higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N5

(8060015)

17 February 2022 (X-paper)
09:00–13:00

CLOSED BOOK EXAMINATION

REQUIREMENTS: **Answer book (8/13)**
A2 drawing sheets
Hot-rolled steel sections (BOE 8/2)

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 6 pages, 2 diagram sheets, 1 formula sheet and 2 addenda.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL CONSTRUCTION N5
TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. QUESTIONS 3, 5 and 6 must be done on the supplied A2 drawing paper.
4. QUESTION 7 must be answered on ADDENDUM 1 (attached).
5. Answer QUESTIONS 1, 2 and 4 in the ANSWER BOOK.
6. Number the answers according to the numbering system used in this question paper.
7. All drawings must be done in pencil with bold outlines.
8. The drawings must be done in accordance with the National Standards and be fully labelled with descriptive notes and dimensions (where applicable).
9. All calculations must conform to the relevant SABS/SANS Codes of Practice.
10. Write neatly and legibly.

QUESTION 1

An H-section parallel steel beam is required to span a distance of 10,5 m where the left-hand end forms a 2,50 m overhang. FIGURE 1 (below) shows the fully-loaded beam which includes the value of the reaction at the right-hand side. The self-weight of the steel beam must not be considered. Bending stress = 158 MPa.

1.1 Calculate the value of the reaction at the left-hand side and show all the calculations. (2)

1.2 Calculate and draw the shear-force diagram and include all the values. (5)

1.3 Calculate the bending moment values at B, C, and D. (3)

1.4 Calculate the section modulus and then choose a suitable H-section parallel flange steel beam to support the loads. (3)

1.5 Calculate the shear stress of the chosen beam. (3)

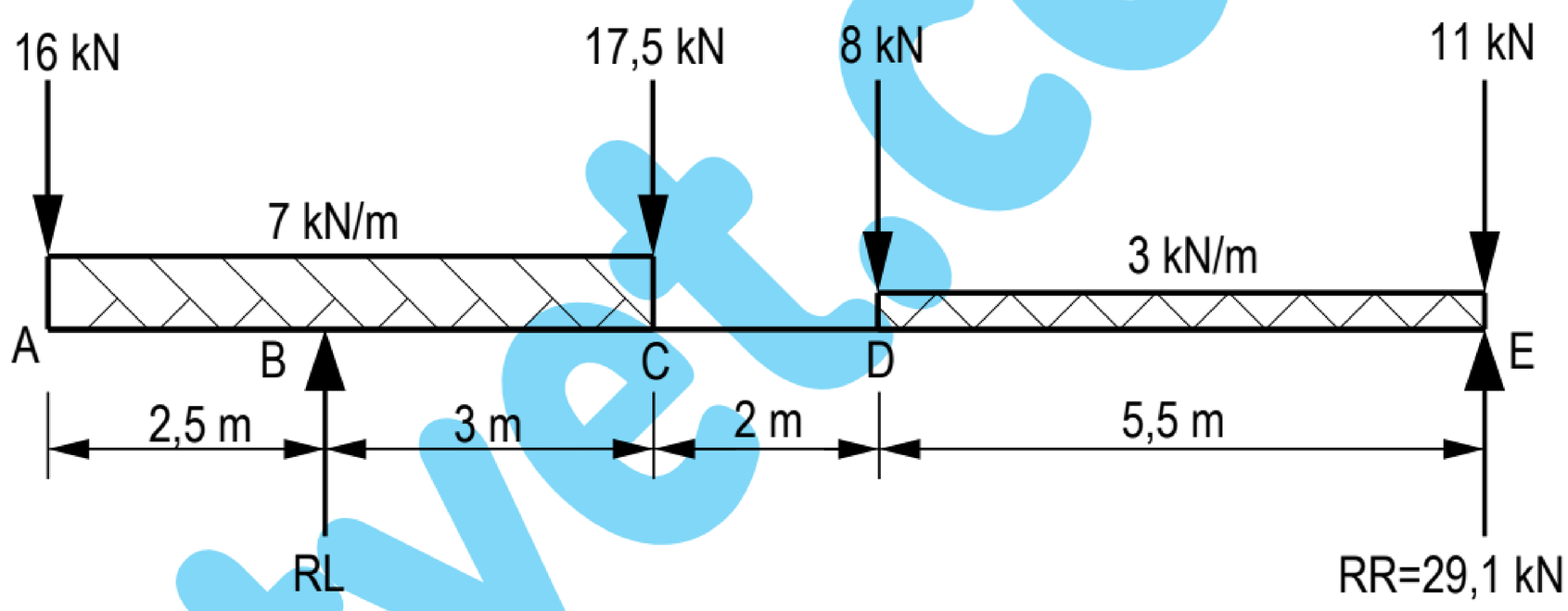

FIGURE 1

[16]

QUESTION 2

FIGURE 2, DIAGRAM SHEET 1 (attached) shows a lamina plate fixed to a rectangular base, with cutouts of a circle and a triangle.

Calculate the following:

2.1 The position of the neutral axis from the bottom of the base (5)

2.2 The second moment of the area (9)

2.3 The section modulus about the x-x axis (3)

[17]

