higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T230(**E**)(A17)T

APRIL EXAMINATION

NATIONAL CERTIFICATE

CARPENTRY AND ROOFING THEORY N2

(11022192)

17 April 2015 (Y-Paper)
13:00–16:00

This question paper consists of 6 pages, 1 addendum and 2 diagram sheets.

ENGINEERING

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
CARPENTRY AND ROOFING THEORY N2
TIME: 3 HOURS
MARKS: 100

NOTE: If you answer more than the required number of questions, only the required number of questions will be marked. All work you do not want to be marked must be clearly crossed out.

INSTRUCTIONS AND INFORMATION

1. This question paper must be answered as follows:
   - 1.1 ALL the candidates must answer QUESTION 1 TO 6.
   - 1.2 CARPENTRY CANDIDATES must answer QUESTION 7 only.
   - 1.3 ROOFING CANDIDATES must answer QUESTION 8 only.
   - 1.4 DO NOT answer both QUESTION 7 and QUESTION 8.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Keep subsections of questions together.
5. Sketches must be neat and clear and done in PENCIL.
6. ALL drawings must be labelled.
7. Rule off across the page on completion of each subsection.
8. Start each question on a NEW page.
9. Write neatly and legibly.

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QUESTION 1: SETTING OUT OF BUILDINGS

1.1 Column B below outlines the procedure to set up a dumpy level, but the steps are not in order. Rearrange the steps into its correct order by writing down the letter (A–E) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

PROCEDURE	COLUMN B	
1.1.1	A	The three adjusting screws on the footplate are adjusted until the bubble lies in the centre of the circle.
1.1.2	B	The dumpy level is mounted on the tripod head and fixed.
1.1.3	C	The dumpy level is ready to be used.
1.1.4	D	The tripod is set up by pressing the points firmly into the ground.
1.1.5	E	The level is turned through 180° and tested again to set the bubble in the centre of the circle.

(5)

1.2 Briefly explain what *working drawings* are in building work. (3)

1.3 State TWO uses of the water level during the setting-out process of a building. (2)

[10]

QUESTION 2: ROOF CONSTRUCTION

2.1 Illustrate, by means of geometrical construction how to determine the edge bevel and the side bevel of a purlin. (10)

2.2 Indicate TWO methods of securing purlins to rafters. (2)

2.3 Briefly explain how trusses are permanently fixed to the wall structure. (3)

2.4 The attached ADDENDUM is an extract from the National Building Regulations. Study TABLE 1 and then answer the following questions:

A pitched roof with a slope of 22.5° is needed. The maximum span of the roof is 10,00 m and the roof is covered with metal sheets.

Determine:

2.4.1 The size and grade of the timber for the rafter (2)

2.4.2 The size and grade of the timber for the tie beam (2)

2.4.3 The maximum spacing for the roof trusses (1)

[20]

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QUESTION 3: ROOF COVERING

Roof covering plays a very significant role on the roof of a building. There is a large variety of roof covering available on the market. It is the responsibility of the architect when designing a building to choose the correct and most suitable roof covering for a specific building.

3.1 List FIVE important criteria that an architect needs to consider when choosing roof covering for a specific building. (5)

3.2 Make a neat cross-sectional drawing of the apex of Howe roof trusses covered with interlocking clay tiles. (10)
[15]

QUESTION 4: CEILINGS

4.1 Column B below outlines the procedure to install a gypsum board ceiling. The steps are not in the correct order. Rearrange the steps into its correct order by writing down the letter (A–H) next to the question number (4.1.1–4.1.8) in the ANSWER BOOK.

PROCEDURE	COLUMN B
4.1.1	A Fit a double row of battens
4.1.2	B Fit and fix the cornice
4.1.3	C Fit and fix the ceiling boards
4.1.4	D Fix the cover strips
4.1.5	E Create a datum mark
4.1.6	F Mark the batten spacings on the wall
4.1.7	G Fixing the brandering
4.1.8	H Level the brandering

[8]

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QUESTION 5: DORMER-ROOF CONSTRUCTION

5.1 FIGURE 1, DIAGRAM SHEET 1, shows a vertical cross-sectional view through a dormer window with a pitched roof. Identify the parts as numbered by writing down the answers next to the question numbers (5.1.1 – 5.1.15) in the ANSWER BOOK.

[15]

QUESTION 6: ROOF-LIGHT CONSTRUCTION

Make a neat and detailed, longitudinal drawing of a typical roof light built into a pitched roof with a slope of 38^0 and finished off with fibre-cement roof tiles. Clearly indicate the roof light to hinge at the top. **[12]**

QUESTION 7: THIS QUESTION IS FOR CARPENTRY CANDIDATES ONLY

7.1 Make neat, horizontal sectional drawings to distinguish between the following:

7.1.1 The internal corner of a room panelled with block board

7.1.2 The external corner of a room panelled with block board

(2 x 3) (6)

7.2 Give the names of the following parts/members used in the construction of a drywall partition made of timber:

7.2.1 The horizontal top member at the ceiling.

7.2.2 The horizontal bottom member at the floor.

7.2.3 The vertical member at the end of the partition.

(3 x 1) (3)

7.3 Draw a neat vertical, cross-sectional view through the meeting rails of a stable door in a closed position to show part of the top door and part of the bottom door. Clearly indicate which door will open first. (5)

7.4 Briefly explain the following terms in building work:

7.4.1 'Easing and striking' in centering. (2)

7.4.2 A 'kicker' in formwork. (2)

7.5 State TWO reasons or important functions of using shoring during construction work. (2)

[20]

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QUESTION 8: THIS QUESTION IS FOR ROOFING CANDIDATES ONLY

8.1 Tabulate and state TWO uses and TWO advantages of the following metals applicable to roofing:

8.1.1 Copper (2 x 2) (4)

8.1.2 Lead (2 x 2) (4)

8.2 FIGURE 2, DIAGRAM SHEET 2, shows a vertical cross-sectional view of a typical gutter system fixed to an external wall and part of the roof.

Identify the parts as numbered by writing down the answers next to the applicable question numbers (8.2.1 – 8.2.8) in the ANSWER BOOK. (8)

8.3 FIGURE 3, DIAGRAM SHEET 1 shows FOUR tools used by a roofer.

Identify the tools as numbered by writing down the answers next to the question numbers (8.3.1 – 8.3.4) in the ANSWER BOOK. (4)

[20]

TOTAL: 100

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ADDENDUM

(a) Where the roof covering is of the class given in column 1 of Table 1 the size of rafter (top chord), tie-beam (bottom chord) and the grade of timber to be used shall be selected from such table in such a way that the desired truss span does not exceed the relevant figure for maximum truss span given in column 4, 5 or 6, as the case may be.
(b) All web members shall be not less than 38 mm x 114 mm Grade 4 timber.
(c) Where rafter and tie-beam sizes are to be determined from Table 1, the slope of the roof shall —
  (i) be not less than 15° nor more than 30° for Class A or Class C covering; and
  (ii) be not less than 17° nor more than 35° for Class B covering.

TABLE 1 — MAXIMUM TRUSS SPANS FOR VARIOUS RAFTER AND TIE-BEAM SIZES

1	2	3	4	5	6
Roof covering	Truss member	Nominal timber size, mm	Max. span, m		
			Timber grade 4	Timber grade 6	Timber grade 8
Class A*	Rafter	38 x 114 38 x 152 38 x 228	3,1 4,0 6,1	4;6 5,8 8,5	5,8 7,2 10,0
	Tie-beam	38 x 114 38 x 152 38 x 228	3,1 4,5 7,1	4,5 6,4 10,0	6,2 8,3 10,0
Class B†	Rafter	38 x 114 38 x 152 38 x 228	6,0 8,2 10,0	9,0 10,0 10,0	10,0 10,0 10,0
	Tie-beam	38 x 114 38 x 152 38 x 228	4,7 5,9 7,2	6,7 8,5 10,0	9,4 10,0 10,0
Class C‡	Rafter	38 x 114 38 x 152 38 x 228	6,2 8,0 10,0	9,0 10,0 10,0	10,0 10,0 10,0
	Tie-beam	38 x 114 38 x 152 38 x 228	4,5 5,9 8,7	6,7 8,7 10,0	9,0 10,0 10,0

*Class A roof covering includes metal sheets and fibre-cement sheets.
†Class B roof covering includes concrete tiles, clay tiles or tiles of similar materials and thatch.
‡Class C roof covering includes metal roof tiles.

The centre-to-centre spacing of trusses relevant to the roof covering to be applied shall not exceed:
(a) Sheets, either metal or fibre cement ..... 1 400 mm
(b) Concrete tiles, clay tiles or tiles of similar material ..... 760 mm
(c) Metal tiles ..... 1 050 mm

(a) Timber roof trusses and other roof framing shall have all joints accurately cut, securely made and so fitted that the component parts are drawn tightly together.
(b) Any trussed roof shall be provided with approved bracing to prevent buckling of rafters, tie-beams and long web members and to keep trusses upright.
(c) No member of any truss shall have a length greater than sixty times its least dimension.

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DIAGRAM SHEET 1

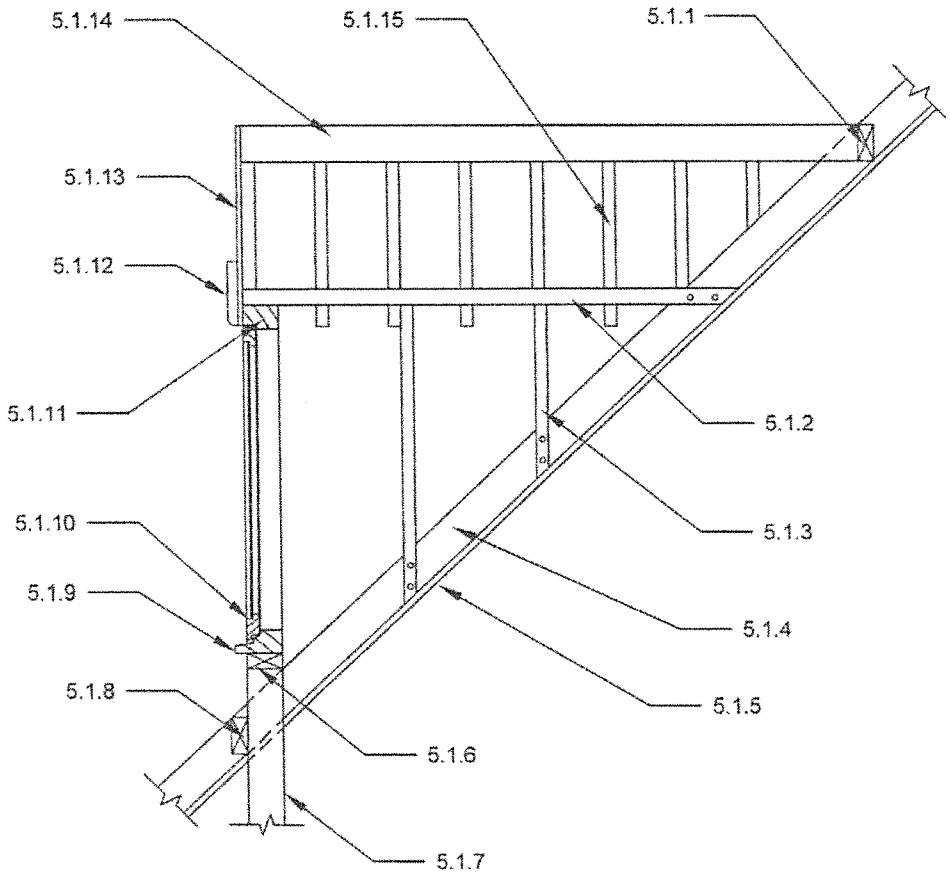


FIGURE 1

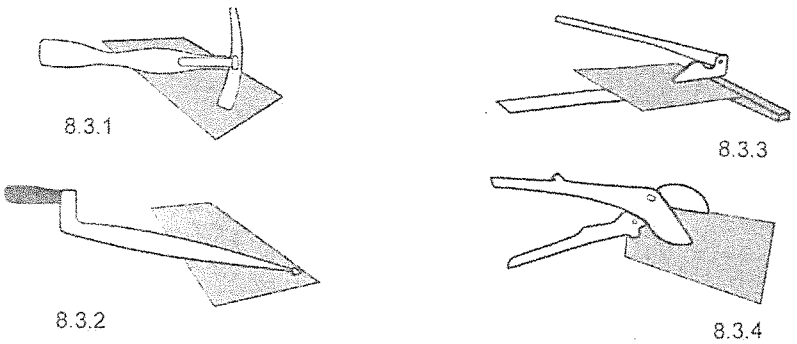


FIGURE 3

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DIAGRAM SHEET 2

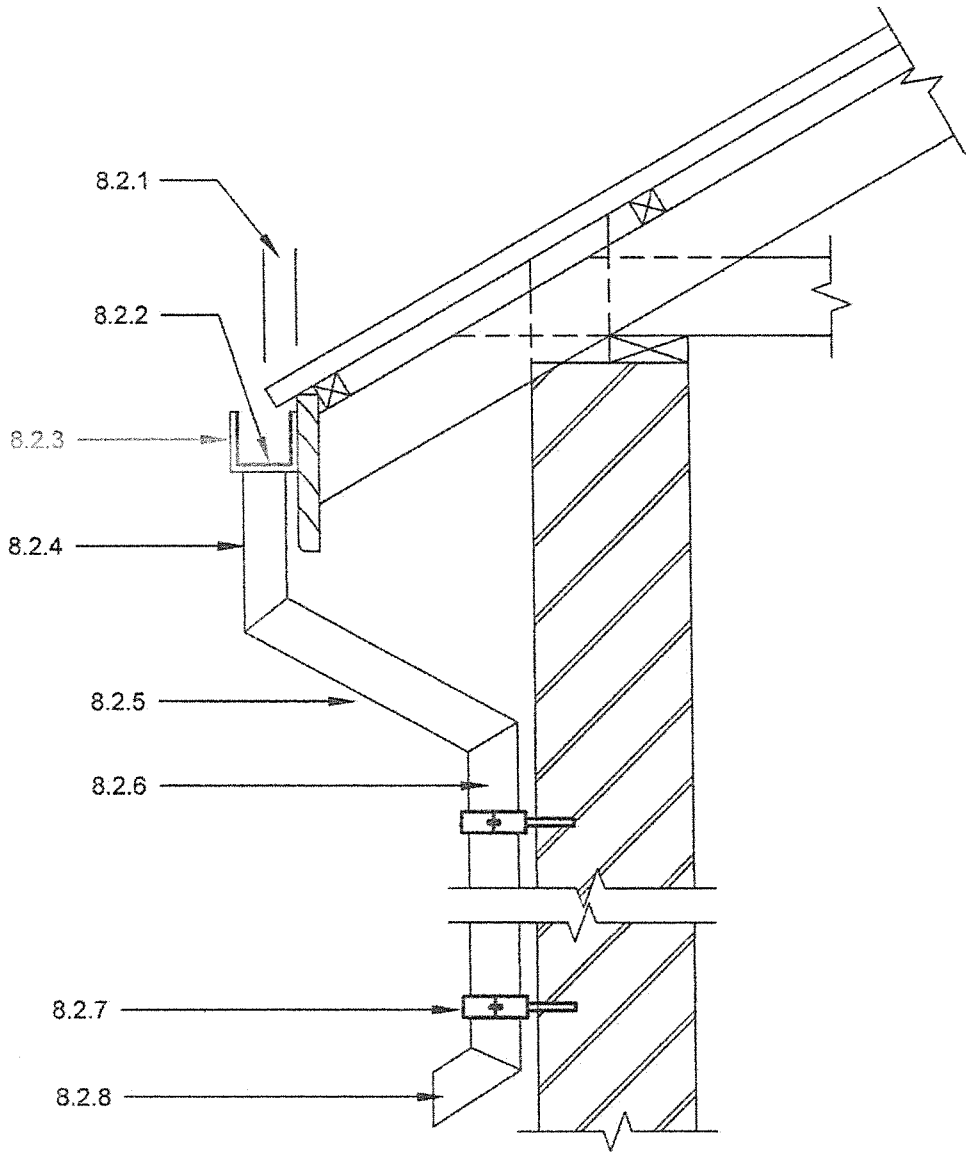


FIGURE 2

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