basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

CIVIL TECHNOLOGY

FEBRUARY/MARCH 2014

MEMORANDUM

MARKS: 200

This memorandum consists of 14 pages.

QUESTION 1: CONSTRUCTION PROCESSES

1.1

1.1.1	B √	This type of materials must be stored close to fire extinguishers
1.1.2	L √	The resistance of a material to break under tension
1.1.3	A √	Resistance to wear
1.1.4	C √	A vertical member of a roof truss
1.1.5	K √	Material made of wood particles held together with adhesives
1.1.6	J √	A type of metal that will not rust
1.1.7	I √	A material that measures 38 mm x 38 mm
1.1.8	G √	A protective material that is used to prolong the life span of materials
1.1.9	E √	An accessory used with a dumpy level
1.1.10	D √	Type of roof covering

(10)

ONE '√' FOR EACH CORRECT ANSWER. *Do not* penalise the candidate if the description is written.

1.2   1.2.1   Rough arch/gauged arch/semi-circular arch/segmental arch/
                    flat arch **√**   (1)

         1.2.2   Cheaper to build **√**
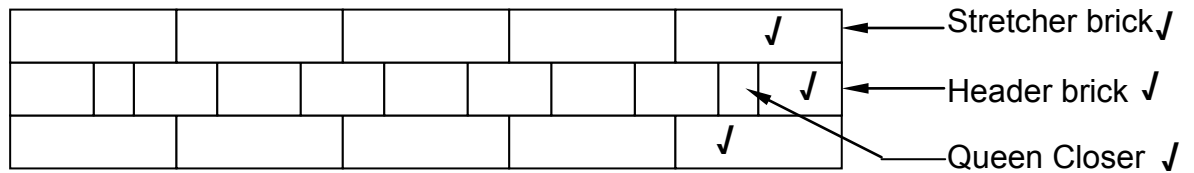   Time saving
                    Less labour

                    **ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE
                    ANSWER**   (1)

1.3

FRONT ELEVATION OF A WALL BUILT IN ENGLISH BOND ✓

Proportion - ✓

Assessment criteria	
1st course correctly drawn	1
2nd course correctly drawn	1
3rd course correctly drawn	1
Proportion	1
Header	1
Stretcher	1
Queen Closer	1
Title	1
Total	**8**

1.4   Call ambulance/ contact site safety officer ✓
Do not induce vomiting. ✓
Do not give the patient anything to drink. ✓
The patient must lie on his/her back.

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER   (3)

1.5
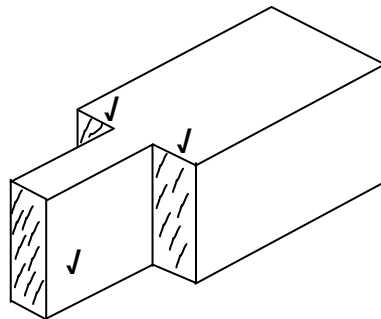
Assessment criteria	
Tenon	1
Shoulders of tenon	2
Proportion	1
Total	**4**

(4)

1.6   Prevents birds, insects, dust, wind and rain from entering the roof construction. ✓
Protects the sides of the trusses.
Retains thermal condition of the roof.

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER   (1)

1.7   No. ✓
The closed eaves will prevent birds etc. to enter the roof. ✓

OR

Yes.
The closed eaves will ensure that the thermal condition of the roof is retained.

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER   (2)

[30]

QUESTION 2: ADVANCED CONSTRUCTION PROCESSES

2.1   2.1.1   FALSE √   (1)

          2.1.2   FALSE √   (1)

          2.1.3   TRUE √   (1)

          2.1.4   FALSE √   (1)

          2.1.5   TRUE √   (1)

2.2   2.2.1   A - Timber √
                  B - Dry wall screw / Screw√
                  C – Gauze/Rhino tape/Cover strips/Aluminium strips/Half rounds √
                  D – Gypsum board √ /Fibre cement/hard board/chip board
                  E – Gypsum plaster √   (5)

          2.2.2   Clout nail/ screws √   (1)

          2.2.3   To reinforce the joint √
                  Conceals the joint
                  Finishing the surface   (1)

2.3   Steel shuttering is more durable. √
     Steel shuttering is more rigid √   (2)

     ANY OTHER ACCEPTABLE ANSWER

2.4

BS	FS	RISE	FALL	REMARK
0, 95				Peg C
	2, 95		**(D) 2,00 √**	Peg D
3, 25				Peg D
	1, 20	**(E) 2, 05 √**		☐Peg E
4, 20	4,15	2, 05	2, 00	**TOTAL**
4, 20 – 4,15 √		**2, 05 – 2, 00 √**		**DIFFERENCE**
0, 05 √		**0, 05 √**		**RESULT**

(6)

2.5

Short bored pile

Strip foundation
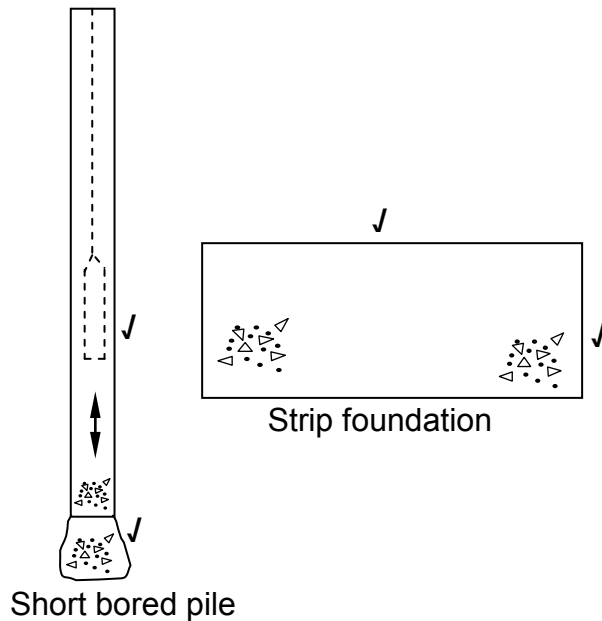
Assessment criteria	
Correct shape of foundation	2
Symbol for concrete	2
Total	**4**

(4)

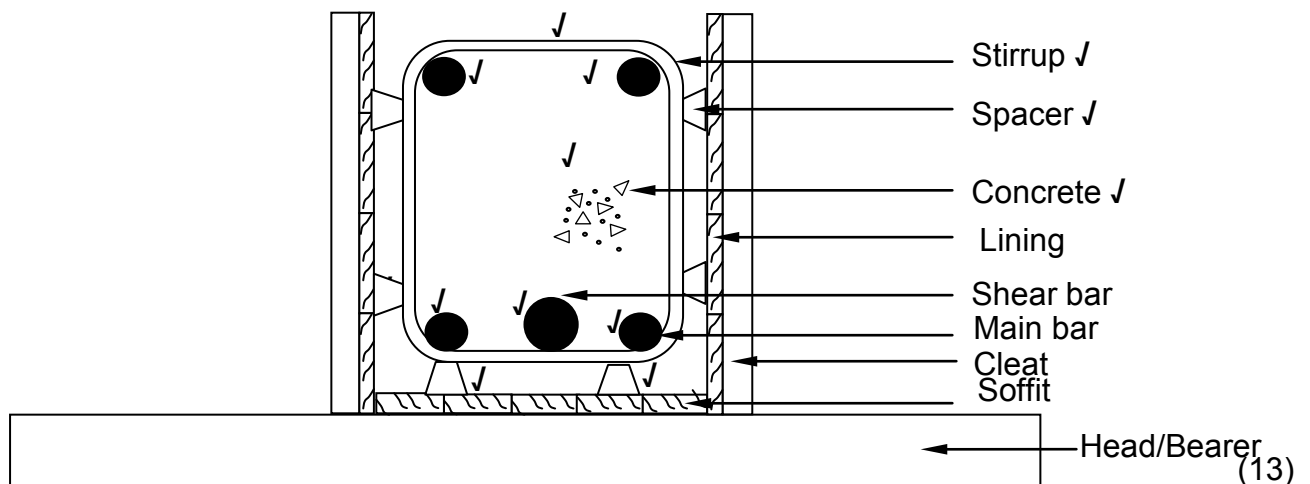2.6 It is resistant to water. √
It is resistant to heat. √
It is resistant to stains. √
It is resistant to weather conditions.
It enhances the appearance of the material.

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (3)

2.7

Stirrup √
Spacer √
Concrete √
Lining
Shear bar
Main bar
Cleat
Soffit
Head/Bearer (13)

Assessment criteria	Marks	L M
Two main bars	2	
One shear bar	1	
Two anchor bars	2	
Stirrup (binder)	1	
Symbol for concrete	1	
Two spacers	2	
Any three labels	3	
Correctness of sketch	1	
Total	**13**	

[40]

QUESTION 3: CIVIL SERVICES

3.1   3.1.1   Sun/Solar photo voltaic cells/Solar photo voltaic panel √   (1)

         3.1.2   Water/Hydro-electricity √   (1)

         3.1.3   Coal power √
                    Nuclear energy √
                    Wind power   (2)

                    **ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE
                    ANSWER**

         3.1.4   √   √
                    Solar power is reliable and involves no moving parts.
                    The maintenance cost is very low with no noise or atmospheric
                    pollution.
                                                                                        (2)

                    OR ANY OTHER ACCEPTABLE ANSWER

3.2   3.2.1   On next page (ANSWER SHEET 3.2)

         3.2.2   On next page (ANSWER SHEET 3.2)

         3.2.3   On next page (ANSWER SHEET 3.2)

3.2.2

4　B ✓

RE ✓　✓

F
Light
✗ ✓

Power point ✓

E

VP ✓ ✓

WC ✓
3

IE ✓

✓

WB ✓
2

D
Fluorescent light
✓

C　DB ✓

Distribution box

Ø 110 mm PVC SP @ 1 : 40 Slope

✓
✓
✓

One way
switch double
pole
A

1　S ✓

G ✓

W ✓
B

IE ✓　RE ✓

IE

MH ✓

CONNECTION POINT

Assessment Criteria	Marks	L M
3.2.1		
1. S	1	
2. WB	1	
3. WC	1	
4. B	1	
3.2.2		
Manhole	1	
Gulley	1	
Vent pipe	1	
Rodding eyes	2	
Inspection eyes	2	
Correct layout	4	
3.2.3		
Description of pipe	3	
3.2.4	6	
Total	**24**	

NOTE: A correct alternative layout is also acceptable.   **[30]**

QUESTION 4: MATERIALS AND QUANTITIES

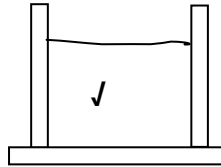4.1   4.1.1   Cube test √   (1)

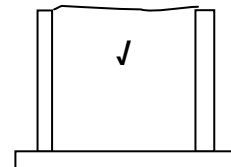   4.1.2   To test the compressive strength of concrete √   (1)

          4.1.3
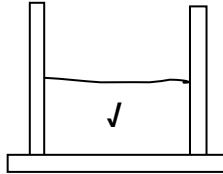
| Fill first layer with concrete 50 mm | Second layer 2 layers of 50 mm | Third layer 3 layers of 50 mm |

                                                                                            (3)

          4.1.4   25 times √   (1)

          4.1.5   It must be stored in a water tank / wet bags. √   (1)

          4.1.6   Store at 22° to 25° C √   (1)

          4.1.7   • The name of the company √
                      • Contact number √
                      • Date of mixture

                      ANY TWO OF THE ABOVE   (2)

4.2

A	B	C	D
1/	6,0 m ✓		Area of rectangular wall up to wall plate level. (Door included)
	<u>2,7 m</u> ✓	16,2 m²✓	6 000 mm x 2 700 mm
1/	0,5 ✓		Area of gable (triangular) part of wall
	6,0 m	✓	0,5 x 6 000 mm x 1 700 mm
	<u>1,7</u> ✓	5,1 m²	
			Total area of wall including the door opening
			16,2 m² + 5,1 m² = 21,3 m² ✓
1/	2,1 m ✓	✓	Area of door
	<u>0,9 m</u>✓	1,89 m²	2 100 mm x 900 mm
			Area of wall with door opening deducted
			21,3 m² - 1,89 m² = 19,41 m² ✓
			Number of bricks
1/	19,41m² ✓	✓	110 bricks per m² for a 220 m wall
	<u>110</u>✓	2 135,1	= 2 135,1 bricks ✓
OR			
2/	19,41		
	<u>55</u>	2 135,1	
			5% for breakages and cutting of bricks
	2 135,1		2 135,1 bricks x 5%
	<u>5%</u>✓		106,755 bricks ✓

(15)

(2)

4.3   Reasonably priced ✓
Available in large sheets.
Non-splintering.
Easy to work with.
Can easily be cleaned
More hygienic

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (1)

4.4   Available in long lengths. ✓
Lighter to handle. ✓
Easier to join.
Does not rust.
Less maintenance.

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER (2)

[30]

QUESTION 5: APPLIED MECHANICS

5.1   5.1.1   SFa = + 8 kN - 0 kN = 8 kN ✓   (1)

        5.1.2   SFb = + 8 - 6 = + 2 kN ✓   (1)

        5.1.3   SFc = + 2 - 5 = - 3 kN OR SFc = + 8 - 6 - 5 = - 3 kN ✓   (1)

        5.1.4   SFd = - 3 - 4 = - 7 kN OR SFd = + 8 - 6 - 5 - 4 = - 7 kN ✓   (1)

        5.1.5   SFe = - 7 + 7 = 0 kN OR SFe = + 8 - 6 - 5 - 4 + 7 = 0 kN ✓   (1)

5.2   5.2.1

(1)

        5.2.2

(5)
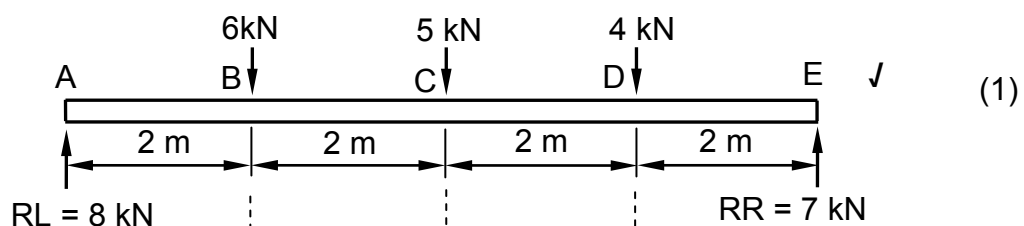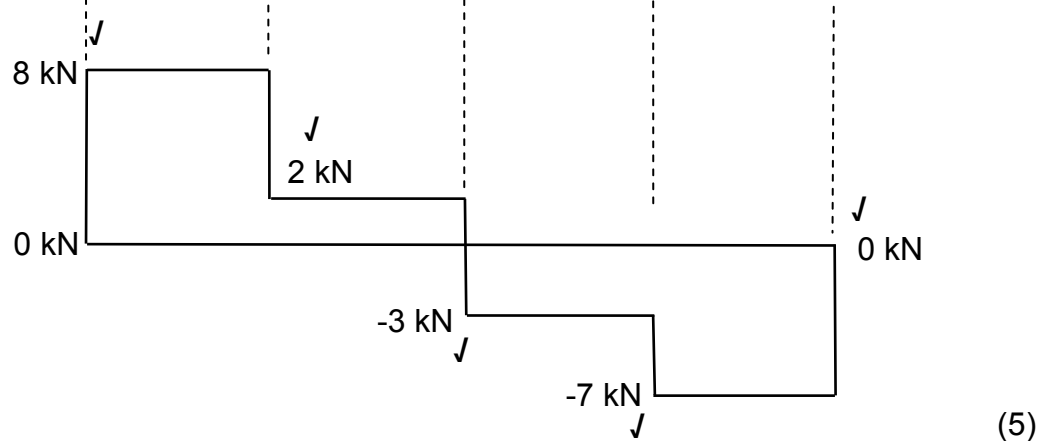
5.3   Position of centroid from A- A = $\underline{\text{(Area 1 x d) - (Area 2 x d)}}$
                                                    Total Area
                                      ✓   ✓   ✓   ✓
                          = $\underline{\text{(2 500 x 50) - (300 x 50)}}$
                                        2 200 ✓
                          = $\underline{\text{125 000 - 15 000}}$
                                        2 200
                          = $\underline{\text{110 000}}$ ✓
                              2 200
                          = 50 mm ✓✓

OR

Take moments about A on X axis   (8)
                      ✓   ✓   ✓   ✓
2 200 mm^2 x X = $\underline{\text{(½ x 100 x 50 x 50) - (30 x 10 x 50)}}$ mm^3
2 200 mm^2 x X = $\underline{\text{125 000 - 15 000}}$mm^3
          X = $\underline{\text{110 000}}$ mm^3✓
              2 200 mm^2✓
          = 50 mm ✓✓

OR

Part	AREA (A)	X	AREA OF X Ax
Triangle	2 500 mm^2 ✓	50 ✓	125 000
Rectangle	300 mm^2 ✓	50 ✓	15 000
∑	2 200 mm^2 ✓		110 000 mm^3

$\dfrac{\sum AX}{\sum A}$

= $\underline{\text{110 000 mm}^3}$ ✓
    2 200 mm^2

= 50 mm ✓✓

5.4   5.4.1

90 N

30 N

B

A   F

E   C

30°   30°

D

8 m

LR = 15 N   RR = 105 N

a

e   d

b/f
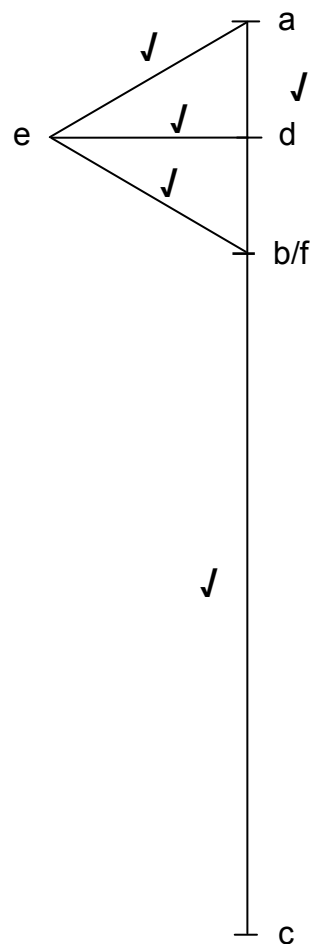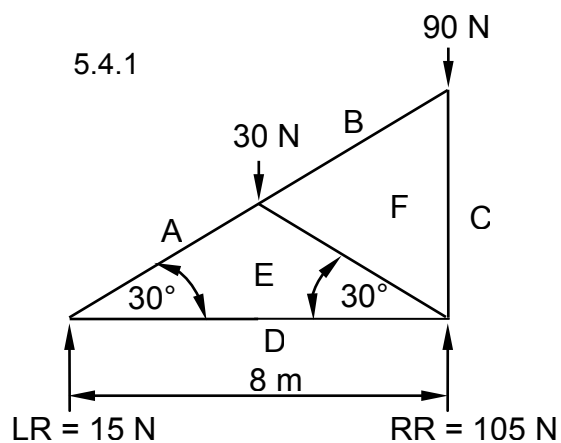
c   (5)

5.4.2

MEMBER	MAGNITUDE	NATURE
AE	30 N √	Strut √
BF	0 N	---
DE	26 N √	Tie √
EF	30 N √	Strut √
FC	90 N	Strut

Tolerance 1 N to either side   (6)

[30]

QUESTION 6: GRAPHIC COMMUNICATION
ANSWER SHEET 6.1
QUESTION 6.1
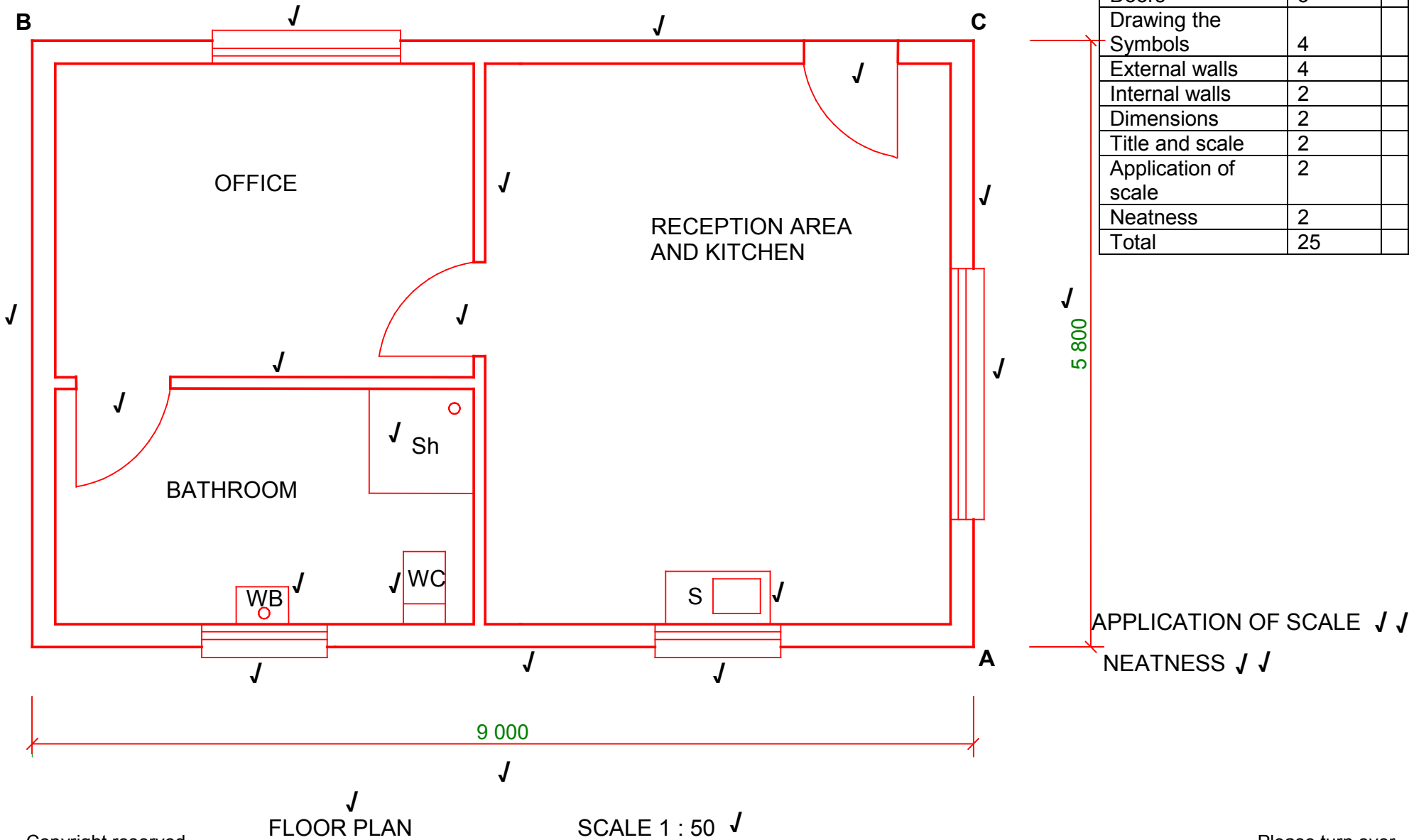
Aspect	Marks	
Windows	4	
Doors	3	
Drawing the Symbols	4	
External walls	4	
Internal walls	2	
Dimensions	2	
Title and scale	2	
Application of scale	2	
Neatness	2	
Total	25	

OFFICE

RECEPTION AREA AND KITCHEN

5 800

Sh

BATHROOM

WC

WB

S

APPLICATION OF SCALE ✓ ✓

NEATNESS ✓ ✓

9 000

FLOOR PLAN   SCALE 1 : 50 ✓

ANSWER SHEET 6.2
QUESTION 6.2

No.	Answer	Marks	L M
6.2.2	It shows the opening direction of the window	1	
6.2.3	Plaster and paint/Face brick wall/Cladding/ Rough cast/Splattered plaster	3	
6.2.4	Gable roof/Pitched roof	1	

6.2.1		Description	Marks	LM
	A	Ridge	1	
	B	Barge board	1	
	C	Gutter	1	
	D	Fascia board	1	
	E	Fan light/window	1	
	F	Rainwater down pipe/down pipe	1	
	G	Window sill	1	
	H	Finished floor level (FFL)	1	
	J	Natural ground level (NGL)	1	
	K	Overhang/eaves	1	
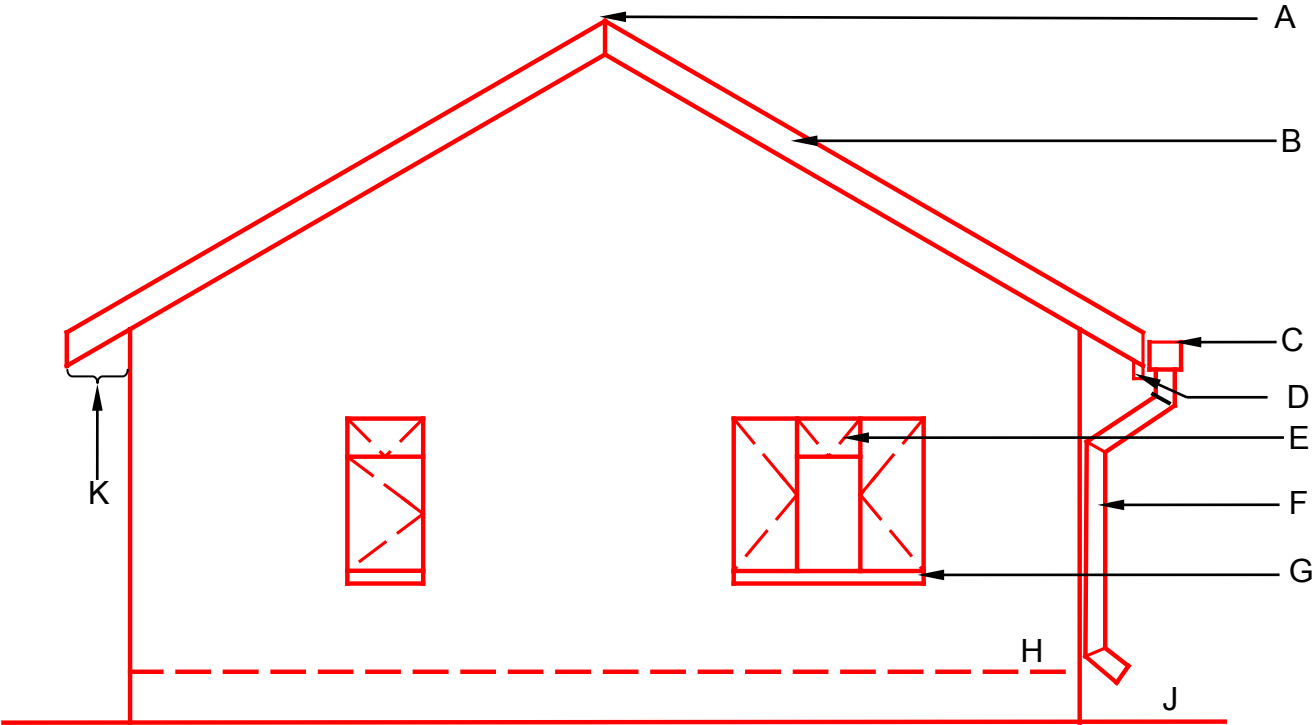
EAST ELEVATION

SCALE 1 : 10