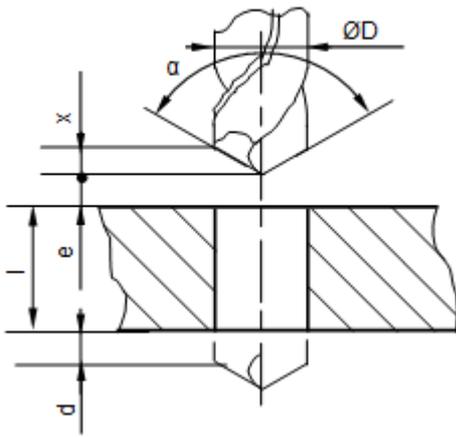


Figure 3

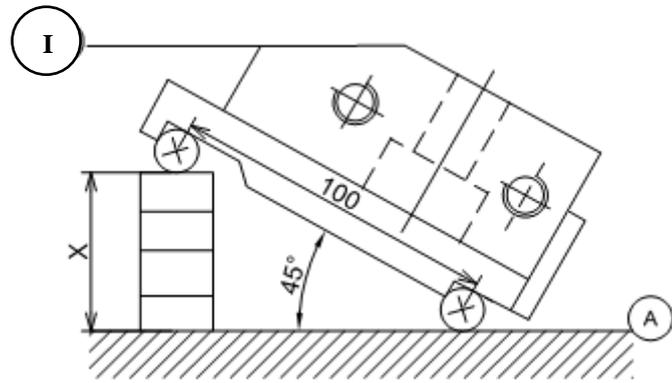


Figure 4: Sine bar

**SECTION B**  
**MANUFACTURING STUDY**  
**ALL QUESTIONS CARRY EQUAL MARKS, ANSWER ANY ONE**

**NB: USE APPENDIX 1 TO ANSWER SOME OF THE QUESTIONS BELOW**

5. Detail and manufacturing drawings of the **VICE SUPPORT** is represented as figure5 below

**a) Decoding of detail drawing**

Decode the following designations found on the detail drawing

**(3 marks)**

C	$\perp$	0,2	B-A
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G	$\odot$	$\varnothing 0,2$	F
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**b) Chronological order of operations**

Give the chronological order for the machining of the following surfaces **G,F,H,A**

**(4 marks)**

**c) Production methods**

Name the operations , cutting tools , machine-tool and measuring instrument which enable one to control surface **I** and the associated surfaces **H** and **G**.

**(4 marks)**

**d) Isostatic positioning**

Represent the isostatic positioning of the piece during the machining of surface **I** see(Appendix 1)

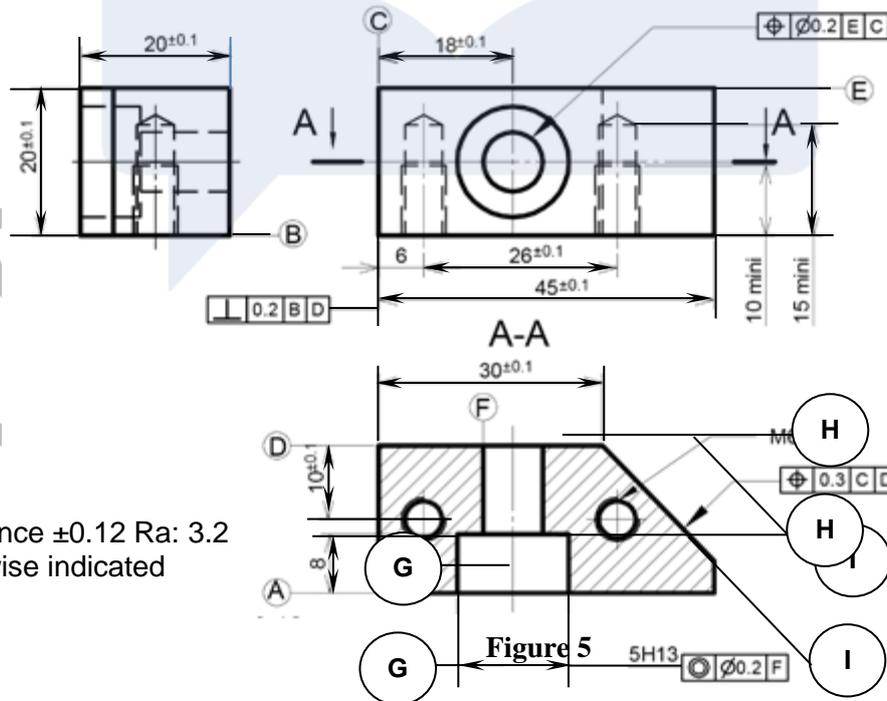
**(4 marks)**

**e) Calculation of machine dimensions**

Calculate the machining dimension for the machining of **H**

**(6 marks)**

**DETAIL AND MANUFACTURING DRAWING**



Scale 1:1  
 General tolerance  $\pm 0.12$  Ra: 3.2  
 all over otherwise indicated

Figure 5

6. The connecting screw of a wood turning lathe which detail and manufacturing drawings in figure 6.

**NB: USE APPENDIX 1 TO ANSWER SOME OF THE QUESTIONS**

**a) Decoding of Detail Drawing**

- i) Explain the following indications: Conicity 72% and  $\text{Ø}16\text{g}6$  (3 marks)

**b) Chronological Order of Operations**

- i) Give the name of the machining operations that enable the realization of the following surfaces:  $A_1, F_1, D_1, C_1$ . (3 marks)
- ii) Identify the geometrical specification that links the following groups of surfaces: ( $F_2$  and  $F_3$ ), ( $D_1$  and  $D_2$ ). (3 marks)

**c) Production Methods**

- i) Identify the machine-tool, appropriate cutting tools and instrument that are to be used for this machining of phase 40: ( $F_4F, F_5F$  and  $D_5F$ ). (3 marks)

**d) Isostatic Positioning**

- i) Represent on Appendix 1, the isostatic positioning of the piece to machine the surfaces of phase 30 ( $F_4, F_5, D_3, D_5, D_1, C_2, F_1, F_3$ ) and indicate the manufacturing dimension without numerical value. (3 marks)

**e) Calculation of Machining Dimensions**

- i) Establish the chain of dimension relating to the calculation of the dimension  $Md1$  for the machining of surface  $F_3$ . (3 marks)
- ii) Calculate the manufacturing dimension  $Md1$ . (2 marks)

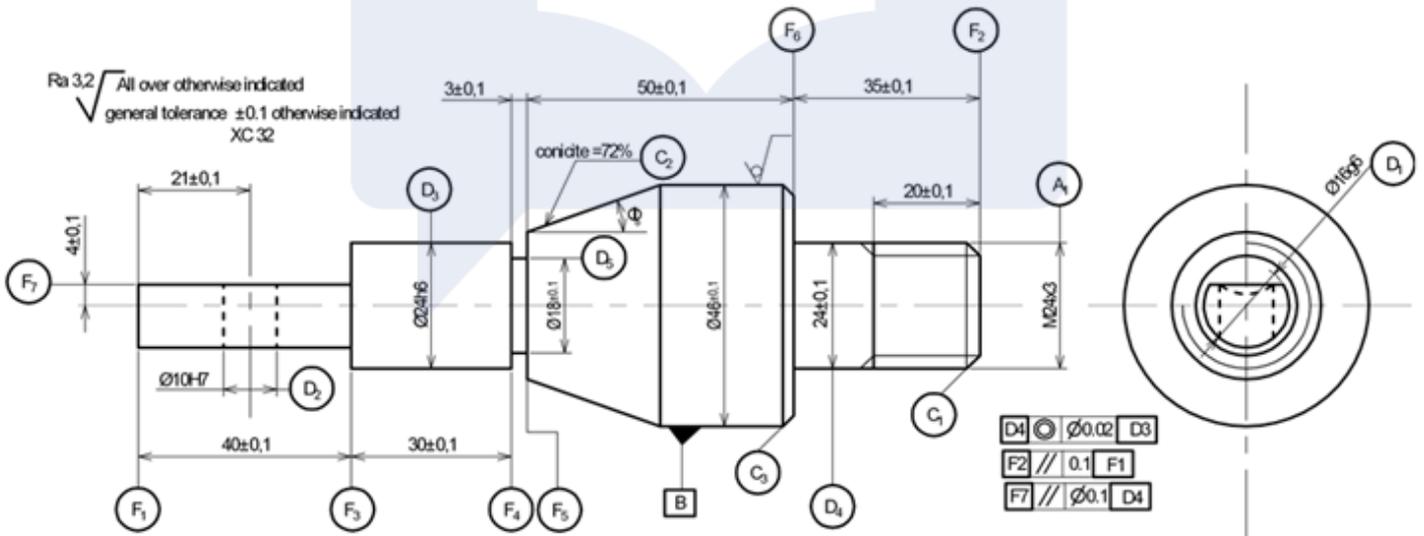
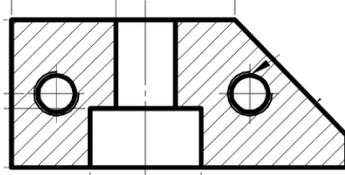


Figure 6

## APPENDIX 1

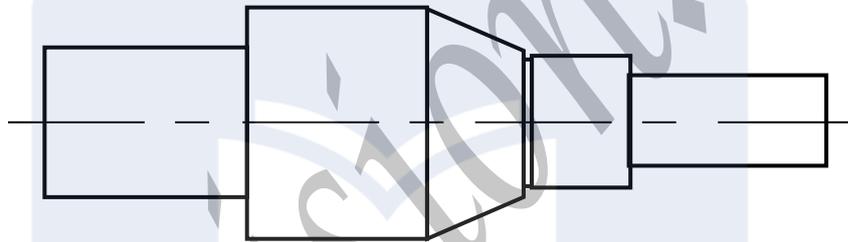
Question 5-d)



Question -d)

a) Isostatic Positioning

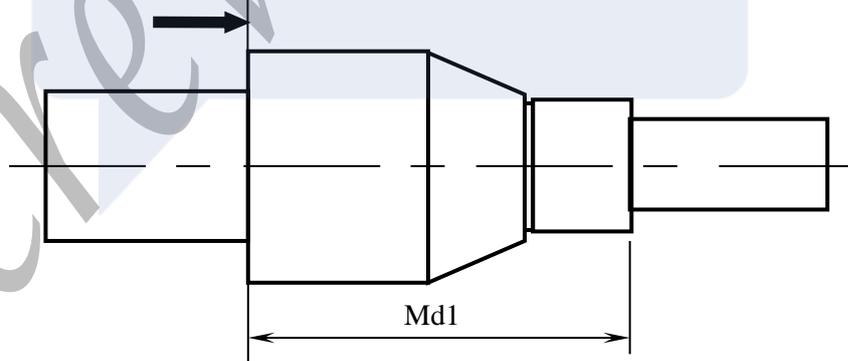
- i) Isostatic positioning of the piece in order to machine the surfaces and positioning of the manufacturing dimension without numerical value.



Question 6-e)

b) Calculation of Machining Dimensions

Establish the chain of dimension relating to the calculation of dimension Md1



Calculation of manufacturing dimension Md1

Md1 = \_\_\_\_\_

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