CIVIL TECHNOLOGY

MARKING GUIDELINES

Time: 3 hours

200 marks

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.


QUESTION 1   CONSTRUCTION, SAFETY AND MATERIAL

1.1   1.1.1 – E
        1.1.2 – G
        1.1.3 – I
        1.1.4 – B
        1.1.5 – C   (5)

1.2   Trench safety
        Check daily especially after rain
        Must be cordoned off
        Access and exit must be accessible
        Must be shored so that cave-in does not occur
        No vehicles or heavy machinery close to trench
        Warning lights placed for public safety
        Any FOUR or other applicable answer   (4)

1.3   1.3.1

LINE DIAGRAM OF SA TRUSS
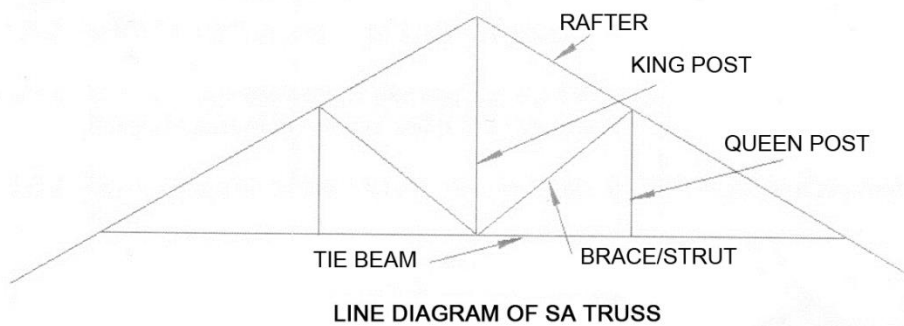
        Any 3 labels and 1 for correctness of drawing   (4)

        1.3.2   Draw a neat drawing to indicate at wall end the difference between a
                GABLE roof and a HIPPED roof.

        2 Correct drawing   2 Correct drawing
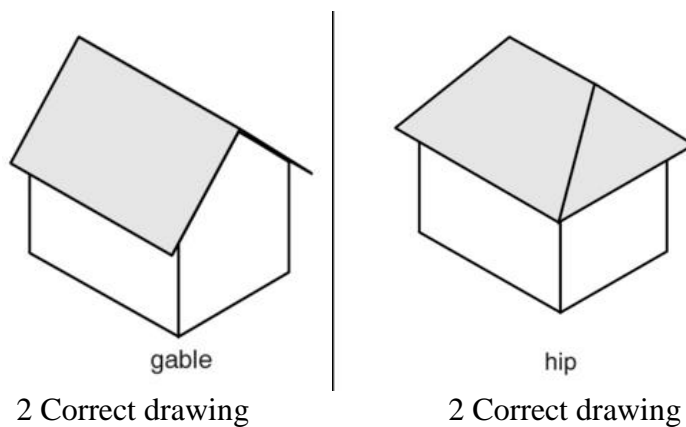
                                                                                                           (4)

1.4   Site safety
        Site should be neat and tidy
        Provisions for toilet facilities
        No unauthorized entrance onto site
        Site must be fenced off
        Warning signs in applicable places
        First Aid must be available
        Workers must wear appropriate safety clothing
        Any TWO or other applicable answer   (2)

1.5   1.5.1   Tapered cone, spirit level, measuring tape, tamping rod
                Any ONE correct   (1)

        1.5.2   Used to test correct mix between ingredients
                 Used to test correct consistency
                 Used to test correct water volume
                Any ONE correct   (1)

        1.5.3   Compression test
                To test compression strength of concrete   (2)

1.6   1.   I-beam
        2.   Channel iron
        3.   H-bar/two-sided channel   (3)

1.7   1.   Head plate
        2.   Stud
        3.   Panel board, Gypsum board, cladding, plywood, chipboard (any one)
        4.   Sole plate   (4)
                                                                              [30]

QUESTION 2   ADVANCED CONSTRUCTION AND EQUIPMENT

2.1   Check that blades are sharp
        Keep away from moisture, rust
        Cover cutting edges
        Put away in safe place and clean after use
        Place in tool-box
        Check the power cord is not frayed or damaged
        Any THREE or other applicable answer   (3)

2.2   2.2.1   Independent scaffold
                Pipe scaffold
                Any ONE correct   (1)

        2.2.2   Bracing and used to keep scaffold secure   (1)

2.2.3   Ensure it is on level ground
        Working platform can carry load
        Kick board in place
        Guard rail in place
        Qualified person erected scaffold
        No paint or rust visible
        Ensure tied onto structure
        Only workers allowed on scaffold
        Any TWO or other applicable answer   (2)

2.2.4   A – Guard rail
        B – Platform
        C – Kick board
        D – Vertical standard   (4)

2.3   2.3.1   Factors
              • Span
              • Weight of floor
              • Load on floor
              • Daily use for suspended floor
              • Time available for construction
              • Reinforcing method for floor
              Any THREE factors or any other applicable answer   (3)

      2.3.2   Method – Precast concrete slab OR slab on corrugated iron OR reinforced
              slab   (1)

2.4   ANSWER BOOKLET   (4)

2.5   B – Shuttering
      C – Rise
      D – Tread
      E – Landing
      G – Wedges   (5)

2.6   Strong enough to carry load
      Easily nailed, screwed
      Reusable
      Not able to bond with concrete
      Any TWO applicable or any other applicable answer   (2)

2.7   Driven pile – Driven into soil with weight, like a nail driven into wood
      Precast pile – Already made up pile driven straight into the ground
      Drilled pile foundation – Hole is drilled by large auger drill bit and poured afterwards
      Any TWO applicable answers   (4)

2.8   12 – Number of bars
      Y – High yield/ Y-bar
      12 – Diameter of bar
      10 – Bar number in code
      300 – Spacing of bars   (5)

2.9   Rough arch – Plastered when finished
        Built with uncut bricks
        Mortar wedge shaped
        Any ONE answer or any other applicable answer

        Gauged arch – Built with voissoirs (purpose made bricks)
        Do not plaster.
        Any ONE answer or any other applicable answer   (2)

2.10   2.10.1 Curing of concrete – Drying, removal of water out of mix

        2.10.2 Segregation of concrete – The concrete breaks apart due to mix not done
                properly

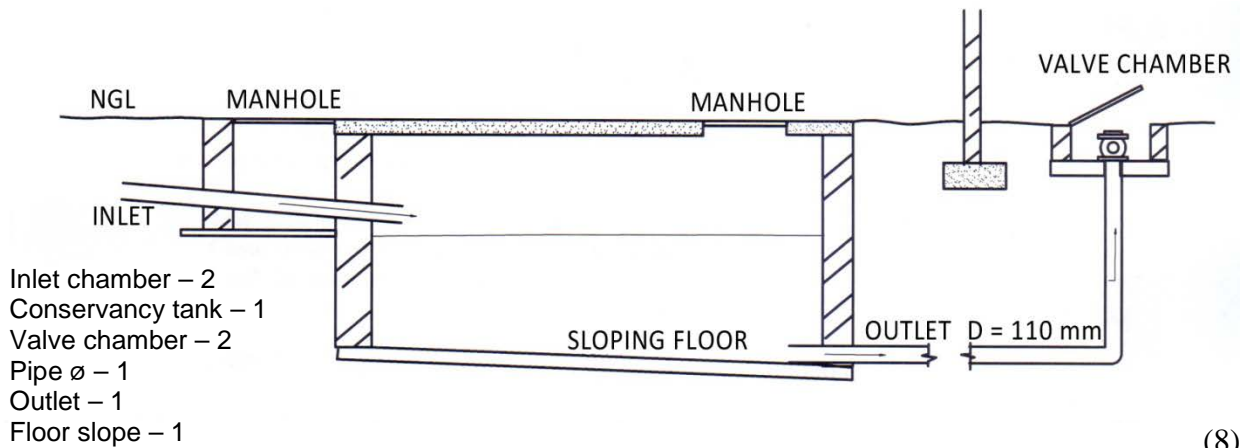   2.10.3 Beam filling – Bricks placed between trusses to close gap between wall and
                roof   (3)
                                                                                              [40]

QUESTION 3   CIVIL SERVICES

3.1   A conservancy tank can be used in the absence of a waterborne sewerage system
        and where a septic tank is not viable. Make a neat, labelled sketch of the sectional
        view of a conservancy tank. Clearly showing the following:
        Inlet, outlet, valve chamber, pipe diameters and floor slope, manhole cover.

        Inlet chamber – 2
        Conservancy tank – 1
        Valve chamber – 2
        Pipe ø – 1
        Outlet – 1
        Floor slope – 1   (8)

3.2   ANSWER BOOKLET   (15)

3.3

ADVANTAGES	DISADVANTAGES
Excellent coastal areas	*Expensive*
Readily available	*Joints laborious, difficult*
Durable in aciduous soil	

        or ANY other acceptable answer   (4)

3.4   3.4.1   Trap consists of sieve that stops food going into main drain
                Clean sieve and pipes can be unblocked quickly
                ANY other acceptable answer   (2)

        3.4.2   **Used:** Restaurants, large kitchen
                ANY other acceptable answer   (1)
                                                                                              [30]

QUESTION 4   QUANTITIES, MATERIALS AND JOINING

4.1   Fixatives
      4.1.1   General use where nail can be visible
            Carpentry
            Crates
            Any ONE or other acceptable answer   (1)

      4.1.2   The large head of the clout nail holds the ceiling material better   (1)

      4.1.3   Use where large nail is unsuitable
            Use where nail must be hidden
            Use where wood is in danger of splitting
            Any ONE or other acceptable answer   (1)

      4.1.4   PVC cement/glue   (1)

      4.1.5   Soldering
            Compression fittings   (2)

4.2   Advantages of screws
      Does not damage the wood when inserting
      Easy to take out and does not damage wood, when taking out
      Grip is much stronger
      Holds longer than nails
      Any THREE or other acceptable answer   (3)

4.3   Incomplete cutting list
      4.3.1   Description
      4.3.2   Width
      4.3.3   Thickness   (3)

4.4   ANSWER BOOKLET   (18)
                                                             [30]

QUESTION 5   APPLIED MECHANICS

5.1   5.1.1   Rec 1 $= 30 \times 20 = 600$ mm²
                        Rec 2 $= 20 \times 20 = 400$ mm²
                        Rec 3 $= 40 \times 90 = 3\ 600$ mm²
                        Total $= 4\ 600$ mm²   (5)

        5.1.2   CENTROID FROM AA

                $4\ 600 \times X$ $= (600 \times 15) + (400 \times 40) + (3\ 600 \times 75)$
                                    $= 9\ 000 + 16\ 000 + 270\ 000$
                                    $= 295\ 000/4\ 600$
                                    $= 64,13$ mm   (5)

5.2   ANSWER BOOKLET   (14)

5.3 $RR \times 5$ $= (3 \times 0) + (4 \times 1) + (5 \times 3) + (4 \times 4)$
                        $= 0 + 4 + 15 + 16$
                        $= 35/5$
        RR   **$= 7$ kN**

        $RL \times 5$ $= (4 \times 1) + (5 \times 2) + (4 \times 4) + (3 \times 5)$
                        $= 4 + 10 + 16 + 15$
                        $= 45/5$
        RL   **$= 9$ kN**   (6)
                                                                                                [30]

QUESTION 6   GRAPHICS AND COMMUNICATION

6.1   ANSWER BOOKLET   (15)

6.2   ANSWER BOOKLET   (25)
                                                                                                [40]

                                                                                Total: 200 marks