CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE®
EXAMINATION

04 MAY 2021 (a.m.)

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TEST CODE | 0 | 1 | 3 | 7 | 3 | 0 | 2 | 0 |

SUBJECT INDUSTRIAL TECHNOLOGY
OPTION B – MECHANICAL ENGINEERING TECHNOLOGY – Paper 02

PROFICIENCY TECHNICAL

REGISTRATION NUMBER | | | | | | | | | | |

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NAME OF SCHOOL/CENTRE

CANDIDATE'S FULL NAME (FIRST, MIDDLE, LAST)

DATE OF BIRTH | D | D | M | M | Y | Y | Y | Y |

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FORM TP 2021084

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MAY/JUNE 2021

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

INDUSTRIAL TECHNOLOGY

OPTION B – MECHANICAL ENGINEERING TECHNOLOGY

Paper 02 – Technical Proficiency

2 hours 10 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of FIVE compulsory questions.
2. Use sketches where necessary to support your answers.
3. Write your answers in the spaces provided in this booklet.
4. Do NOT write in the margins.
5. You may use a silent, non-programmable calculator to answer questions.
6. This paper contains metric dimensions only. You should work your answers in the metric system.
7. You are advised to take some time to read through the paper and plan your answers.
8. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra lined page(s) provided at the back of this booklet. **Remember to draw a line through your original answer.**
9. **If you use the extra page(s) you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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1. Figure 1 shows a picture of a roller conveyor idler section.

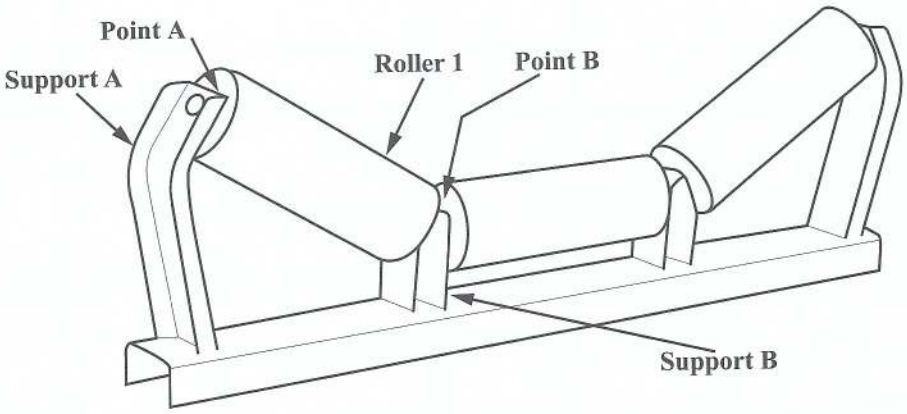


Figure 1. Roller conveyor idler section

Each roller is 30 cm long and 8 cm in diameter. The spaces between the rollers are 2 cm wide. In the current design, the rollers are bolted into the supports which are fabricated from 3 mm thick sheet metal.

(a) (i) State TWO fasteners that can be used to secure the axil of the rollers to the supports shown in Figure 1.

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(2 marks)

(ii) State TWO features of EACH of the fasteners listed in (a) (i).

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(4 marks)

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0 1 3 7 3 0 2 0 0 4

(b) Sketch a modification to Support A, so that the angle of Roller 1 can be adjusted between 0 and 45 degrees. Include all relevant dimensions on your sketch.

(6 marks)

(c) With the aid of a diagram, describe a design for Support B, which will facilitate the pivot at Point B.

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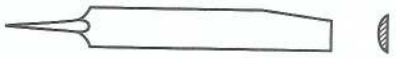
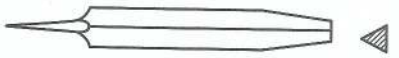
(6 marks)

Total 18 marks

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2. Files are a family of hand tools which are commonly used in the workshop.

(a) Complete the table below by stating the name of EACH of the files shown.

File	Name
(i) 	
(ii) 	
(iii) 	

(3 marks)

(b) State ONE use for EACH of the files in (a).

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(3 marks)

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(c) Outline THREE guidelines that should be followed when using files.

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(6 marks)

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(d) Figure 2 shows a curve on a piece of two-inch flat steel.

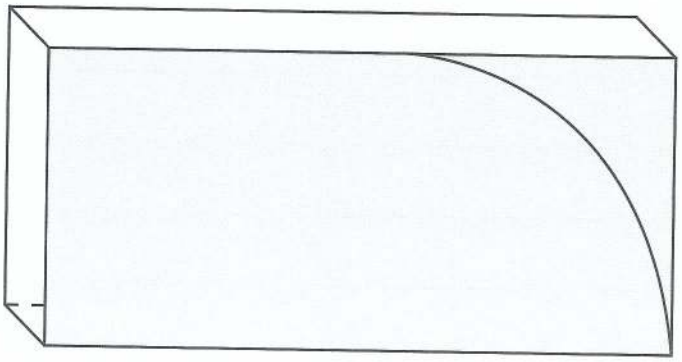


Figure 2. Flat steel with a curve

List the steps in the procedure for producing the curve using only hand-held tools and a vice.

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(6 marks)

Total 18 marks

3. (a) List THREE benefits of using a cutting lubricant during the turning process.

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(3 marks)

(b) List THREE safety precautions which must be taken when operating a centre lathe.

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(3 marks)

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(c) Figure 3 shows three views of a tool for cutting metal, with six different types of angles.

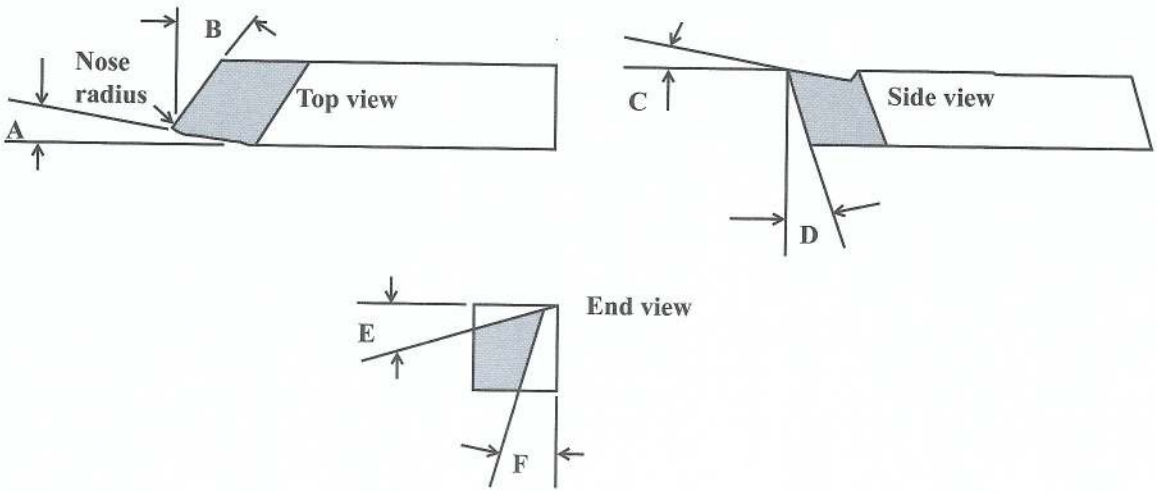


Figure 3. Cutting tool angles

State the names of the types of angles labelled A, B, C, D, E and F in Figure 3.

A .....

B .....

C .....

D .....

E .....

F .....

(6 marks)

(d) Outline the MAIN observation if an attempt is made to turn aluminium in the centre lathe with a poorly shaped tool.

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(2 marks)

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(e) Calculate the spindle speed required to cut a 50 mm diameter aluminium bar at 75 metres per minute on the centre lathe.

(4 marks)

Total 18 marks

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4. The arc welding process is used extensively to join metal parts. In this process, the heat is provided by the electric arc between the parent metal and the electrode.

(a) With the aid of a diagram, list the steps in the procedure for striking an electric arc.

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(6 marks)

(b) Name a type of personal protective equipment (PPE) to be worn when welding, in order to protect the following parts of the body.

Eyes .....

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Lungs.....

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Feet.....

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(3 marks)

(c) Sketch the symbol for EACH of the following welded joints.

(i) Single-V

(ii) Double-V

(iii) Single-U

(3 marks)

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(d) Describe THREE **named** defects which can occur during arc welding.

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(6 marks)

Total 18 marks

5. Figure 4 shows a design for a bottle opener to be made from sheet metal 4 mm thick.

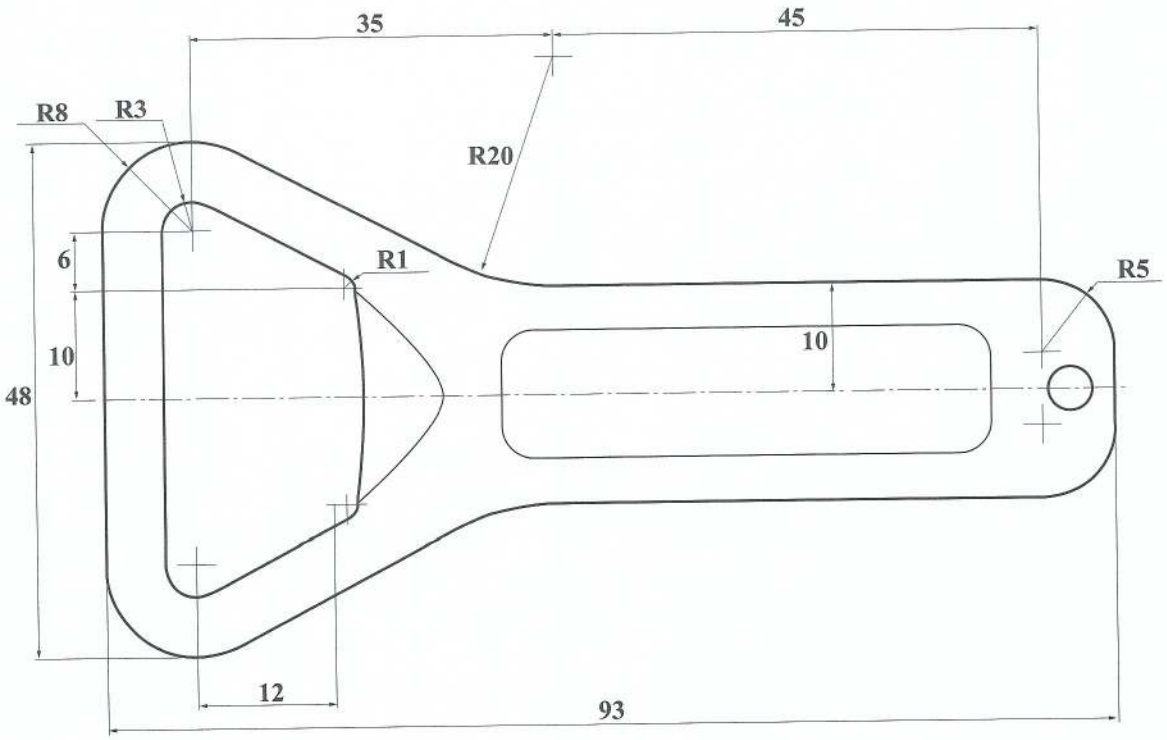


Figure 4. Bottle opener

(a) List the steps in the procedure for marking out the bottle opener.

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(6 marks)

(b) State TWO tools which can be used in the marking out process.

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(2 marks)

(c) Suggest TWO finishes which can be applied to the handle of the bottle opener, other than plastic. Justify **each suggestion**.

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(4 marks)

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(d) List THREE advantages and THREE disadvantages of using plastic as a finish for the bottle opener.

Advantages

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Disadvantages

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(6 marks)

Total 18 marks

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

EXTRA SPACE

If you use this extra page, you MUST write the question number clearly in the box provided.

Question No. ☐

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1. **Fill in all the information requested clearly in capital letters.**

TEST CODE: | 0 | 1 | 3 | 7 | 3 | 0 | 2 | 0 |

SUBJECT: INDUSTRIAL TECHNOLOGY
OPTION B – MECHANICAL ENGINEERING TECHNOLOGY – Paper 02

PROFICIENCY: TECHNICAL

REGISTRATION NUMBER: | | | | | | | | | | |

FULL NAME: _____
(BLOCK LETTERS)

Signature: _____

Date: _____

2. **Ensure that this slip is detached by the Supervisor or Invigilator and given to you when you hand in this booklet.**

3. **Keep it in a safe place until you have received your results.**

INSTRUCTION TO SUPERVISOR/INVIGILATOR:

Sign the declaration below, detach this slip and hand it to the candidate as his/her receipt for this booklet collected by you.

I hereby acknowledge receipt of the candidate's booklet for the examination stated above.

Signature: _____
Supervisor/Invigilator

Date: _____