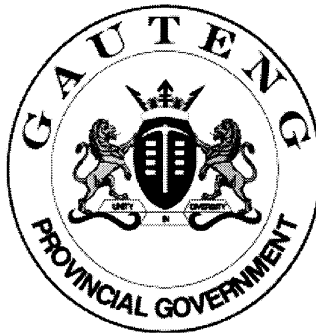


SENIOR CERTIFICATE EXAMINATION



**FEBRUARY / MARCH
2007**

METALWORK

SG

Second Paper

719-2/2 E

**METALWORK SG: Paper 2
Theory**

10 pages



719 2 2E

SG

X05



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GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION

METALWORK SG
(Second Paper: Theory)

TIME: 2 hours

MARKS: 200

INSTRUCTIONS:

- Answer ALL the questions.
 - Sketches may be used to illustrate your answers.
 - Leave a line and rule off after you have answered each question.
-
-

QUESTION 1
MULTIPLE-CHOICE QUESTIONS

Various possible answers (A – D) are provided for each of the following questions. Indicate the correct answer by making a cross (X) over the appropriate letter next to the relevant question number on the **answer sheet** on the **inside cover** of your **answer book**.

- 1.1 Combination pliers are used in _____ .
- A. bending work
 - B. cutting work
 - C. gripping
 - D. All of the above.
- 1.2 Cutting tools are made of _____ .
- A. mild steel
 - B. copper
 - C. cast iron
 - D. high-carbon steel
- 1.3 A Morse twist drill is ground at an angle of _____ .
- A. 60°
 - B. 140°
 - C. 118°
 - D. 120°

- 1.4 To cut concave and convex shapes in sheet metal, _____ are used.
- A. straight snips
 - B. curved snips
 - C. universal snips
 - D. None of the above.
- 1.5 In gas welding, the neutral flame is used for _____ .
- A. general heating
 - B. welding of mild steel
 - C. soft soldering
 - D. All of the above.
- 1.6 Steel alloys are mainly obtained by mixing iron with _____ .
- A. tin
 - B. chromium and nickel
 - C. zinc
 - D. lead
- 1.7 Power transmission to machines can be transferred by means of _____ .
- A. V pulleys and belts
 - B. gears
 - C. direct drive from the source
 - D. All of the above.
- 1.8 Which of the following is a coolant?
- A. Borax
 - B. Zinc chloride
 - C. Resin
 - D. Soluble oil
- 1.9 Hard soldering is a/an _____.
- A. permanent joint
 - B. temporary joint
 - C. adhesive joint
 - D. melted joint
- 1.10 Which metal is classified as a non-ferrous metal?
- A. Copper
 - B. Cast steel
 - C. Mild steel
 - D. Cast iron

- 1.11 Which instrument is used to measure the gauge of wire and sheet metal?
- A. Feeler gauge
 - B. Standard wire gauge
 - C. Thread pitch gauge
 - D. Wire and sheet-metal gauge
- 1.12 Keyways are cut in a shaft by means of a _____ .
- A. diamond pointed chisel
 - B. flat cold chisel
 - C. round nose chisel
 - D. cross-cut chisel
- 1.13 An off-centre drilled hole is pulled over with a _____ .
- A. diamond pointed chisel
 - B. flat cold chisel
 - C. round nose chisel
 - D. cross-cut chisel
- 1.14 From which of the following ores is copper extracted?
- A. Magnetite
 - B. Bauxite
 - C. Hematite
 - D. Sulphide
- 1.15 The metal which is held in boiling water and then cooled in order to anneal is _____ .
- A. copper
 - B. brass
 - C. aluminium
 - D. zinc
- 1.16 Stainless steel does not rust because it contains _____ .
- A. copper
 - B. aluminium
 - C. tin
 - D. chromium
- 1.17 Zinc chloride cannot be used to solder _____ .
- A. galvanised sheet
 - B. tinplate
 - C. copper
 - D. bronze
- 1.18 What is used to join brass sheet invisibly?
- A. Fine solder
 - B. Spelter
 - C. Silver solder
 - D. Bronze

1.19 A vernier calliper should measure accurately to _____ .

- A. 0.001
- B. 0.02
- C. 0.01
- D. 0.05

1.20 _____ should be used as a coolant when drilling cast iron.

- A. Paraffin
- B. Turpentine
- C. Oil
- D. Nothing

20x1= **[20]**

QUESTION 2

2.1 Indicate whether the following statements are **TRUE** or **FALSE** by simply writing the letter **T** (true) or **F** (false) next to the corresponding question number.

2.1.1 Hydrochloric acid is used as a flux for hard soldering.

2.1.2 The carbon content of mild steel is 1,5%.

2.1.3 The Jenny calliper is used to draw circles and curves on metal.

2.1.4 Salamoniac is a lubricant.

2.1.5 The diamond-pointed chisel is used to clear inside corners.

2.1.6 118° is the included angle formed by the two cutting edges of a morse twist drill.

2.1.7 The Jacobs chuck is used to hold square bars in the metalwork lathe during cutting.

2.1.8 Ductility is the ability of metal to be drawn out into thin wire or tubing.

2.1.9 A ball pene hammer is used to shape sheet metal.

2.1.10 A Stillson wrench is used to release damaged bolts and nuts.

(10)

- 2.2 Copy the items from Column **A** one below the other. Now write next to these the items from Column **B** that are related to those in Column **A**.

COLUMN A		COLUMN B	
2.2.1	Oxygen cylinder	A.	External thread
2.2.2	Electric arc furnace	B.	Soluble oil
2.2.3	Hand vice	C.	Anti-clockwise thread
2.2.4	Soldering iron	D.	Black in colour
2.2.5	Etching	E.	Die stock
2.2.6	Acetylene cylinder	F.	Copper
2.2.7	Tap wrench	G.	First class lever
2.2.8	Shifting spanner	H.	Third class lever
2.2.9	Die nut	I.	Beeswax
2.2.10	Brass	J.	Water-cooled roof
		K.	Silver solder

(10)

[20]

QUESTION 3

- 3.1 During the arc welding process the following mistakes are made, resulting in welding defects. Name the welding defect in each case.
- 3.1.1 Incorrect angle of the electrode
- 3.1.2 Too fast cooling of the weld
- 3.1.3 The slag is not removed thoroughly after each weld
- 3.1.4 Too strong a current resulting in overheating
- 3.1.5 Too little welding metal deposited (5)
- 3.2 Name any FIVE differences between the oxygen and an acetylene cylinder. (5)
- 3.3 State the meaning of each of the following terms and give an example of each.
- 3.3.1 Annealing of steel
- 3.3.2 Hardening of steel
- 3.3.3 Case hardening
- 3.3.4 Tempering of steel 4x2= (8)
- 3.4 Name ONE coolant used with each of the following metals:
- 3.4.1 Steel
- 3.4.2 Copper (2)

[20]

QUESTION 4

4.1 Figure 1 shows the profiles of different lathe tools.

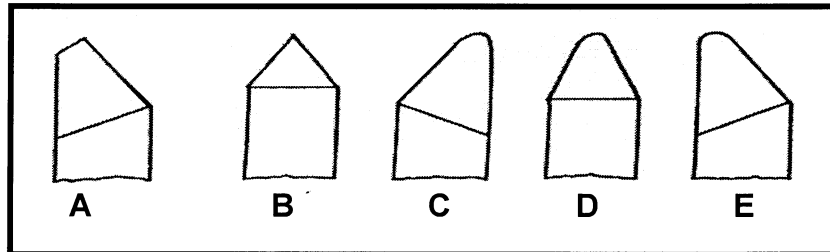


Figure 1

4.1.1 Redraw the lathe tools and indicate by means of an arrow, the direction of movement during the cutting action. (5)

4.1.2 Supply the correct name for each cutting tool. (5)

4.2 Figure 2 shows different lathe accessories.

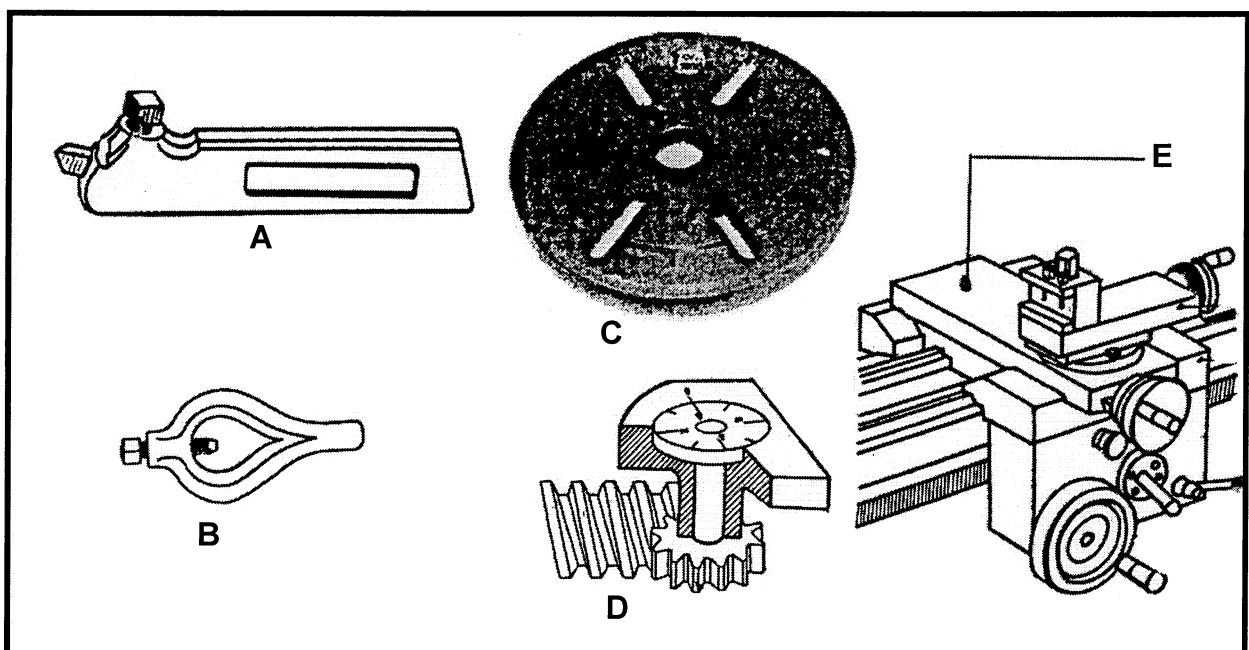


Figure 2

4.2.1 Name each of the accessories labelled A to E. (5)

4.2.2 Give a use for each of the following:

- A. Boring bar
- B. Knurling tool
- C. Revolving centre
- D. Combination centre drill
- E. Travelling steady

(5)
[20]

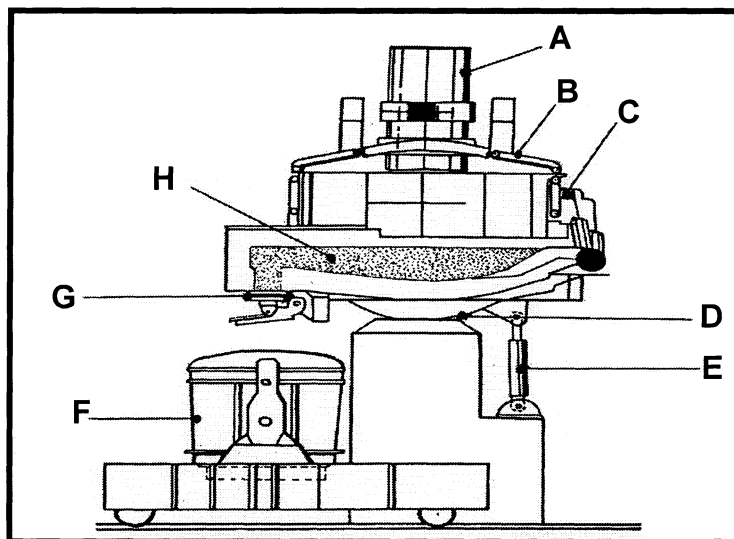
QUESTION 5

- 5.1 What is an **alloy**? (2)
- 5.2 What is the purpose of manufacturing alloys? (4)
- 5.3 Name THREE types of steel alloys and give ONE use for each. (3)
- 5.4 Name the SEVEN main stages in the manufacturing process of copper according to the Phalaborwa process. (7)
- 5.5 Describe point by point the annealing process of copper. (3)
- 5.6 Give ONE reason why copper is used for the head of a soldering iron. (1)

[20]

QUESTION 6

Figure 3 shows a diagram of an electric arc furnace. Study the diagram and answer the questions that follow.

**Figure 3**

- 6.1 Where is the electric current carried to? (1)
- 6.2 What causes the furnace charge to heat? (1)
- 6.3 Name the materials used to charge the electric arc furnace. (2)
- 6.4 In total, how long does the smelting process last before tapping takes place? (1)
- 6.5 Which additions are made for refining to take place? (2)
- 6.6 Which metal is manufactured in the electric arc furnace? (1)
- 6.7 Name FOUR advantages of the electric arc furnace. (4)
- 6.8 Name parts **A** to **H** of the electric arc furnace. (8)

[20]

QUESTION 7

- 7.1 Copy the following list of tools or machines with their question numbers and next to each, give ONE use.
- | | | |
|--------|-------------------------------|------|
| 7.1.1 | Standard wire gauge | |
| 7.1.2 | Thread tool and setting gauge | |
| 7.1.3 | Hawkbill snips | |
| 7.1.4 | Screw-thread pitch gauge | |
| 7.1.5 | Chasing dial | |
| 7.1.6 | Emery wheel dresser | |
| 7.1.7 | Micrometer | |
| 7.1.8 | Vernier | |
| 7.1.9 | Half-moon stake | |
| 7.1.10 | Independent four-jaw chuck | (10) |
- 7.2 Draw THREE kinds of levers used in the metalwork centre. Clearly indicate the position of the effort, fulcrum and load of each lever **and** give a use for each kind of lever. (9)
- 7.3 What is the meaning of the term **sweat soldering**? (1)
[20]

QUESTION 8

- 8.1 A drill press is driven by an electric motor that turns at 1 400 r.p.m. The pulley on the motor has a diameter of 50 mm and the pulley on the drill spindle has a diameter of 125 mm. Calculate the speed of the drill (show the formula as well as **all** calculations). (6)
- 8.2 Name and make neat drawings of FOUR different bolt heads. (8)
- 8.3 Name and make neat drawings of TWO different rivet heads. (4)
- 8.4 Make neat drawings of a double-folded seam and a wired edge used in sheet-metalwork. (2)
[20]

QUESTION 9

- 9.1 Complete the following sentences by filling in the suitable missing words. Write the question numbers below each other and the word(s) next to it.
- 9.1.1 Plumbing _____ is an alloy consisting of _____ and tin. (2)

- 9.1.2 Zinc chloride is used as a flux during the _____ soldering process and it is prepared by pouring _____ acid on pieces of _____ in a _____ dish. (4)
- 9.1.3 Galvanised iron sheets consist of _____ steel sheets that have been covered on both sides with a thin layer of _____. (2)
- 9.1.4 A _____ is used to complete a folded seam, while a _____ is used to shape the head of a snap-head rivet. (2)
- 9.2 Name the tool or machine on which the following component parts or accessories are found:
- 9.2.1 Chuck key
9.2.2 Driver plate
9.2.3 Centres
9.2.4 Operating pressure gauge (4)
- 9.3 What precautionary measures would you take when doing the following?
- 9.3.1 Gripping Perspex in a vice
9.3.2 Drilling a large diameter hole through a Perspex sheet
9.3.3 Drilling a 12 mm diameter hole on the drilling machine through thin sheet metal (3)
- 9.4 Name THREE precautionary measures to be observed when fitting the pressure regulator to an acetylene cylinder. (3)

[20]**QUESTION 10**

- 10.1 The design loop is a simple process that can be used productively for practical subjects. Name the FOUR phases it consists of. (4)
- 10.2 Your neighbours have asked you to design a bird-feeder stand for their garden so that they can feed seeds and fruit to the birds during the winter months.
- 10.2.1 Make a neat working drawing for the bird stand. (10)
- 10.2.2 Draw up a cutting list for all materials required. (4)
- 10.2.3 Explain what kind of finish you would use and give a reason. (2)

[20]**TOTAL: 200****END**