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.	**THREE**

THREE HOURS

INSTRUCTIONS

This paper is practical. It is carried out in a Manufacturing Mechanical workshop equipped with machine-tools, measuring/control instruments, cutting tools and welding equipment.

The paper consists of three independent sections as follows:

Section 1: Machining – 2 hours.

Section 2: Metrology – 30 minutes.

Section 3: Welding – 30 minutes.

You are reminded to respect the safety rules and regulations of the workshop.

At the end of your examination, hand in the pieces realized and metrology report to the examiner(s).

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

SECTION 1: MACHINING – 30 marks

You have at your disposal one (**01)** rough piece to manufacture the prototype of the **Body** of an Adjustable Stop as shown in figure 1. The prototype is to be manufactured with respects to all the specifications as indicated in the detail and manufacturing drawings.

WORK TO BE DONE

You are required to machine the piece in your workshop. The controls and machining by each candidate should go through the following work posts:

1) **Phase 10:** *(Post 100)*: Control of rough piece;

2) **Phase 20: Turning 1:** (*Post 200*): Set and machine **F_1F, D_1F, D_2F, D_3F** and **C_1F**;

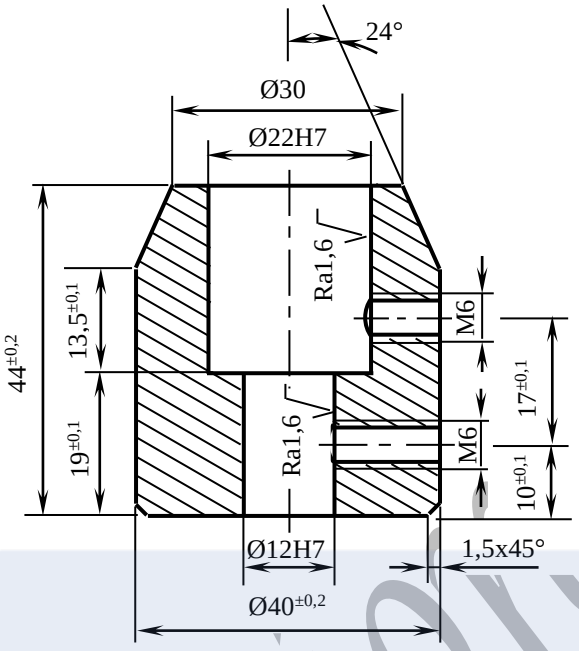
3) **Phase 30: Turning 2:** (*Pose 300*): Set and machine **F_3F, $D4_1F$** and **C_2F;**

4) **Phase 40: Drilling:** (*Pose 400*): Set and machine **A_1F, A_2F;**

5) **Phase 50:** *(Post 500)*: Final control of machined piece.

MARK DISTRIBUTION /30 marks	
Dimensions obtained / Operations carried out	**Mark**
Manipulation on machines	/05 marks
Phase 20	/08 marks
Phase 30	/20 marks
Phase 40	/08 marks
Presentation of finished workpiece	/05 marks

DETAIL DRAWING



MANUFACTURING DRAWING

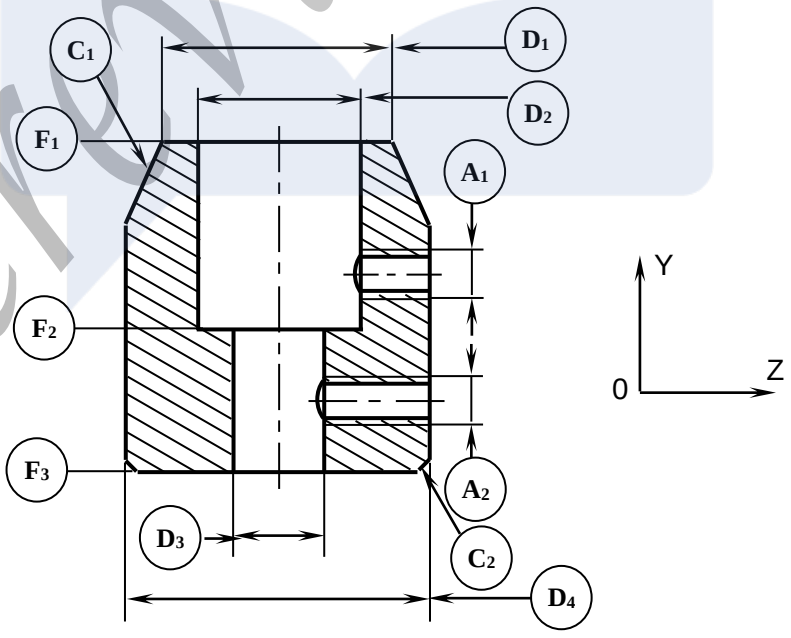


Figure 1

SECTION 2: METROLOGY – 10 marks

The jury has put at your disposal the piece to be controlled as shown in figure 2.

WORK TO BE DONE

1st Part: Control of geometrical tolerance

I- Metrology laboratory

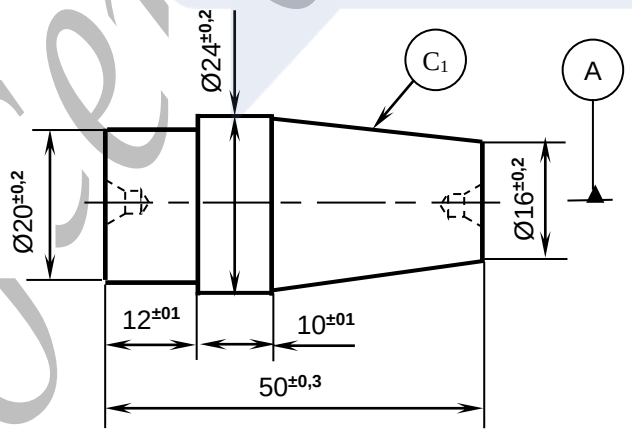
1. Give the list of equipment needed for the geometrical dimension:
2. Control the concentricity with the above equipment.

2nd Part: Report writing

II- Technology room

1. Describe with the help of a sketch, the method to control the geometrical tolerance.

MARKS DISTRIBUTION /10 marks			
Control	**/06 marks**	**Report**	**/04 marks**
List of equipment needed	/03 marks	Description of method	/4 marks
Control of geometrical dimension	/03 marks		



C1	∠	0,2	**A**

Figure 2

SECTION 3: WELDING – 10 marks

You have at your disposal 02 pieces (**1** & **2**) of the **Piping Joint** shown in figure 3, to be assembled together by the electric arc welding operation respecting the specifications indicated of the assembly drawing.

WORK TO BE DONE

1- Prepare the pieces **1** and **2** in order to carry out the welding operation.
2- Carry out the welding operation of the pieces respecting the specifications indicated in the assembly drawing**.**
3- Deburr the weld.

MARKS DISTRIBUTION /32 marks			
Dimensions obtained / Operations carried out	**Mark**	**Dimensions obtained / Operations carried out**	**Mark**
Preparation of pieces	/04 marks	Execution of welding	/12 marks
Accuracy of dimensions	/10 marks	Presentation of the weld	/06 marks

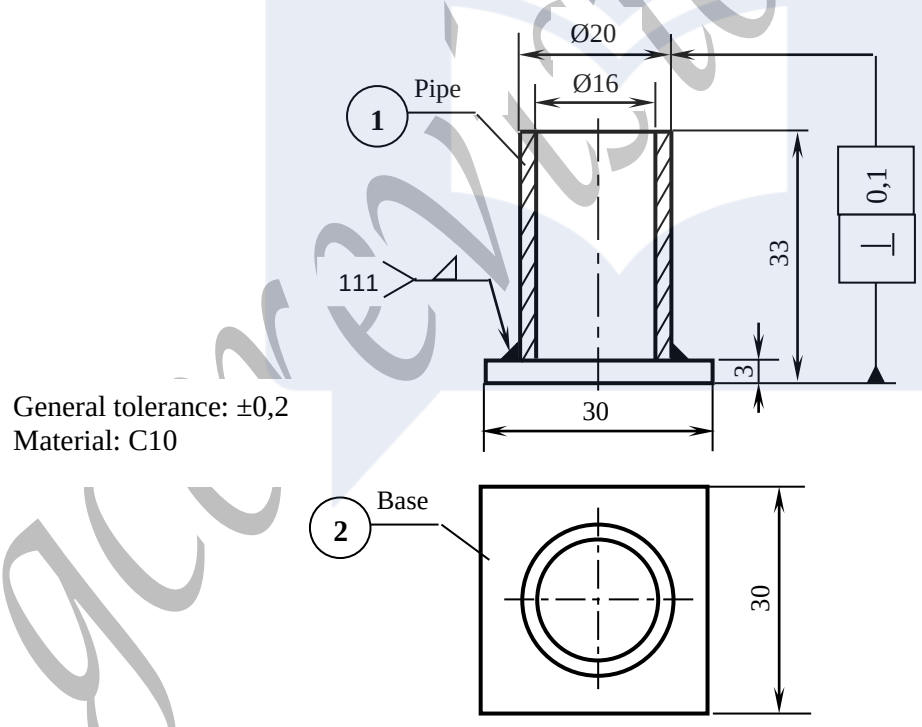


Figure 3

MANUFACTURING PROCESSES 3
5380

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Subject Title	**MANUFACTURING PROCESSES**
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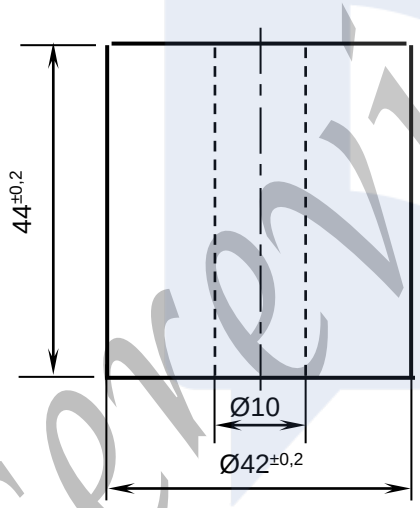
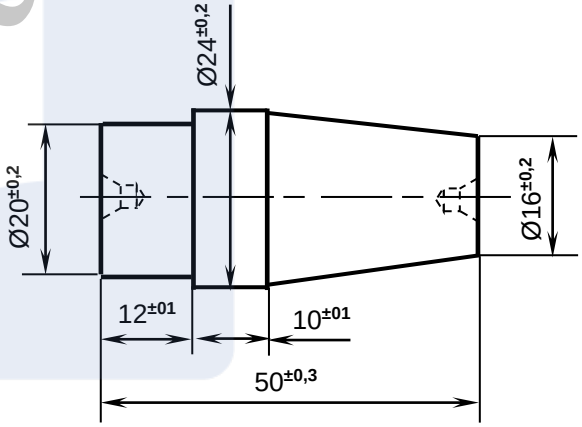
Paper No.	**Paper 3**

ADVANCED INFORMATIONS

LIST OF MATERIALS TO BE GIVEN TO CANDIDATES

PIECES TO BE PROVIDED TO EACH CANDIDATE	03 PIECES FOR ALL THE CANDIDATES
Machining 	**Metrology** 

WELDING

- Pipe of external Ø20 and internal Ø16 of length 30 in S 235 per candidate;
- Flat bar of 30 x 30 x 3 in S 235 per candidate

WORKSHOP EQUIPEMENT AND TOOLS

EQUIPMENT/TOOLS AVAILABLE			
MACHINE TOOLS		**MESURING INSTRUMENTS**	
No.	**DESIGNATION**	**No.**	**DESIGNATION**
01	Centre lathe	02	Vernier caliper 1/50th
01	Bench sensitive drilling machine	03	Vernier depth gauge 1/50th
01	Universal milling machines	01	Vernier height gauge 1/50th
01	Surface grinding machines	01	Micrometer 0 - 25 1/100th
01	Electrical arc welding station	01	Micrometer 25 - 50 1/100th
		01	Dial test indicator with magnetic base
		01	Set of slip gauges
		01	Gap gauge 35
		01	Try square
CUTTING TOOLS			
02	Knife tool, HSS	02	Bent shank turning tool
02	Reamer Ø12H7	02	Center drill Ø4, HSS
02	Set of taps M6	01	Drill set (Ø8 to Ø20)
02	Boring tool, HSS	10	Electrode Ø3,2
DEVICES			
01	Dividing head of 1/40th with swivel head	01	Circular plate
01	Three jaws self-center or concentric chuck	01	Four jaws chuck
01	Milling vice	01	Clamping flange
01	Vee block	01	Dog or carrier
01	Dead centre	01	Live centre

LISTS OF MATERIALS TO BE BROUGHT BY CANDIDATES

- Overall;
- Helmets;
- Safty boots;
- Googles;
- Leather gloves;
- Noise protector;
- Steel rules;

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MARKING GUIDE

OPERATIONS	Dimensions obtained / Operations carried out	Mark	Score	Remarks
MACHINING	Manipulation on machines	/03 marks		
	Phase 20	/06 marks		
	Phase 30	/06 marks		
	Phase 40	/06 marks		
	Presentation of finished workpiece	/05 marks		
METROLOGY	List of equipment needed	/03 marks		
	Control of geometrical dimension	/03 marks		
	Description of method	/4 marks		
WELDING	Preparation of pieces	/02 marks		
	Accuracy of dimensions	/02 marks		
	Execution of welding	/04 marks		
	Presentation of the weld	/02 marks		