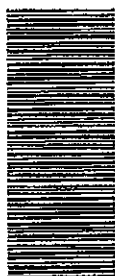


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education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**T260(E)(M31)T
APRIL 2010**

NATIONAL CERTIFICATE

BUILDING SCIENCE N3

(15070023)

**31 March (X-Paper)
09:00 – 12:00**

Calculators and drawing instruments may be used.

This question paper consists of 5 pages and 2 diagram sheets.

**DEPARTMENT OF EDUCATION
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
BUILDING SCIENCE N3
TIME: 3 HOURS
MARKS: 100**

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers correctly according to the numbering system used in this question paper.
4. ALL diagrams, sketches and labelling must be done in pencil.
5. 1 kg = 10 N
6. Write neatly and legibly.

QUESTION 1

- 1.1 Explain THREE important reasons for the grading of aggregates for concrete. (6)
- 1.2 Name THREE types of sand that are commonly used as fine aggregate. (3)
- 1.3 Explain what is meant by the water:cement ratio of a concrete mix. (1)

[10]

QUESTION 2

A simply supported beam with a uniformly distributed load (UDL) of 9 kN/m and a 27 kN point load at mid-span is shown in FIGURE 1, DIAGRAM SHEET 1 (attached).

- 2.1 Calculate the reactions at the supports RL and RR. (4)
- 2.2 Calculate the bending moment at the point load (A). (3)
- 2.3 Calculate the following shear forces: (1)

- 2.3.1 At RL (1)
- 2.3.2 (C) between RL and the point load (1)
- 2.3.3 (A) at the point load (1)
- 2.3.4 (B) between the point load and RR (1)
- 2.3.5 At RR (1)

- 2.4 Draw the shear force diagram to scale 1 mm = 1 kN. (2)

- 2.5 Draw the bending moment diagram to scale 1 mm = 1 kN/m. (1)

[15]

QUESTION 3

A loaded beam is shown in FIGURE 2, DIAGRAM SHEET 1 (attached). Assume that the reaction RH is at an angle and the reaction RR is vertical.

Calculate the following:

- 3.1 The reaction at RR (4)
- 3.2 The sum of the vertical components (4)
- 3.3 The sum of the horizontal components (2)
- 3.4 The reaction at RH (3)
- 3.5 The angle and the direction of the reaction at RH (2)

[15]

PTO

QUESTION 4

FIGURE 3, DIAGRAM SHEET 2 (attached) shows a frame that is in equilibrium.

- 4.1 Calculate the reactions at the supports. (2)
- 4.2 Draw the force diagram to scale 4 mm = 1 kN. (5.5)
- 4.3 Show, by means of arrows on the members of the frame in QUESTION 4.1, whether the force is pushing or pulling (3)
- 4.4 Copy and complete the following table in the ANSWER BOOK.

MEMBER	MAGNITUDE	NATURE
AF		
BG		
CH		
DI		
EI		
EF		
FG		
GH		
HI		

(4.5)
[15]

QUESTIONS

A lamina is shown in FIGURE 4, DIAGRAM SHEET 2 (attached).

Calculate the following:

- 5.1 The area of section 1 5.1.1
The area of section 2 5.1.2
The area of section 3 5.1.3
- 5.2 The total area of the figure
- 5.3 The distance from side AB to the centre of section 1 5.3.1
The distance from side AB to the centre of section 2 5.3.2
The distance from side AB to the centre of section 3 5.3.3
- 5.4 The distance from side AC to the centre of section 1 5.4.1
The distance from side AC to the centre of section 2 5.4.2
The distance from side AC to the centre of section 3 5.4.3
- 5.5 The distance of the centre of gravity of the figure from side AB
- 5.6 The distance of the centre of gravity of the figure from side AC

(2.5)
[15]

PTO

QUESTION 6

Make a neat sketch of a single-purchase winch lifting machine in the ANSWER BOOK. Clearly indicate the following parts on the sketch:

Effective length of the handle; teeth on the pinion; teeth on the drum gear; diameter of the drum; weight being lifted

[10]

QUESTION 7

During an experiment on an adjustable incline plane a block with a mass of 3,2 kg was placed on the table. It was found that the block starts moving at a constant speed when the plane is inclined at 20 degrees to the horizontal.

Calculate the following:

- 7.1 The coefficient of friction between the block and the plane
 7.2 The normal pressure between the block and the plane
 7.3 The frictional force

(3)
 (3,5)
 (3,5)
 [10]

QUESTION 8

Describe the following terms with reference to plastic:

- 8.1 Thermoplastics
 8.2 Thermosetting plastics
 8.3 Catalyst
 8.4 Fillers
 8.5 Plasticise

(2)
 (2)
 (2)
 (2)
 (2)
 [10]

TOTAL:

100

DIAGRAM SHEET 1

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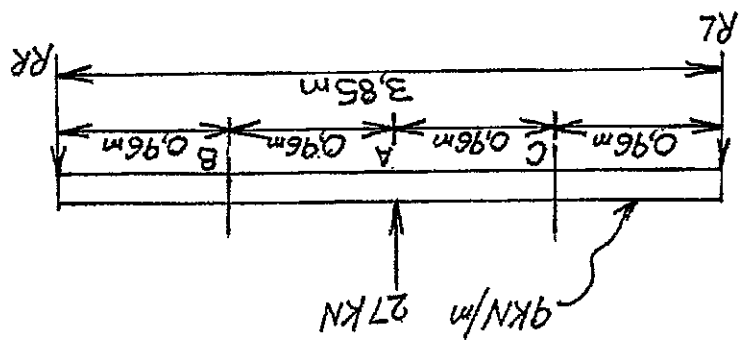


FIGURE 1

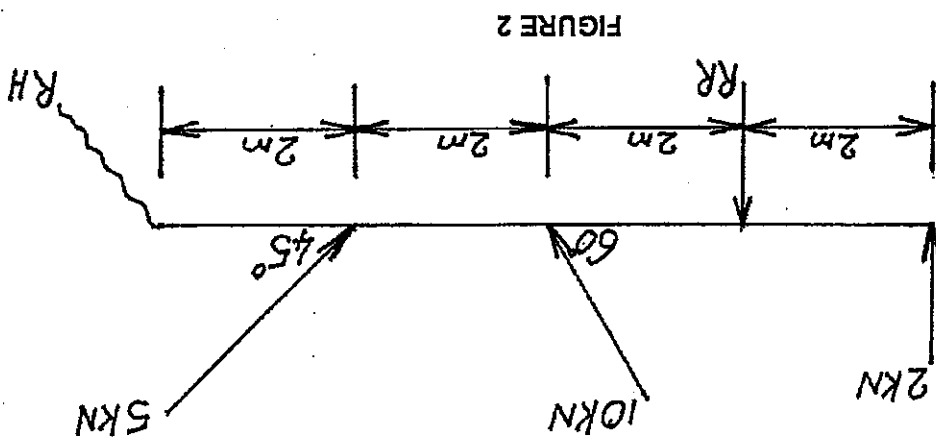


FIGURE 2

DIAGRAM SHEET 2

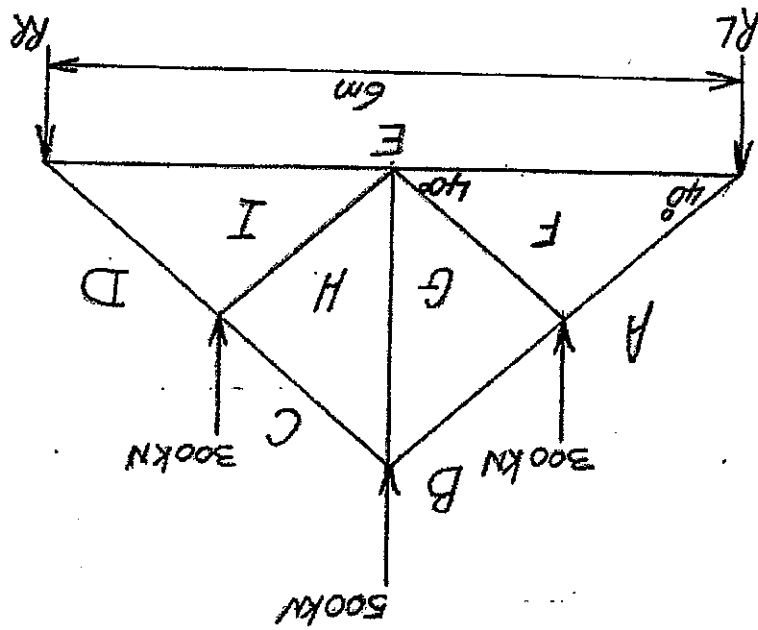


FIGURE 3

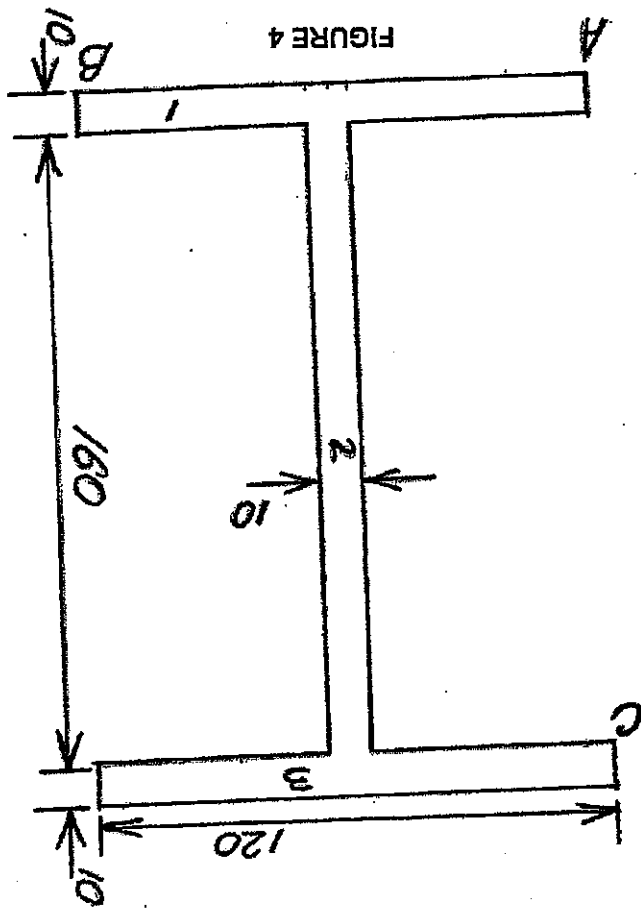


FIGURE 4