



VCE VET Engineering Studies: Certificate II Engineering Studies Written examination

Introduction

The following sample examination is provided to demonstrate the format and types of questions which will be asked in the examinations for this study. The duration of the examinations will be 90 minutes plus 15 minutes reading time.

The examinations are based on the underpinning knowledge and skills specified in the core units of competence from Units 3 and 4 of the 22019VIC Certificate II in Engineering Studies.

The elective units of the program will not be examined.

Certificate II Engineering Studies

Structure and format

All questions will be compulsory. The examination will comprise five sections.

Section A VBN 771: Apply Electrotechnology Principles in an Engineering Environment, will consist of 15 multiple-choice questions worth 1 mark each.

Section B VBN 773: Produce Engineering Sketches and Drawings, will consist of a series of short-answer questions and questions which will require students to sketch components or parts of components. Students will not be required to undertake drawings which will require the use of drawing instruments. This section will be worth approximately 15 marks.

Section C VBN 776: Use Basic Engineering Components to Plan the Manufacture of Engineering Components, will consist of a series of short-answer questions. This section will be worth approximately 15 marks.

Section D VBN 777: Handle Engineering Materials, will consist of a series of short-answer questions. This section will be worth approximately 15 marks.

Section E VBN 778: Produce Basic Engineering Components and products Using Fabrication and Machining, will consist of a series of short-answer questions. This section will be worth approximately 40 marks.

The examination will be worth approximately 100 marks in total. The examination will be in the form of a question and answer book.

Other relevant references

Teachers should refer to the Examination section of the *VCE and VCAL Administrative Handbook 2011*, the VCE VET Engineering Studies page on the VCAA website and to the *VCAA Bulletin VCE, VCAL and VET* for further advice during the year.

SECTION A – VBN 771 Apply electrotechnology principles in an engineering environment**Instructions for Section A**

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

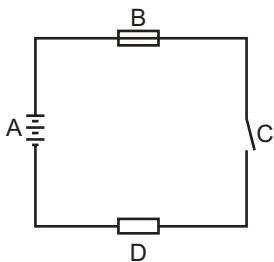
Question 1

_____ is the electrical property of a material describing its ability to oppose an electric current.

- A. Resistance
- B. Voltage
- C. Amperage
- D. Wattage

Question 2

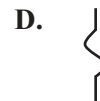
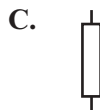
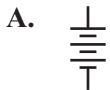
Select the letter that indicates a **switch** in the schematic diagram below.



- A. A
- B. B
- C. C
- D. D

Question 3

Which symbol represents a **resistor**?

**Question 4**

Which one of the following formulas is the correct mathematical representation of Ohm's Law?

- A. $I = \frac{V}{R}$
- B. $I = V \times R$
- C. $R = V \times I$
- D. $V = R + I$

Question 5

Which one of the following is the best test instrument to measure electrical pressure in a circuit?

- A. ohmmeter
- B. ammeter
- C. voltmeter
- D. wattmeter

Question 6

Current in a conductor is the result of movement of

- A. free electrons.
- B. protons.
- C. negative ions.
- D. electron orbits.

Question 7

The unit of electric current is the

- A. watt.
- B. ampere.
- C. volt.
- D. ohm.

Question 8

An ohmmeter is set to its 'ohms $\times 100$ ' range and is indicating 500 on the scale.

The actual resistance is

- A. 5 R.
- B. 500 R.
- C. 50 k Ω .
- D. 5 M Ω .

Question 9

If the temperature of a coil of copper wire increases, its resistance

- A. increases.
- B. decreases.
- C. remains unchanged.
- D. drops to zero.

Question 10

Power used in an electrical circuit is measured in

- A. volts.
- B. watts.
- C. amperes.
- D. ohms.

Question 11

A resistor with colour bands of orange, white, yellow, has a value of

- A. 390 Ω .
- B. 39 k Ω .
- C. 3.9 Ω .
- D. 390 k Ω .

Question 12

Two fault conditions that require circuit protection are

- A. open circuit and closed circuit.
- B. overload and short circuit.
- C. overload and open circuit.
- D. earth leakage and open circuit.

Question 13

A blown fuse usually indicates

- A. a faulty fuse.
- B. an open circuit in an appliance.
- C. reduced circuit resistance.
- D. increased circuit resistance.

Question 14

A circuit breaker can be used to replace

- A. a battery.
- B. a fuse.
- C. a thermocouple.
- D. an electromagnet.

Question 15

A battery provides a source of electrical

- A. resistance.
- B. pressure.
- C. displacement.
- D. opposition.

SECTION B – VBN 773 Produce engineering sketches and drawings

Instructions for Section B

Answer **all** questions in the spaces provided.

Question 1

Using the following list complete the table below.

- hidden outlines
- continuous – thick
- chain – thin
- cutting planes

Line type	Typical applications
	Visible outlines; general details; existing buildings
Continuous – thin	Dimension lines; projection lines; leader lines; hatching; outlines of revolved sections; fold lines; short centre lines
Continuous – thin, ruled with zig-zag	Break lines – other than on an axis
Dashed – thin	
	Centre lines; pitch lines; path lines indicating movement; features in front of cutting plane; developed views; material to be removed
Chain – thin, thick at ends	

4 marks

Question 2

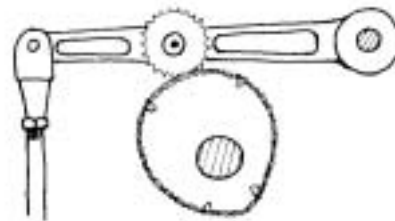
From the following list of drawing types label the sketches below.

- paralline orthogonal pictorial schematic

i.



ii.



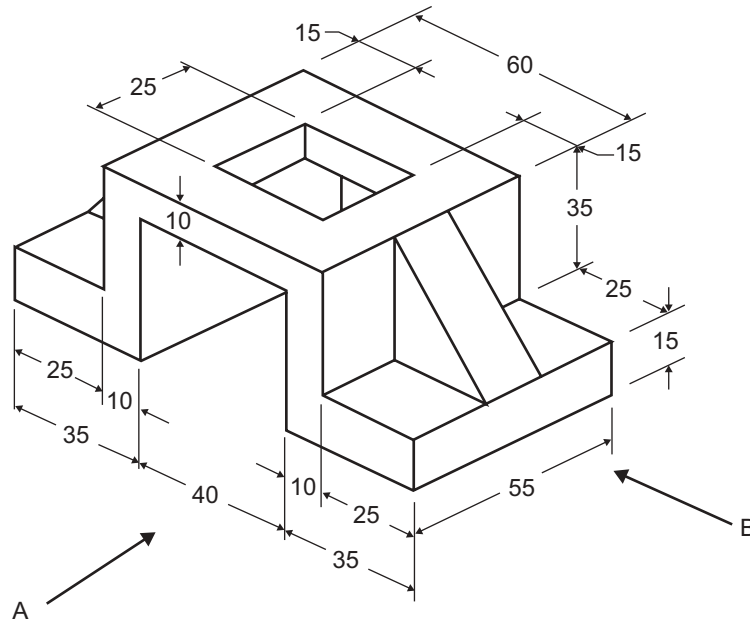
2 marks

Question 3

Below is an isometric view of an engineering component.

You are required to **sketch two** aligned drawings of the object.

- a. Sketch a front view from direction A of the object. Maintain proportion and use the starting corner guides.
- b. Sketch a side view from direction B of the object. Maintain proportion and use the starting corner guides.



Front view



Side view

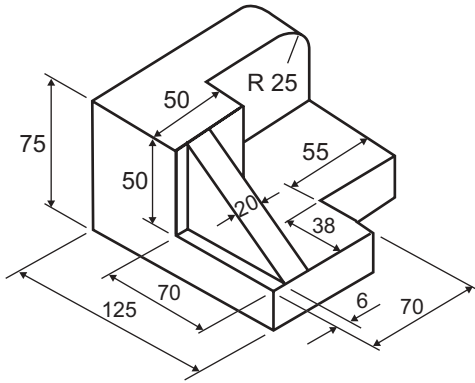
6 marks

Question 4

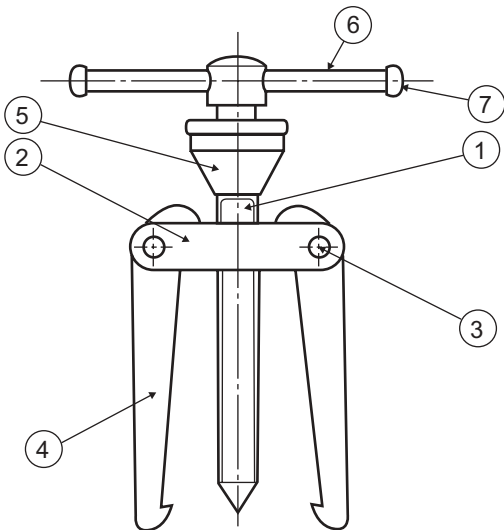
Below are examples of the different types of engineering drawing. Label each drawing, selecting your answers from the following list.

- assembly drawing
- subassembly drawing
- detailed assembly drawing
- detailed drawing

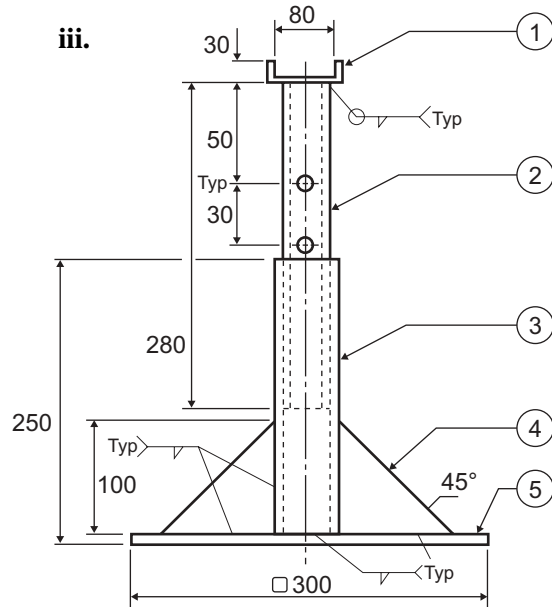
i.



ii.



iii.



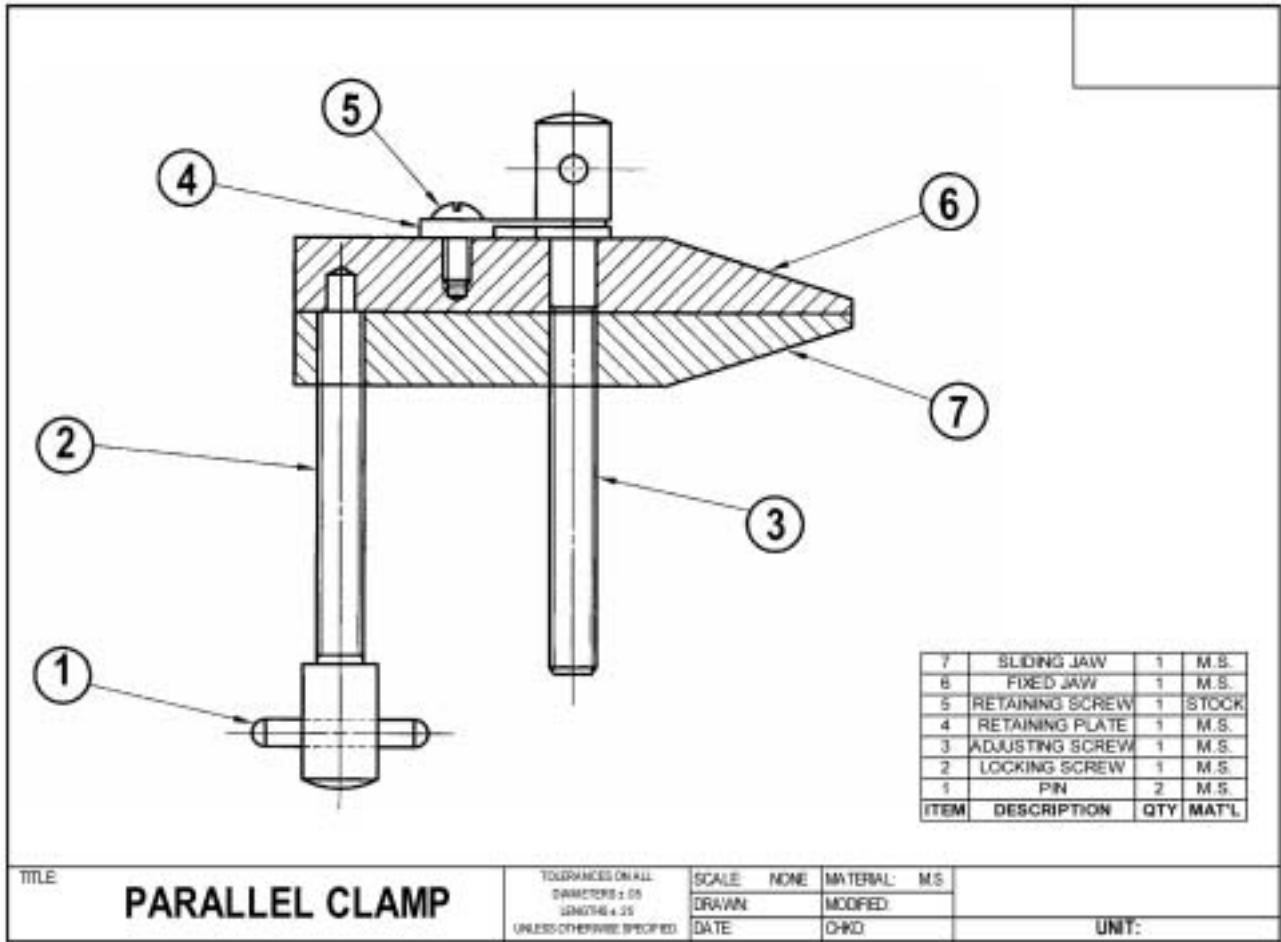
3 marks
Total 15 marks

SECTION C – VBN 776 Using basic engineering principles to plan the fabrication of engineering components

Instructions for Section C

Answer **all** questions in the spaces provided.

The following drawing represents a parallel clamp. This clamp is used in the workshop for a variety of purposes, including clamping and marking out. Your class is about to manufacture a parallel clamp. Different groups will manufacture different components of the clamp and it will be assembled when all the components are completed.



Question 1

Name a suitable material for the manufacture of a fixed jaw.

1 mark

Question 2

From the assembly drawing, identify the item which would be commercially available.

1 mark

Question 3

The tolerance on the diameters for the parallel clamp is $\pm .05$ mm. What does the term tolerance mean in these specifications?

1 mark

Before you begin manufacturing the different components of the parallel clamp you will need to carefully plan the manufacture. You will need to have a complete list of the operations, types of machine, work holding methods, equipment and types of cutters needed to complete the task. This planning will be done on an operational planning sheet. A copy of an operational planning sheet is shown below.

Question 4

Complete the operational planning sheet for the **sliding jaw – item 7** component of the parallel clamp. All of the operation descriptions are listed. You will need to complete the other columns.

OPERATIONAL PLANNING SHEET**Part Name: Sliding Jaw – item 7**

Op. No.	Operation description	Type of machine	Work holding method	Equipment	Type of cutter
1	Check size	NA*	Hand	Steel rule	NA*
2	Clean and debur	NA*			NA*
3	Mark out	NA*		i. ii. iii.	NA*
4	Drill and tap				
5	Mill the taper (angle)				
6	File ends square	NA*			NA*
7	Finish	NA*	Hand or Vice	i. File, ii. Emery cloth	NA*

* NA = Not applicable

4 marks

Question 5

Complete the operational planning sheet for the **locking screw – item 2** component of the parallel clamp. All of the operation descriptions are listed. You will need to complete the other columns.

Part Name: Locking screw – item 2

Op. No.	Operation description	Type of machine	Work holding method	Equipment	Type of cutter
1	Check size	NA*	Hand	Steel rule	NA*
2	Clean and debur	NA*	Vice	File	NA*
3	Face and centre drill				
4	Turn outside diameters of the screw				
5	Produce screw thread				
6	Turn and chamfer location screw outside diameter				NA*
7	Mark out hole	NA*			NA*
8	Drill hole				
9	Finish/Debur	NA*	NA*	Emery cloth File	NA*

* NA = Not applicable

6 marks

Question 6

Excessive noise is one environmental problem in the workplace.

Name **two** considerations that need to be identified before starting the manufacturing operations.

i. _____

ii. _____

2 marks

Total 15 marks

SECTION D – VBN 777 Handle engineering materials in a safe and proper manner

Instructions for Section D
Answer **all** questions in the spaces provided.

Question 1

Back injury is one of the most common health and safety issues in the workplace. What are the **three most important strategies** used to ensure a load is lifted correctly?

- i. _____
- ii. _____
- iii. _____

3 marks

Question 2

Describe how you would organise a team lift.

2 marks

Question 3

Name a mechanical device for moving an oxygen cylinder from the workshop.

1 mark

A MSDS is often required in the workforce.

Question 4

a. What do the initials MSDS stand for?

b. Why would you need to refer to a MSDS?

1 + 1 = 2 marks

Question 5

How would you measure noise in the workplace?

1 mark

Test lifts are important in the workplace.

Question 6

a. Why is it important to have a test lift?

b. How would you size up a load to be lifted?

1 + 1 = 2 marks

Question 7

Give **two** examples of dangerous materials.

i. _____

ii. _____

2 marks

Question 8

Name **two** mechanical aids to assist in the movement of heavy materials.

i. _____

ii. _____

2 marks

Total 15 marks

END OF SECTION D

SECTION E – VBN 778 Produce basic engineering components using fabrication and machining techniques

Instructions for Section E

Answer **all** questions in the spaces provided.

Question 1

You are just starting in a new workplace. Name **three** items you must bring with you to ensure that minimum safety requirements are met?

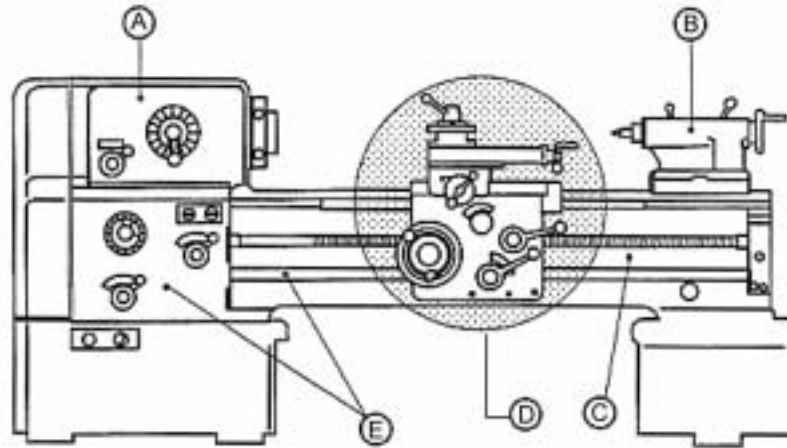
1 mark

Question 2

Safety precautions in the workshop are essential. Give **one** reason why they are important.

1 mark

Question 3



Name the parts of the lathe identified by the letters A–E.

A _____

B _____

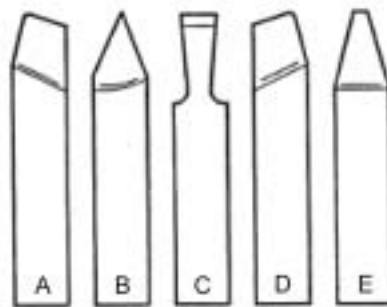
C _____

D _____

E _____

5 marks

Question 4



lathe tools

a. What is the name of the lathe tool marked B?

b. What is this lathe tool B used for?

1 + 1 = 2 marks

Question 5

What is the name of the part of the lathe that is used to turn a taper on a workpiece?

1 mark

Question 6

Why would you use a four jaw chuck to hold a black mild steel shaft Ø 50?

1 mark

Question 7

What is the purpose of the following equipment?

i. parallel strips

ii. odd leg (Jenny) calipers

iii. prick punch

3 marks

Question 8

A cutting tool is marked HSS. What do these letters stand for?

1 mark

Question 9

What is the full name of the drill shown?



1 mark

Question 10

Name **two** types of cut off machines.

i. _____

ii. _____

2 marks

Question 11

A horizontal mill is one type of milling machine. Name **one** other.

1 mark

Question 12

Name the following types of milling cutters.



2 marks

Question 13

Name **one** type of wheel dresser.

1 mark

Question 14

Using a machine vice is one method of holding work on a milling machine.

What is another method?

1 mark

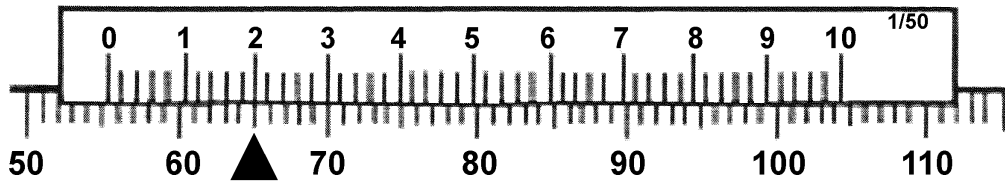
Question 15

Why is wheel dressing necessary on grinding wheels?

1 mark

Question 16

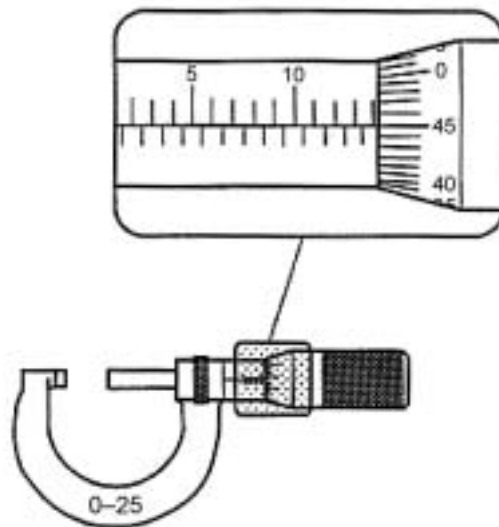
What is the reading of the vernier caliper scale shown?



2 marks

Question 17

What is the reading on the micrometer shown?



2 marks

Question 18

Listed below are four commonly used joining methods. For each method give an example of what you would use it for.

- i. blind rivet

Used for _____

- ii. self-tapping screw

Used for _____

- iii. soldering

Used for _____

- iv. hexagon bolt

Used for _____

4 marks

Question 19

What is a datum point?

1 mark

Question 20

Calculate the rpm for a diameter 10 drill if the recommended cutting speed is 40 m/min. ($\text{rpm} = \frac{300 v}{d}$)
where v = cutting speed.

1 mark

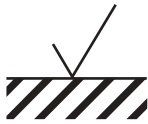
Question 21

You are using a cemented carbide cutting tool. Use the nomogram on page 20 to calculate the approximate rpm to finish turn 25 diameter mild steel.

1 mark

Question 22

The following symbol indicates a type of surface finish.



Name the finish.

1 mark

Swarf is a danger in the workplace.

Question 23

a. Why is swarf dangerous?

b. Describe a safe method of swarf removal.

1 + 1 = 2 marks

Question 24

Name one ferrous and one non-ferrous metal.

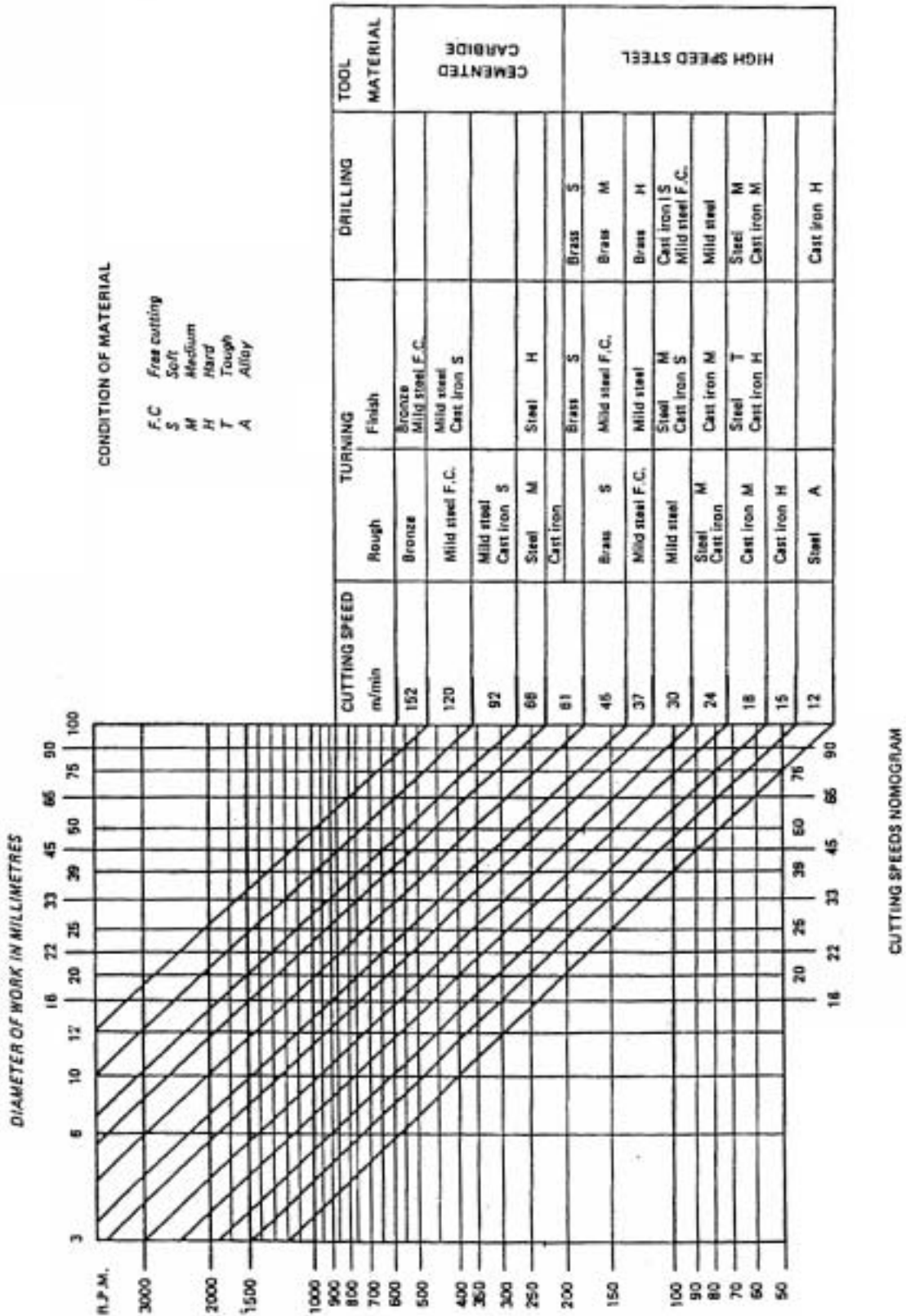
ferrous metal _____

non-ferrous metal _____

2 marks

Total 40 marks

Cutting speeds nomogram



END OF QUESTION AND ANSWER BOOK