



ZIMBABWE

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
INNOVATION, SCIENCE AND TECHNOLOGY
DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

MACHINESHOP ENGINEERING

SUBJECT: Workshop Technology

PAPER NO : 340/18/S01A

DURATION: 3 hours

MARCH / APRIL 2022 EXAMINATION

REQUIREMENTS

- 1) Scientific calculator
- 2) BS:4500 data sheet.
- 3) Answer booklet.

INSTRUCTIONS TO CANDIDATES

- 1) Section A: answer all questions (20 marks).
- 2) Section B: answer all questions (40 marks)
- 3) Section C: answer all four (4) questions 20 marks each.

This paper consists of 6 printed pages.

SECTION A: ANSWER ALL QUESTIONS

QUESTION 1

- 1.1 Define the term 'accident'. (1 mark)
- 1.2 Name a chisel used to cut keyways. (1 mark)
- 1.3 States the point angle for a drill bit for drilling steel. (1 mark)
- 1.4 The teeth of a hacksaw blade should face which direction. (1 mark)
- 1.5 Bronze is an alloy of copper and --- (1 mark)
- 1.6 Define heat treatment (1 mark)
- 1.7 Define carburising in heat treatment. (1 mark)
- 1.8 Give one active flux (1 mark)
- 1.9 Solder is an alloy of lead and ---- (1 mark)
- 1.10 State one use of a seal. (1 mark)
- 1.11 State s scraper used to scrap a curved surface. (1 mark)
- 1.12 List one type of a permanent joint. (1 mark)
- 1.13 The size of a vice is determined by ----- (1 mark)
- 1.14 state the type of a scraper used to scrap a curved surface. (1 mark)
- 1.15 Name the type of a gauge used to check the size of a cylindrical hole.
(1 mark)
- 1.16 A combination spanner has a ring and ---- end . (1 mark)
- 1.17 Drill bit lip lengths must be the same size or ---- hole is generated. (1 mark)
- 1.18 Steels that contain 0.4% carbon are----- (1 mark)
- 1.19 State one material for making, out tables surfaces. (1 mark)
- 1.20 A file card is used for ----- (1 mark)

SECTION B: ANSWER ALL QUESTIONS

QUESTION 2

- a) Draw and label the outside micrometer. State its accuracy. (10 marks)
- b)
 - i) State three (3) methods of arc welding. (3 marks)
 - ii) List four (4) weld defects. (4 marks)
 - iii) State three features by which a file is specified. (3 marks)

QUESTION 3

- a) Draw the iron-carbon on equilibrium diagram and show the following:
 - i) Austenite
 - ii) Hypo-eutectoid
 - iii) Hyper-eutectoid
 - iv) Eutectoid
 - v) Lower critical temperature
 - vi) Upper critical temperature(10 marks)
- b) Define the following terms
 - i) Ferrite
 - ii) Pearlite
 - iii) Cementite
 - iv) Martensite
 - v) Annealing(5 marks)
- c) State five (5) properties of a good cutting fluid. (5 marks)

SECTION C: ANSWER ALL QUESTIONS

QUESTION 4

- a) The hole and shaft sizes are stated as $H^8 f^7$ with a nominal diameter 80mm. Calculate:
- i) Tolerance for the hole
 - ii) Tolerance for the shaft
 - iii) Minimum Allowance
 - iv) Maximum allowance
 - v) State the type of fit. (10 marks)
- b) Sketch the following thread forms and give one purpose for each:
- i) Acme thread
 - ii) Square thread
 - iii) Buttress thread
 - iv) Metric thread
 - v) Knuckle thread (10 marks)

QUESTION 5

- a) Draw a hydraulic circuit diagram and show the following elements:
- i) Tank (2 marks)
 - ii) Motor and pump (2 marks)
 - iii) Relief valve (2 marks)
 - iv) Pressure gauge (2 marks)
 - v) Direction control valve (D.C.V) (2 marks)
 - vi) Double acting cylinder and piston. (2 marks)
- b) i) State three (3) advantages of a hydraulic system over a mechanical system. (3 marks)

- ii) List three (3) advantages of pneumatics over hydraulics. (3 marks)
- c) State the purpose of:
 - i) Sieves (1 mark)
 - ii) Magnetic strainers in a hydraulic system. (1 mark)

QUESTION 6

- a) Define the term 'boiler'. (3 marks)
- b) Explain the differences between the fire tube and the water tube boiler. (12 marks)
- c) Explain which boiler would be suitable for bulk steam supply. (5 marks)

QUESTION 7

- a) i) State three (3) methods of transmitting power in an engineering shop. (3 marks)
- ii) Give two (2) advantages of belt devices over gear drives. (2 marks)
- b) Neatly sketch a ball bearing showing the following:
 - i) Outer race
 - ii) Inner race
 - iii) the cage
 - iv) the ball(10 marks)
- c) State five (5) locking devices used with bolts and nuts. (5 marks)

BRITISH STANDARD
SELECTED ISO FITS—HOLE BASIS

[illegible]

British Standard data sheet BS 4500A; selected ISO fits – hole basis

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