



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

## **NATIONAL CERTIFICATE PLUMBING THEORY N2**

**6 AUGUST 2019**

**This marking guideline consists of 9 pages.**

**QUESTION 1: COLD-WATER SUPPLY**

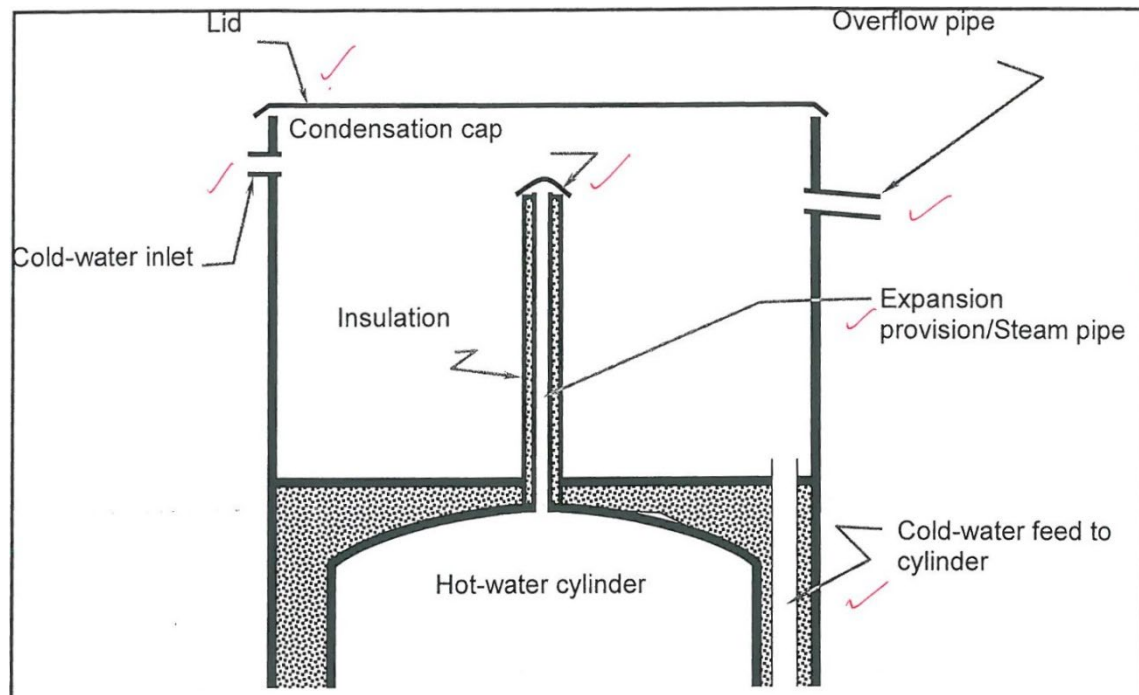
- 1.1
- Provide water to the consumers
  - Ensure adequate reserve of a 2 to 3-day supply of water in case of interruption of supply from the treatment plant/control reservoir
  - Provide the required pressure head to the water mains
  - Conveniently placed to regulate and control the water supply and the quality thereof
- (3)
- 1.2
- Disease-producing organisms of enteric (intestinal) origin
  - Toxic substances most frequently derived from industrial waste but it can also come from the careless use of insecticides
  - Biocides and even lead from lead pipes and lead containers
  - Algae, which release a characteristic taste and odours
  - Disinfecting chlorine, which may produce an objectionable taste unless chlorination is well-managed
  - Iron and manganese are taken into solution in the calcium, magnesium and lead
  - Organic water that produces odours and taste such as the odour of hydrogen sulphide upon decomposition
- (Any 3 × 1) (3)
- 1.3
- 1.3.1 Coagulation: Addition of special chemicals✓ (coagulants) to the impure water.✓ (2)
- 1.3.2 Sedimentation: A stage where coagulants react with the colloidal matter✓ and cause it to bond to one another and form heavier, larger flocks that settle to the bottom of the septic tanks as a sludge.✓ (2)
- 1.3.3 Filtration: A water purification stage that allows the untreated water to pass through layers of material while being treated chemically to remove bacteria✓ and microscopic suspended matter from the water. ✓ (2)
- 1.3.4 Chlorination: During this process, harmful disease-carrying micro-organisms and pathogenic bacteria are destroyed.✓ This disinfecting and sterilisation process is achieved by injecting chlorine into the water at high pressure.✓ (2)

- 1.4      1.4.1      CAUSES OF WATER HAMMER
- Failure to fit supply pipes properly to ceiling joists or to other fixtures that support the pipes
  - Connecting primary flow pipes and primary return pipes the wrong way round
  - Closing taps or valves too quickly, which produces a vibration through the pipe if the pipe is not fitted properly
  - Lime deposits in the pipe system that restrict the flow of water, especially in gravity-type or combination-type hot-water systems
  - Faulty washers, especially in high-pressure installations
- (Any 3 × 1)      (3)
- 1.4.2      REMEDIES OF WATER HAMMER
- Close all taps slowly and gently.
  - Fit an air-release valve at the top of the water-supply system.
  - Install a water hammer arrestor.
  - Don't use long pipe runs to the rafters or the walls using plastic pipe clips as support.
- (Any 3 × 1)      (3)
- [20]**

## QUESTION 2: HOT-WATER SUPPLY

- 2.1      • To reduce the incoming main pressure to a pre-set pressure rating
- and to maintain this pressure when the system is not in use
- and to control this pressure when the system is not in use.      (3)
- 2.2      2.2.1      200 kPa = black label      (1)
- 2.2.2      400 kPa = red label      (1)
- 2.3      • It can be installed on the floor level as it does not depend on gravity for pressure.
- Horizontal and vertical versions are available.
- A modern mixer valve can be used with the geyser as the pressure is high enough (400–600 kPa).
- Both hot-water and cold-water supply is required to have a balanced water pressure.      (Any 3 × 1)      (3)
- 2.4      • Where a constant supply of water is demanded (hospitals, clinics, ablution facilities at hostels, factories, etc.)
- When a current geyser needs to be upgraded in terms of volume (capacity) the volume could be augmented by interconnecting it with another geyser.
- When different heat sources are being considered as alternative supplies (electric + solar + solid fuel + etc.)      (Any 2 × 1)      (2)

2.5



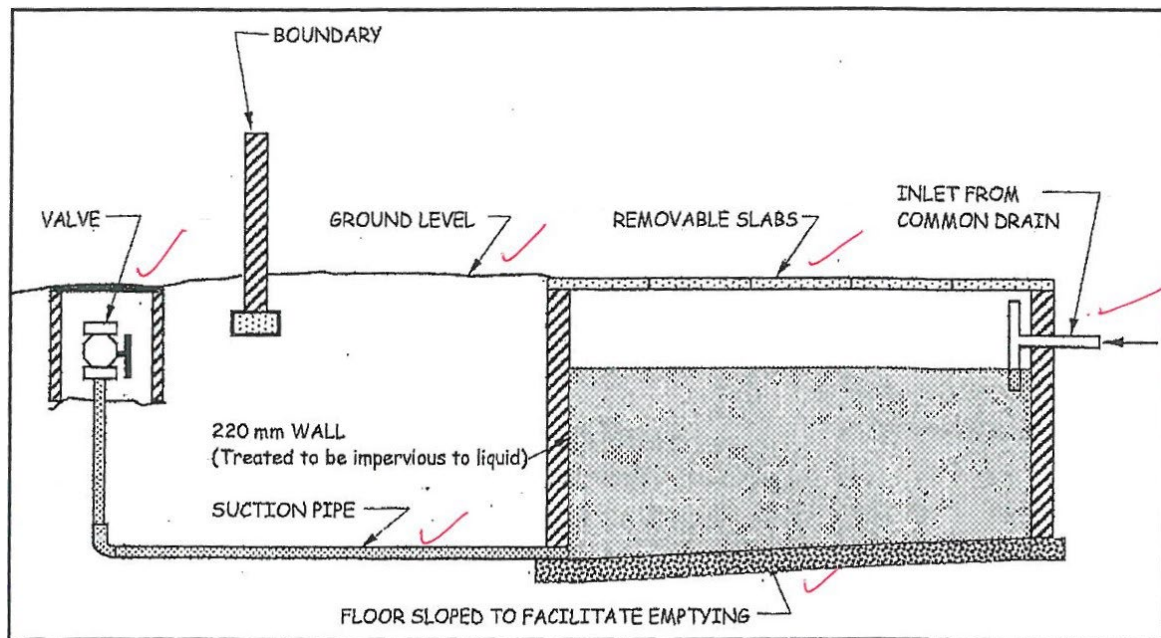
(Labelling) (8)  
(Correctness) (2)  
**[20]**

**QUESTION 3: DRAINAGE**

- 3.1 Drainage installation is an installation which is vested in the owner of the site✓ and is intended for the reception, conveyance storage or treatment of sewage✓ and may include sanitary fixtures, traps, discharge pipes, drains, ventilation pipes, septic tanks, sewage-treatment works or mechanical appliances associated therewith.✓

(3)

3.2

(Labelling)  
(Correct layout)

(6)

(4)

- 3.3 Fall over 11 m  
 $= 11 \times 1/40$ ✓  
 $= 0,275$ ✓

Invert depth at next change  
 $= 0,55 \text{ m} + 0,275 \text{ m}$ ✓  
 $= 0,825 \text{ m}$ ✓

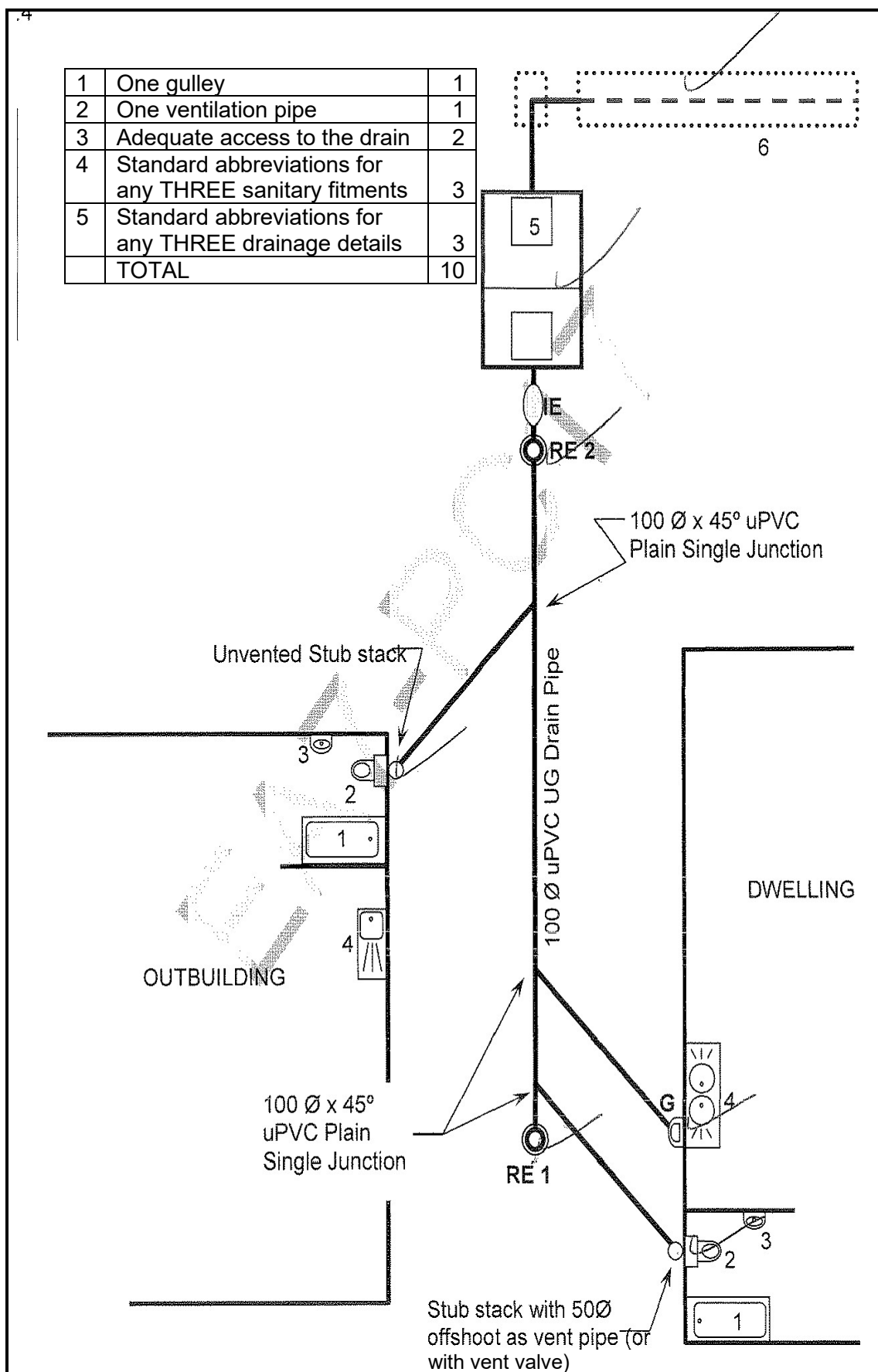
(4)

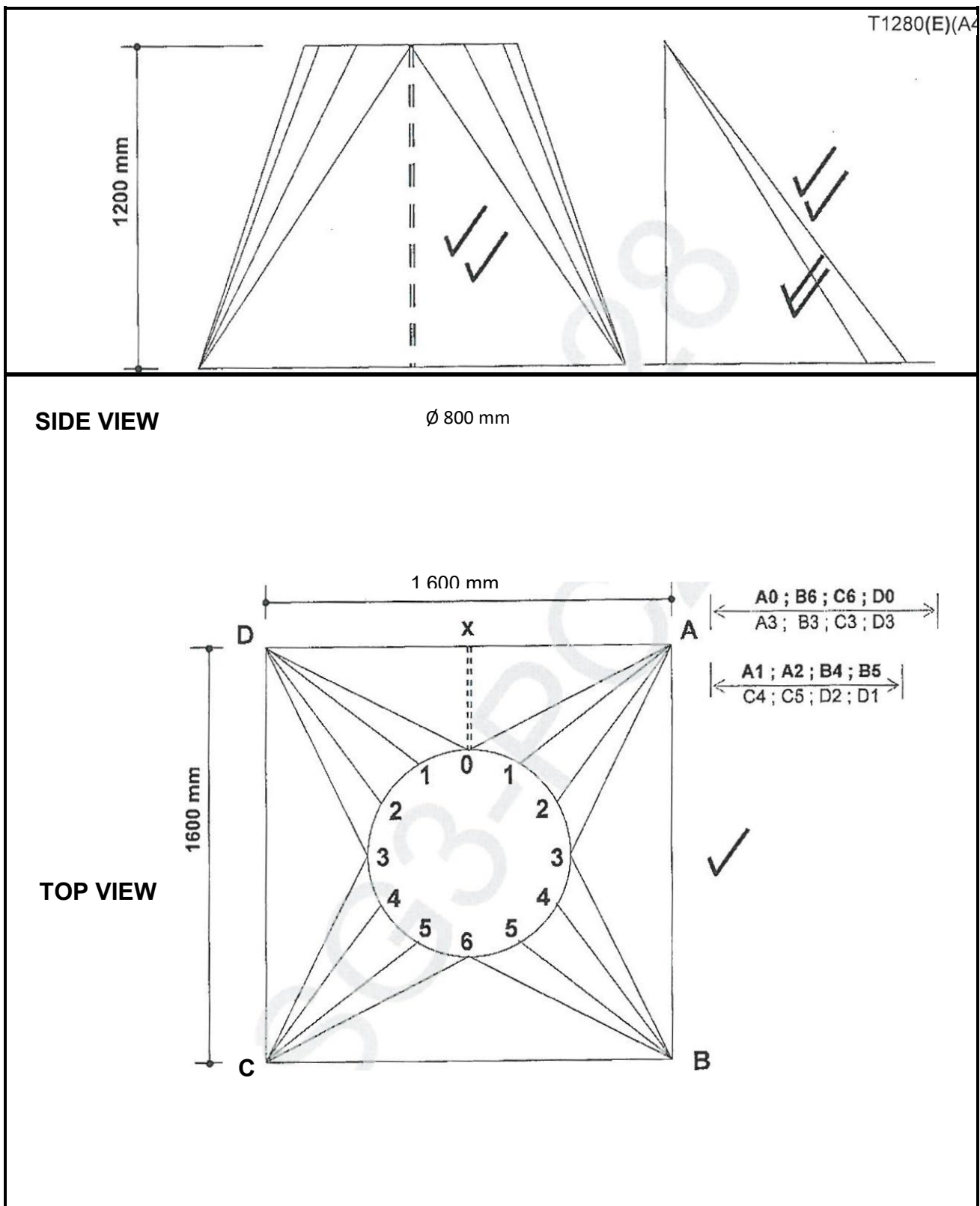
- 3.4
- The shortest most practical route should be used without affecting the effectiveness of the drain.
  - The number of branch pipes must be limited.
  - The number of branch pipes must be as short as possible.
  - Drains should only be allowed to run under buildings where no other route is available.
  - Avoid excessive excavations i.e. follow natural gradient of ground and consider the installation of ramps where required.
  - The underground drain should be at least 1 m from the building if the runs are parallel to the wall.
  - All regulations regarding ventilations, access, gradients, invert depths, etc. should be considered and adhered to.

(Any 3 × 1)

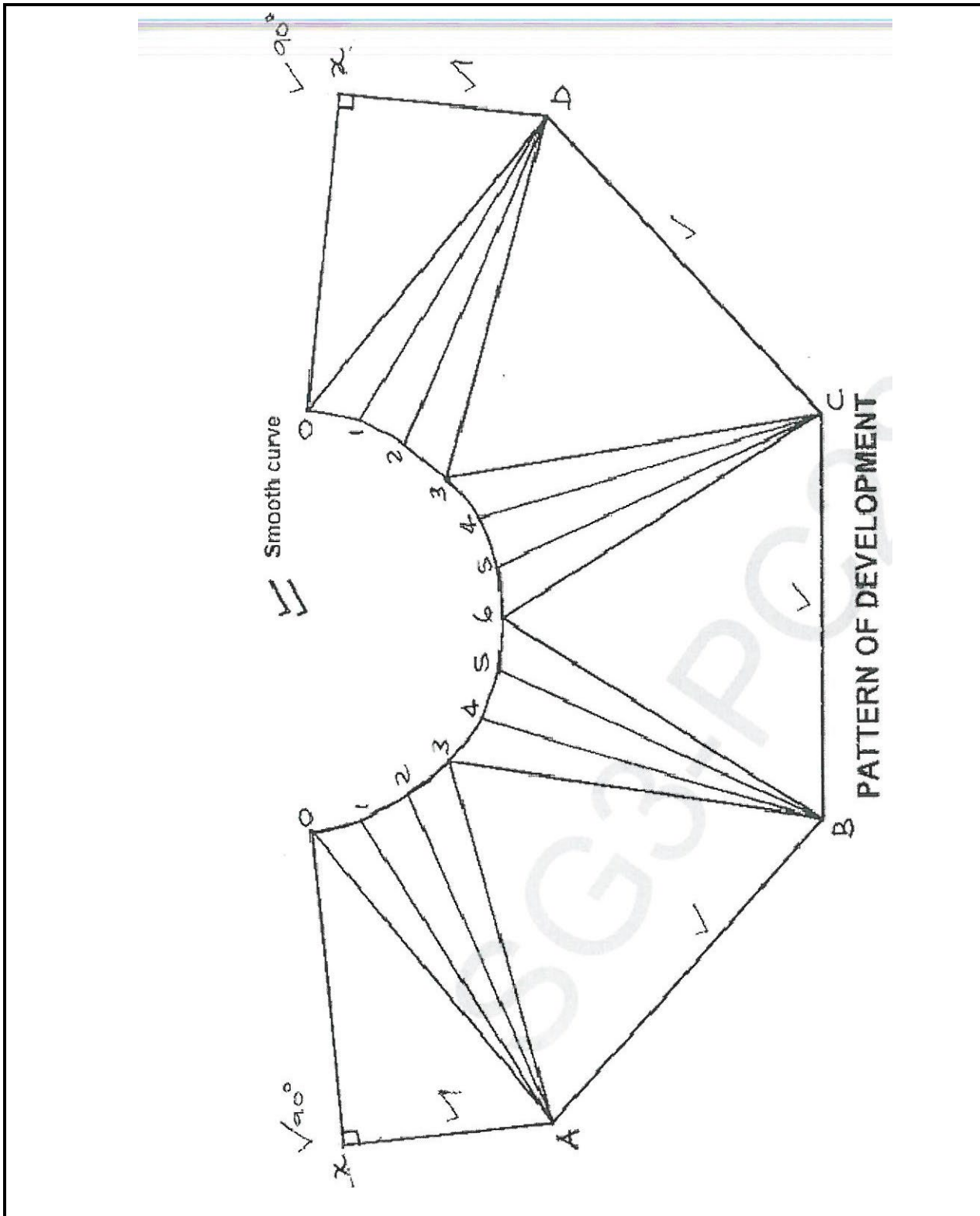
(3)

3.5

(15)  
[35]

**QUESTION 4: SHEET-METAL WORK AND FLASHING**

The dimensions for the transition must be adjusted to 600 mm for the square, 350 mm for the circle and the height to only 600 mm.



SCALE 1:10

[15]



**QUESTION 5: CALCULATIONS**

5.1      Volume = L × B × H

$$= 1 \times 1,2 \times 1,5 \checkmark$$

$$= 1,8 \text{ m}^3 \checkmark$$

$$= 1\,800 \text{ litres} \checkmark$$

(3)

5.2      Mass = Density × volume

$$= 1,8 \text{ m}^3 \times 1\,000 \text{ kg/m}^3 \checkmark$$

$$= 1\,800 \text{ kg} \checkmark$$

$$\text{Mass of tank} + \text{mass of water} = 130 + 1\,800 \checkmark$$

$$= 1\,930 \text{ kg} \checkmark$$

(4)

5.3      Total area = Area of a base + Area of sides ✓

$$= (1 \times 1,2) + 2(1 \times 1,5) + 2(1,2 \times 1,5) \checkmark$$

$$= 1,2 + 3 + 3,6 \checkmark$$

$$= 7,8 \text{ m}^2 \text{ OR } 8 \text{ m}^2$$

(3)

[10]

**TOTAL:      100**