



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2014

**CIVIL TECHNOLOGY**  
**MARKING GUIDELINES**

Time: 3 hours

200 marks

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**These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.**

**The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.**

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**QUESTION 1 CONSTRUCTION, SAFETY AND MATERIAL**

1.1 To look after health and safety of workers in the building industry. (2)

1.2 Five safety regulations.

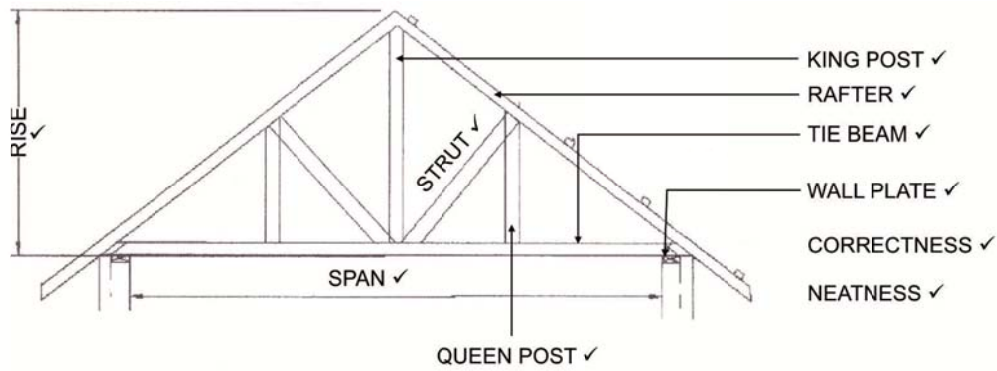
- 1.2.1 Scaffold safety  
 Pipes not painted  
 Protruding ends covered  
 setup on level ground  
 Must have a footplate  
 Only trained people can erect scaffolding  
 No work on scaffold during bad weather  
 Platforms able to carry load  
 Safety harnesses when using scaffolding  
**any FIVE or other acceptable answer** (5)

1.3 Column A and B

COLUMN A	COLUMN B
1.3.1 Pollution	I contamination of air, soil or water
1.3.2 By-product	D product which is derived from the making of another product
1.3.3 Cutting list	E description and size of materials required to build a specific object
1.3.4 Excavations	A digging of trenches, holes, etc.
1.3.5 Cantilever	B an unsupported projecting beam at one end of the beam
1.3.6 Jointer	H a hand tool used in shaping the space between bricks
1.3.7 Angle grinder	J machine used in cutting materials
1.3.8 Symbols	K figure or sign that shows how different items and material can be indicated on a drawing
1.3.9 Servitude	C a restriction that prevents you from building in a specific area

(9)

1.4 SA truss (Howe Truss)



(10)

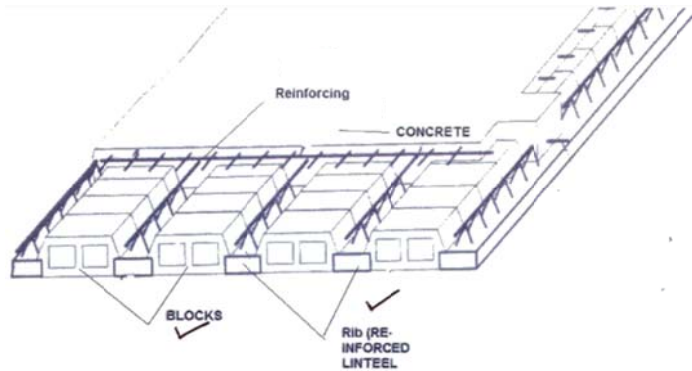
1.5 1<sup>st</sup> Aid electricity

Remove electricity source, switch off, remove cable non-conductor  
 Assess and treat for shock  
 Not breathing or breathing laboured – start CPR  
 exercise caution as cables recoil  
**any other acceptable answer**

(4)  
**[30]**

**QUESTION 2      ADVANCED CONSTRUCTION AND EQUIPMENT**

2.1    2.1.1    Sketch rib and block suspended floor



**Marks allocated:**

- Lintel – 1
  - Block – 1
  - Label lintel – 1
  - Label block – 1
- } Draw

**Or any other acceptable sketch**

(4)

- 2.1.2    Size of slab
- Load on floor
- Type of forces on floor
- Span
- Insulation characteristics needed
- Type of struts underneath
- any TWO or any other acceptable answer**

(2)

- 2.2    Maintenance hand tools
- Clean and pack away after use
- Keep sharp and oiled
- Metal parts, resist touching with hands
- Pack away in secure sturdy container
- Use tool for specific purpose
- Sharp tools stored so that sharp parts not being damaged
- any FOUR or any other acceptable answer**

(4)

2.3    Answer Booklet

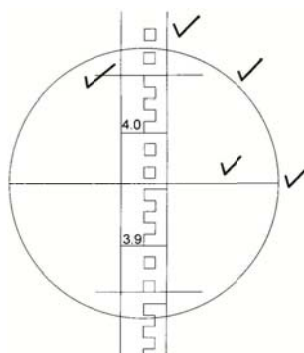
(10)

2.4    Dumpy level

2.4.1     $(2,250 - 1,750) \times 100$   
           $= 50 \text{ m}$

(2)

2.4.2



- Vertical outside lines staff    1
- Circle eyepiece                    1
- Top bottom stadia line        1
- Horizontal hair                    1
- Height of C                        1
- 3 355 + 600
- = 3 955 or 3,955

(5)

2.4.3    Slope  
           $3\ 355 - 2\ 550 = 805$   
          RISE of 805 mm

**OR**

$3,355 - 2,250$   
 $= 0,805 \text{ m}$

(3)

## 2.5 Dry walls

### 2.5.1 Advantages:

- Relatively quick to install
- Different types of cladding can be used
- Can be painted
- Versatile as different size spaces can be erected
- Easily disassemble
- Dry process
- Placed in awkward spaces
- Cheaper

**any TWO or other acceptable answer**

(2)

## 2.6 Arch

1. Extrado
2. Keystone/keybrick
3. Intrado
4. Abutment
5. Semi-circular gauged arch OR one brick gauged arch

(5)

## 2.7 Pile foundations

1. Driven pile
2. Auger drill pile
3. Caisson pile foundation
4. Driven in situ pile

**any THREE**

(3)

**[40]**

**QUESTION 3      CIVIL SERVICES**

## 3.1    3.1.1    Conservancy and Septic tank

**Conservancy tank**

- Cleaned regularly by pumping out sewage
- Connected to outlet valve
- Single chamber
- Sloped floor

**Any THREE or any other acceptable answer** (3)

**Septic tank**

- Connected to French drain
- 2 chambers
- Aperture
- Below ground construction
- Bacteria must be alive/no foreign objects

**Any THREE or any other acceptable answer** (3)

## 3.1.2    Uses

Conservancy – Close to municipality but no civil services pipe, truck must clean tank, airplanes

Septic – Far from any municipal area, far from town, no civil service pipes, soil runs into French drain. (2)

3.2    ANSWER BOOKLET (8)

3.3    ANSWER BOOKLET (14)  
**[30]**

**QUESTION 4 MATERIALS, QUANTITIES AND JOINING**

- 4.1 Cure concrete  
 Ponding  
 Paint with curing agents  
 Keep formwork in place  
 Cover with damp material  
 Spraying  
**any THREE** (3)
- 4.2 Window frame  
  
 Material – Aluminum  
 Reasons: Rust resistant  
           Very light in weight  
           Durable  
**any TWO or other acceptable answer** (3)
- 4.3 Roof truss  
  
 4.3.1 By means of roof ties/anchor embedded four courses into super structure (1)  
  
 4.3.2 Gang nails  
       Nut and bolts (2)
- 4.4 4.4.1           Area =  $4,5 \times 3,5 = 15,75 \text{ m}^2$   
       Ceiling board =  $3,6 \times 0,9 = 3,24 \text{ m}^2$   
        $15,75 \div 3,24 = 4,86$   
       5 boards needed (4)
- 4.4.2 Perimeter = 16 m  
        $16 \div 2,7 = 5,93$   
       = 6 lengths (3)
- 4.5 Fix to wall  
 Anchors through extra wood  
 Concrete/cut nails  
 Anchors into wall through flat bracket  
 Rest on cleat  
**any TWO or other acceptable answer** (2)
- 4.6 ANSWER BOOKLET (12)  
**[30]**

**QUESTION 5 APPLIED MECHANICS**

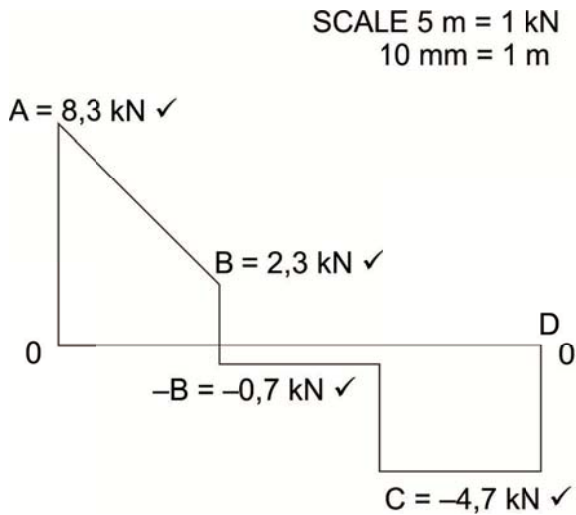
5.1  $(7\,500 \times a) + (900 \times 50) = (6\,000 \times 50) + (2\,400 \times 153,33)$   
 $7\,500 a = 300\,000 + 367\,992 - 45\,000$   
 $= 83,07 \text{ mm} = 622\,992/7\,500$   
 $= 83,07 \text{ mm}$  (8)

5.2 Beam

5.2.1  $P \times 9 = (4 \times 3) + (3 \times 6) + (6 \times 7,5) + (5 \times 9)$   
 $9P = 12 + 18 + 45 + 45$   
 $= 120/9 \quad P = 13,3 \text{ kN}$

$Q \times 9 = (5 \times 0) + (6 \times 1,5) + (3 \times 3) + (4 \times 6)$  TEST  
 $9Q = 0 + 9 + 9 + 24 \quad 13,3 + 4,7 = 5 + 6 + 3 + 4$   
 $= 42/9 \quad Q = 4,7 \text{ kN} \quad 18 = 18$  (5)

5.2.2 Shear force diagram



Correct calculation shown on diagram. (4)

5.2.3 Bending moment

$BM_b = (13,3 \times 3) - [(6 \times 1,5) + (5 \times 3)] = 39,9 - 24 = 15,9 \text{ kNm}$  (3)

5.3 ANSWER BOOKLET

**QUESTION 6**

6.1 ANSWER BOOKLET

6.2 ANSWER BOOKLET

**Total: 200 marks**