



ZIMBABWE

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

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

CIVIL ENGINEERING

**MODULE: Civil Engineering Draughting and PAPER NO: 313/22/M03
Detailing**

DURATION: 3 Hours

MAY/JUNE 2025 EXAMINATION

REQUIREMENTS

- 1) Drawing board and instruments.
- 2) Non programme calculator.

INSTRUCTIONS TO CANDIDATE

- 1) Section A carries (60 marks) and section B carries (40 marks).
- 2) Answer all questions.
- 3) Section A and B should be answered in different booklets.

This paper consists of 4 printed pages.

SECTION A

QUESTION 1

- a) Construct an ellipse in a rectangle measuring 100mm and 80mm. (5 marks)
- b) Given diagonal of 80mm construct a regular pentagon. (5 marks)
- c) A triangle has a perimeter of 147mm using a side ratio of 2:3:4 construct the triangles. (10 marks)

QUESTION 2

A square reinforced concrete column spanning from a base $2500 \times 400\text{mm}$. The column has side 450mm. Use the design information below:

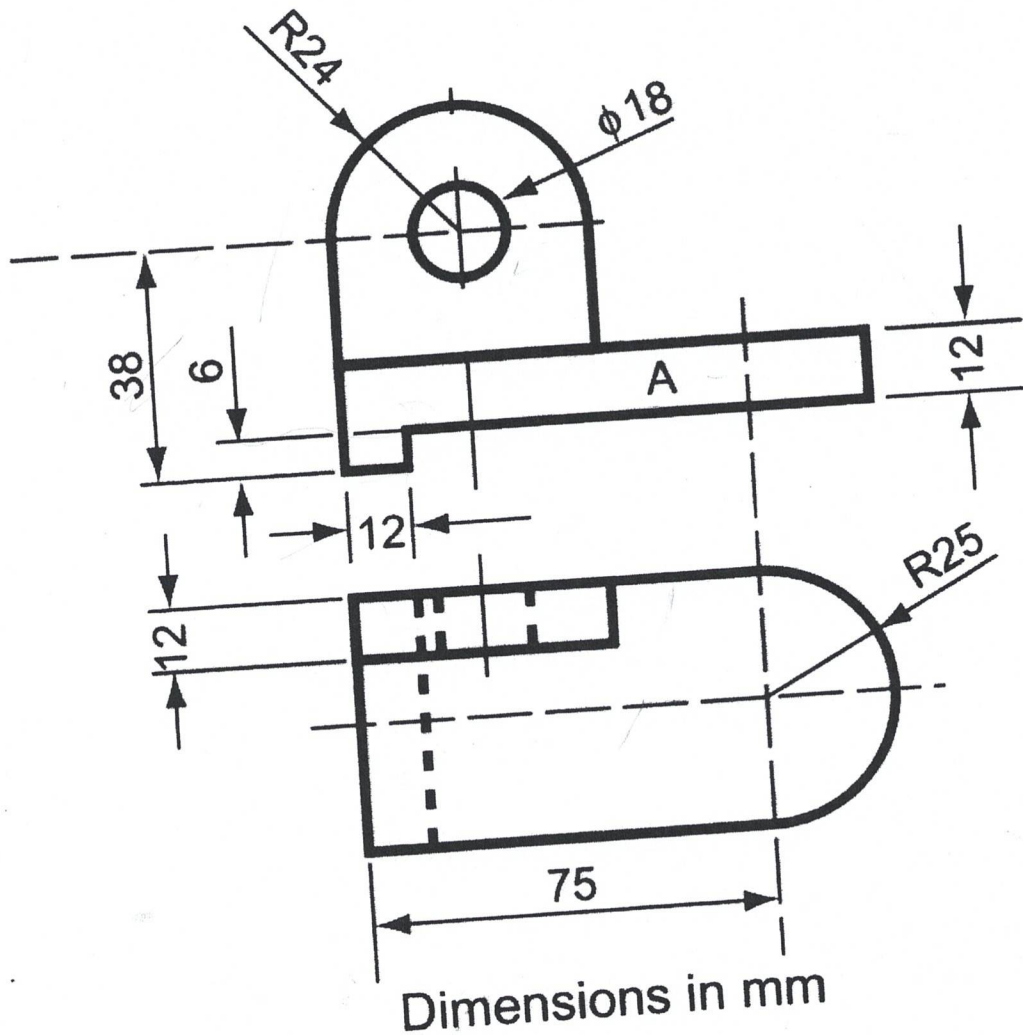
Size	Base ()	Column (side 450)
Reinforcement	25mm high yield steel at centres 200mm	i) diameter high yield extending 2700mm
Stirrups		ii) 8mm diameter mild steel binders 150mm starting at the top of base.
Cover	40mm	40mm
Kicker		75mm

- a) Detail at a scale 1:20 the base and the square column. (15 marks)
- b) Prepare a bar bending schedule. (5 marks)

QUESTION 3

Draw in isometric projection with face A on the front.

(20 marks)



SECTION B

QUESTION 1

- Simplify $\frac{a^3-b^3}{a-b}$ (3 marks)
- Evaluate $\frac{\log 25 - \log 125 + \frac{1}{2} \log 625}{3 \log 5}$ (3 marks)
- Solve the equation for t by completing the square: $2t^2 + 5t = 4$. (4 marks)

PAPER NO: 313/22/M03-CIVIL ENGINEERING DRAUGHTING AND
DETAILING

- d) Solve the simultaneous equations
 $2x + 3y = 14$
 $x + 3y = 10$ (4 marks)
- e) Find the derivative of $x^2 + 4x + 5$ from first principles. (3 marks)
- f) Find the volume of a cone of radius 6.0cm and perpendicular height 8.0cm. (3 marks)

QUESTION 2

Mark	0-9	10-19	20-29	30-39	40-49	50-59
Frequency	5	18	23	17	14	3

- a) Calculate the mean mark. (4 marks)
- b) Construct a "more than" Ogive for the data and use it to estimate the median mark. (6 marks)

QUESTION 3

Without drawing the graph of the relation $y = (4 - x)(2 + x)$, write down the coordinates of the point where the curve cuts

- a) The $x - axis$ (2 marks)
- b) The $y-axis$ (2 marks)
- c) State whether the curve has a maximum or minimum value of y . (2 marks)
- d) Write down the value of x this point (2 marks)
- e) Hence calculate the corresponding value of y . (2 marks)

QUESTION 4

- a) Find the area enclosed by the curves $y = x(x - 1)$ and $y = x(2 - x)$. (5 marks)
- b) Find the volume of the solid generated by rotating about the $y-axis$ the area in the first quadrant enclosed by $y = x^2$, $y = 1$, $y = 4$ and the y axis. (5 marks)
-/fk