higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CARPENTRY AND ROOF WORK
NQF LEVEL 2

(12020122)

22 November 2018 (X-Paper)
09:00–12:00

This question paper consists of 7 pages.

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TIME: 3 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. Start each question on a NEW page.
5. Rule off across the page on completion of each question.
6. ALL sketches must be neat and clear.
7. ALL abbreviations and symbols must comply with the latest National Building Regulations and all relevant SANS(SABS) codes
8. Write neatly and legibly.

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QUESTION 1: TERMINOLOGY AND BASICS USED IN ROOF WORK

1.1 In carpentry, certain hand tools are used to construct roofs.

Name at least FIVE important hand tools and write down what each tool is used for. (5)

1.2 Give ONE word or term for each of the following descriptions. Write only the word or term next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

1.2.1 Timber sections fixed across the top chords at a spacing of up to 1 150 mm to carry the metal or fibre-cement sheeting

1.2.2 A timber member that is similar to battens but fixed to the bottom chord to support the ceiling

1.2.3 A person who is qualified by training and experience to design, erect, manufacture or inspect roof trusses

1.2.4 A double-pitched truss with sloping bottom chords

1.2.5 Triangular timber blocks that are used in pairs to level trusses

(5 × 1) (5)

1.3 Make neat sketches of FIVE different types of roof trusses. Each sketch must clearly indicate the width of the timber members. (5 × 2) (10)

[20]

QUESTION 2: ROOF CONSTRUCTION

2.1 Load means the heavy objects or materials that a roof structure has to support or carry.

Give THREE examples of dead loads in a roof structure. (3)

2.2 Name TWO criteria that are used for roof design. (2)

2.3 What is the maximum span covered by each of the following wall plate sizes:

2.3.1 38 mm × 152 mm

2.2.3 38 mm × 76 mm

2.3.3 38 mm × 114 mm

(3 × 1) (3)

2.4 Give TWO examples of when it would be necessary to support a wall plate on the outermost skin of the brickwork. (2)

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2.5 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (2.5.1–2.5.10) in the ANSWER BOOK.

2.5.1 Wall plates are always supported on the outermost skin of brickwork.

2.5.2 An example of a rationally designed roof truss is one using connecting plates.

2.5.3 The wedges used as packing when levelling the trusses must be at least the same width as the wall plate.

2.5.4 Battens and purlins are fixed to the rafters in the same way.

2.5.5 Empirical deemed-to-satisfy rules are based on observation, experience and proven success.

2.5.6 A roof should allow the accumulation of water on its surface.

2.5.7 Gang-nail plates can only be used with butt joints.

2.5.8 Roof anchors must be more than 200 mm from each other, measured sideways.

2.5.9 The hurricane clip is a heavyweight metal strap that is attached with nails to fix two timber members at 90° to each other.

2.5.10 The maximum centre-to-centre truss spacing for metal ribbed sheet is 1 350 mm.

(10 × 1) (10)

2.6 State TWO negative consequences of not handling and storing roof trusses correctly. (2)

2.7 2.7.1 Name the product that was used in the past to stop insects from eating wood.

2.7.2 Name the product that is currently used to protect wood against insects.

(2 x 1) (2)

2.8 Name THREE devices that a crane makes use of to lift heavy trusses and state the conditions for which each device will be used. (6)

2.9 2.9.1 Give TWO disadvantages of nail plate connections.

2.9.2 Give TWO advantages of Bolted connections.

(2 x 2) (4)

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2.10 You must follow certain rules when you build a roof truss. These rules are laid down in the National Standard SANS 10400. The roof covering is also classified in the table.

Name the roof covering that is used to cover each of the following classes:

2.10.1 Class A

2.10.2 Class B

2.10.3 Class C

(3 × 1) (3)

2.11 Describe TWO methods of securing purlins to rafters. (2)

2.12 Describe the term *bracing* with reference to roof construction. (1)
[40]

QUESTION 3

3.1 Name the parts of the truss in FIGURE 1 below. Write only the answer next to the question number (3.1.1–3.1.5) in the ANSWER BOOK.

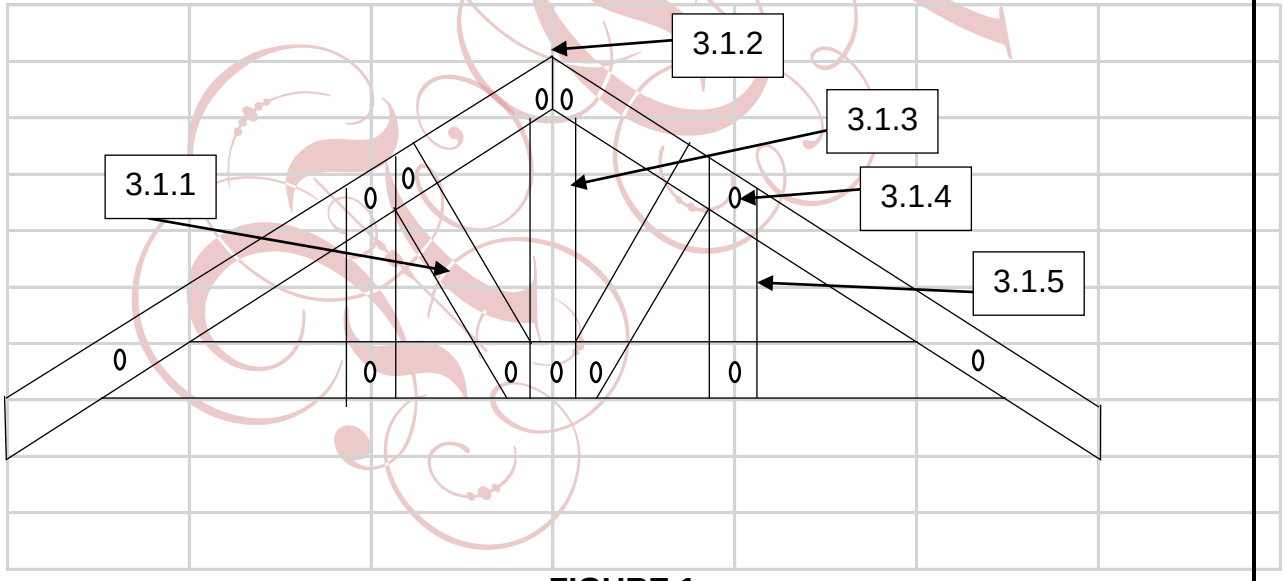

FIGURE 1

(5)

3.2 Write down a formula to calculate the rise in the truss. (1)

3.3 Name the tool that is used to mark a plumb cut. (1)

3.4 Building a roof truss is a process with three steps.

Briefly explain the THREE steps. (3)
[10]

QUESTION 4: GABLE ROOF CONSTRUCTION

4.1 Ten steps need to be followed when erecting trusses. The steps in COLUMN B below are not in the correct sequence. Rearrange the steps in the correct sequence. Write only the letter (A–J) next to the question number (4.1.1–4.1.10) in the ANSWER BOOK.

COLUMN A	STEPS: COLOMN B	
4.1.1	A	Mark off the position of all the other trusses on the wall plates.
4.1.2	B	Fix line at the apex of these trusses.
4.1.3	C	Use skew nailing to attach temporary stays to these trusses to make sure that they stay plumb and secure.
4.1.4	D	Mark off the position of the first and the last truss on the wall plates.
4.1.5	E	Nail on the permanent bracing.
4.1.6	F	Lift the other trusses onto the wall plates and place them on the marks you made. Align the apex points with the builder's line. Tack the trusses to the wall plates using skew nailing.
4.1.7	G	Lift the end trusses up onto the wall plates and use a spirit level or plumb line to make sure that these trusses are plumb.
4.1.8	H	Use battens as temporary bracing to fix each truss into position.
4.1.9	I	Fix tie-downs or hoop iron.
4.1.10	J	Level trusses at wall plates using builder's line, wedges and/or packing.

(10 × 1) (10)

4.2 Complete the following sentences by using the words given in the list below. Write only the word or words next to the question number (4.1.1–4.1.10) in the ANSWER BOOK.

brace; surface; timber; load; roof; top; area; weight; wall; foundations; level

A wall plate is a strip of (4.2.1) … laid on top of a (4.2.2) … to provide a (4.2.3) … (4.2.4)… to place the truss on. The (4.2.5) … is placed on (4.2.6) … of the walls, which transmit the (4.2.7) … of the roof to the (4.2.8) … The wall plate in turn helps to spread the (4.2.9) … of the roof over a large (4.2.10) … (10)

4.3 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (4.3.1–4.3.5) in the ANSWER BOOK.

4.3.1 The maximum truss spacing for ribbed metal sheeting using 76 mm x 50 mm purlin on edge is …

A 760 mm
B 1 500 mm
C 800 mm
D 1 060 mm

4.3.2 The minimum size of a wall plate for a truss span between 15 m and 20 m is …

A 38 mm × 76 mm
B 38 mm × 152 mm
C 38 mm × 114 mm
D 50 mm × 76 mm

4.3.3 The recommended washer size for bolts up to 12 mm is …

A 60 × 6
B 25 × 2,4
C 36 × 3,6
D 75 × 6

4.3.4 The maximum truss spacing for concrete tiles using 38 mm × 38 mm battens is …

A 1 500 mm
B 760 mm
C 1 050 mm
D 800 mm

4.3.5 The maximum distance that a roof anchor can be positioned from a truss is …

A 100 mm
B 50 mm
C 200 mm
D 150 mm

(5 × 1) (5)

4.4 The term *packing and caulk* is always used during the levelling of wall plates.

Explain *packing and caulk* in your own words. (2)

4.5 Temporary bracing is attached to a truss to keep it plumb and positioned.

Describe where and how you would attach this bracing. (3)

[30]

TOTAL: 100

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