



ZIMBABWE

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

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL DIPLOMA

IN

CONSTRUCTION ENGINEERING

MODULE: Product Design

PAPER NO: 527/23/M01

DURATION: 4 Hours

NOVEMBER / DECEMBER 2025 EXAMINATION

REQUIREMENTS

1. Computer loaded with AutoCAD.
2. Scientific calculator.
3. Answer booklet.
4. CD Disk.

INSTRUCTIONS TO CANDIDATE

1. Section A is compulsory.
2. Choose one (1) question in Section B.
3. Choose one (1) question in Section C.
4. Make sure your work is saved on the CD disk and on flash] disk.
5. Print your work and submit it together with the CD disk.
6. Only your candidate number should appear on the CD disk, printout and on the answer booklet.

SECTION A – COMPULSORY

QUESTION 1

- a) Reproduce the floor plan on Figure Q1a.

(35 marks)

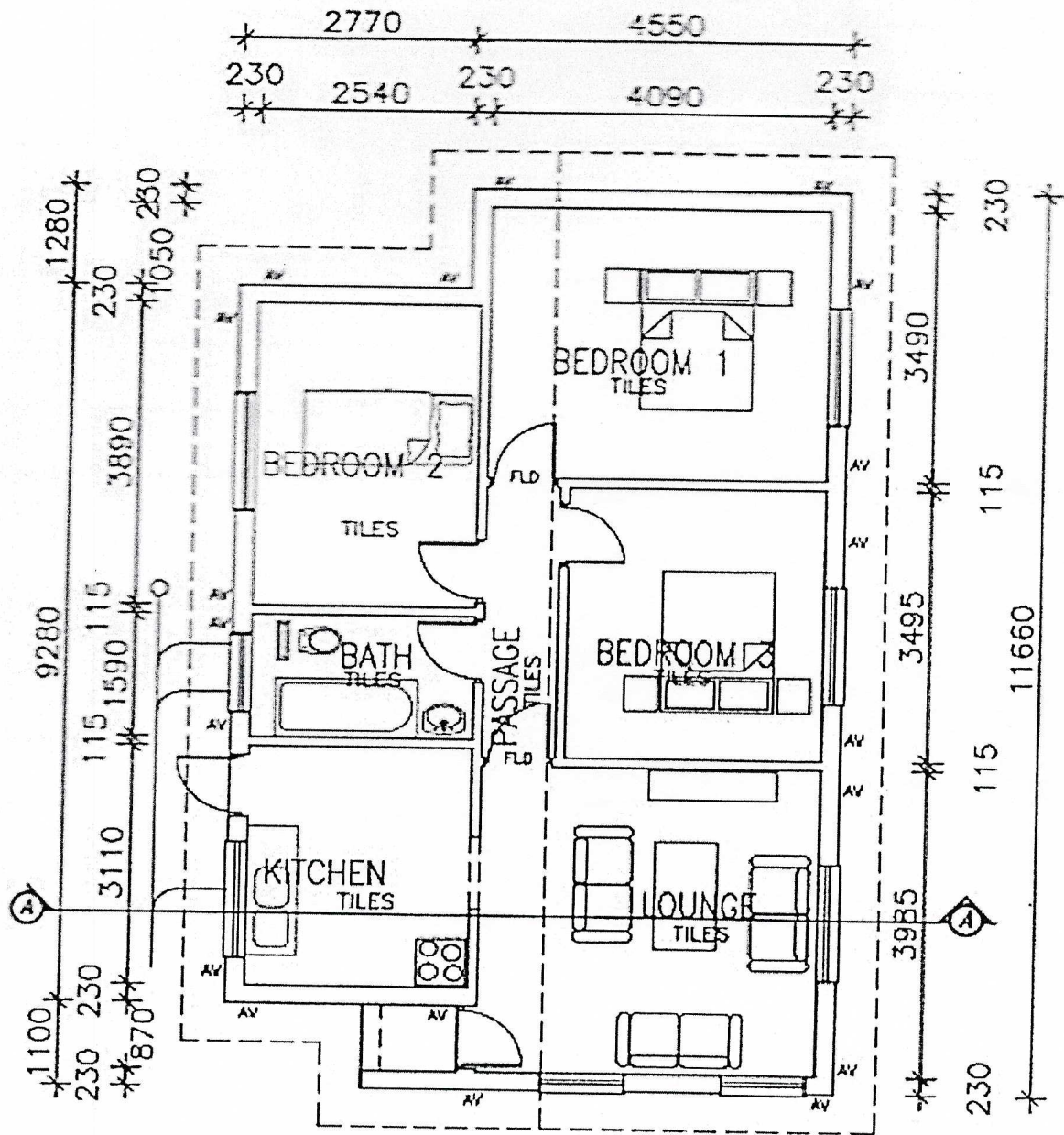


Figure Q1a

- b) Produce the cross-sectional elevation A – A.

(15 marks)

QUESTION 2

List and explain any five (5) disadvantages of using CAD over traditional drafting methods. (10 marks)

SECTION B

Choose one (1) question from this section.

QUESTION 3

- a) What do you understand by the following terms?
- i) Centre of mass (3 marks)
 - ii) Forces at equilibrium (3 marks)
 - iii) Torque (3 marks)
 - iv) Uniformly distributed load (3 marks)
 - v) Strut (3 marks)
- b) Describe Isaac Newton's three laws of motion. (5 marks)

QUESTION 4

- a) From the diagram on Figure Q4a, find the position of the centroid. (10 marks)

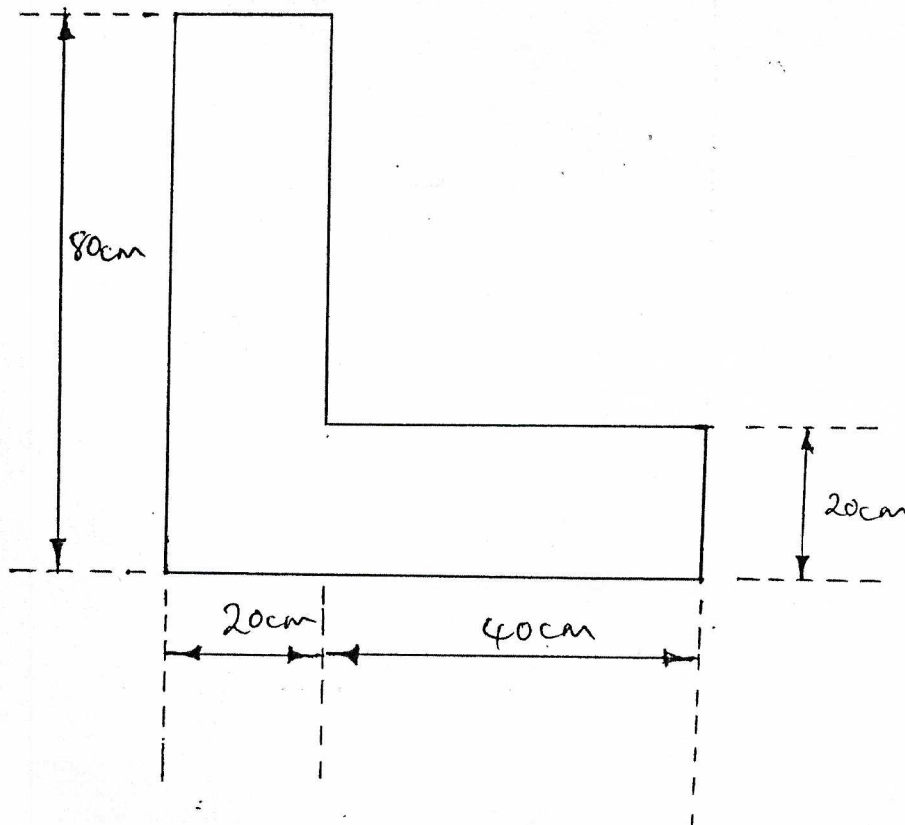


Figure Q4a

- b) Figure Q4b shows concurrent forces. Calculate the resultant force.
(10 marks)

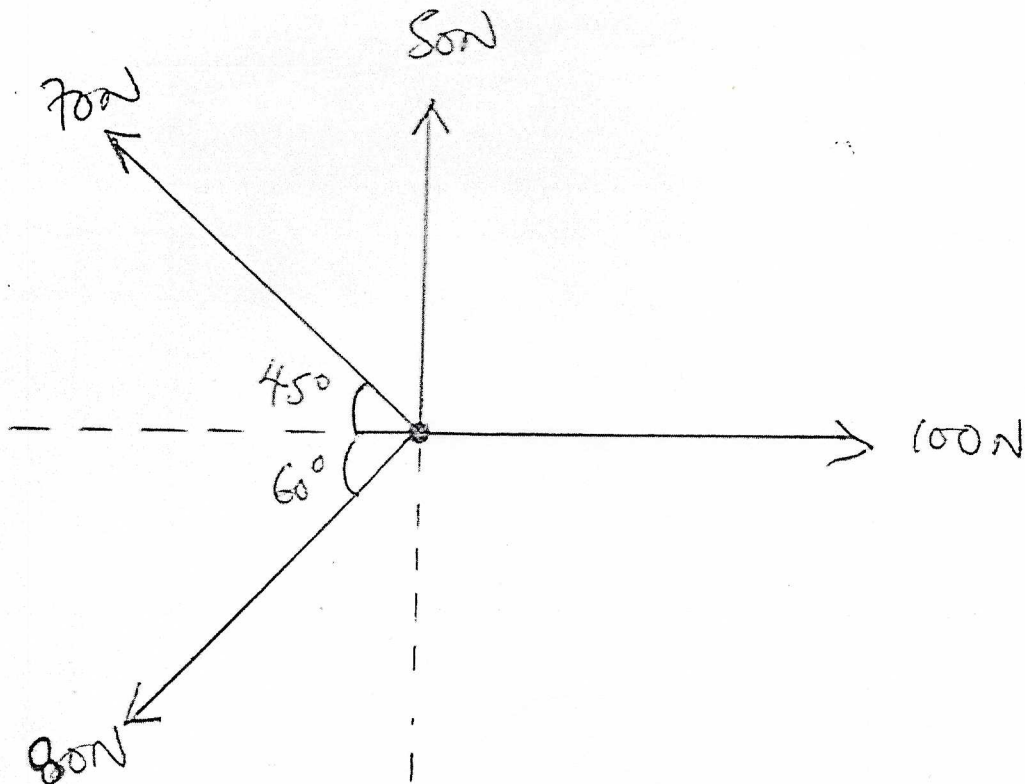


Figure Q4b

SECTION C

Choose only one (1) question from this section.

QUESTION 5

Compare and contrast the two (2) processes of compaction and consolidation.
(20 marks)

QUESTION 6

What are the primary physical properties of soil and how do they affect its behavior?
(20 marks)

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