



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T140(E)(A13)T

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N5

(8060015)

13 August 2019 (X-Paper)
09:00–13:00

OPEN-BOOK EXAMINATION

REQUIREMENTS: ONE A2 drawing sheet
Hot-rolled structural steel sections (BOE 8/2)

This question paper consists of 7 pages and 1 formula sheet.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
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. Number the answers according to the numbering system used in this question paper.
 4. Draw a 20 mm border line around the DRAWING SHEET on both sides.
 5. Use only pencil on the DRAWING SHEET.
 6. Use both sides of the DRAWING SHEET.
 7. Draw ALL drawings to the required scale.
 8. Approximate calculations to THREE decimals.
 9. Use your discretion where dimensions are NOT given.
 10. Write neatly and legibly.
-

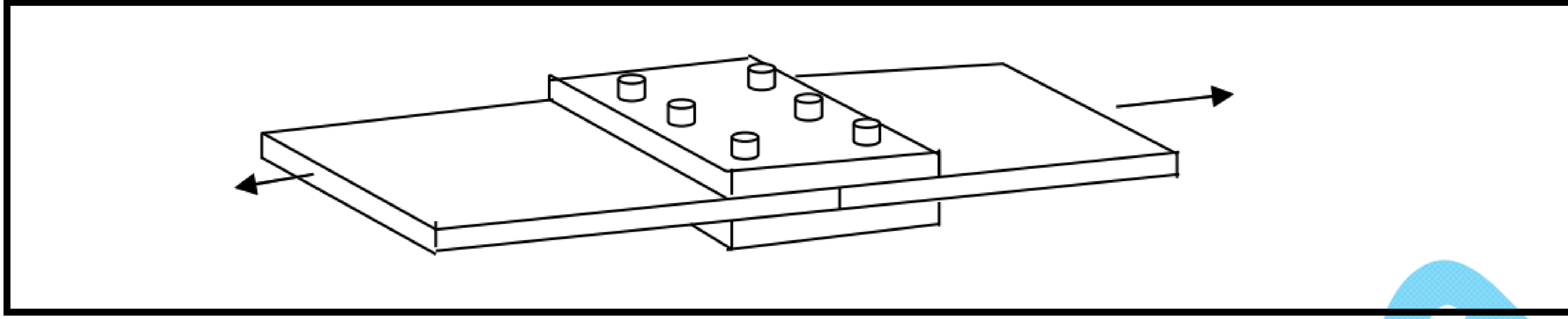
SECTION A: DESIGN**QUESTION 1: BOLT CONNECTION****FIGURE 1**

FIGURE 1 shows two tie bars connected by means of grade 4,5 bolts and two 6 mm thick connector plates.

Calculate the:

- 1.1 Resistance of the bolts to shearing (4)
- 1.2 Resistance of the bolts to crushing (4)
- 1.3 Resistance of the bolts to tearing (4)
- 1.4 Maximum force this connection can withstand safely (1)

Use the following specifications:

Bolts:	M12 (12 mm)
Tie bars:	60 × 8 mm
Holes in the tie bars:	14 mm
Maximum shear stress of the bolts:	100 MPa
Maximum tensile stress of the tie bars:	155 MPa
Maximum crushing stress between bolts and tie bars:	240 MPa

[13]