higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

PLUMBING THEORY N2

22 NOVEMBER 2016

This marking guideline consists of 8 pages.

QUESTION 1: COLD-WATER SUPPLY

1.1
- Precipitation (rain, hail and snow)
- Runoff and percolation (groundwater and underground water to sea)
- Evaporation and transpiration (3 x 1) (3)

1.2
- Disease-producing organisms of enteric (intestinal) origin
- Toxic substances most frequently derived from industrial wastes but can also come from the careless use of insecticides and other substances.
- Biocides, even lead from lead pipes and -containers
- Colouring, usually flushed from the nature of soil strata it passes through.
- Turbidity generally carried in suspension by the erosion of clay deposits.
- Organic matter that produces odours and bad tastes, such as the odour of hydrogen sulfide upon decomposition.
- Carbon dioxide that enables water to take up calcium, magnesium and lead into solution.
- Iron and manganese are taken into solution in the absence of dissolved oxygen.
- Algae, which release characteristic odours and tastes.
- Disinfecting chlorine, which may produce objectionable tastes unless chlorination is well managed.

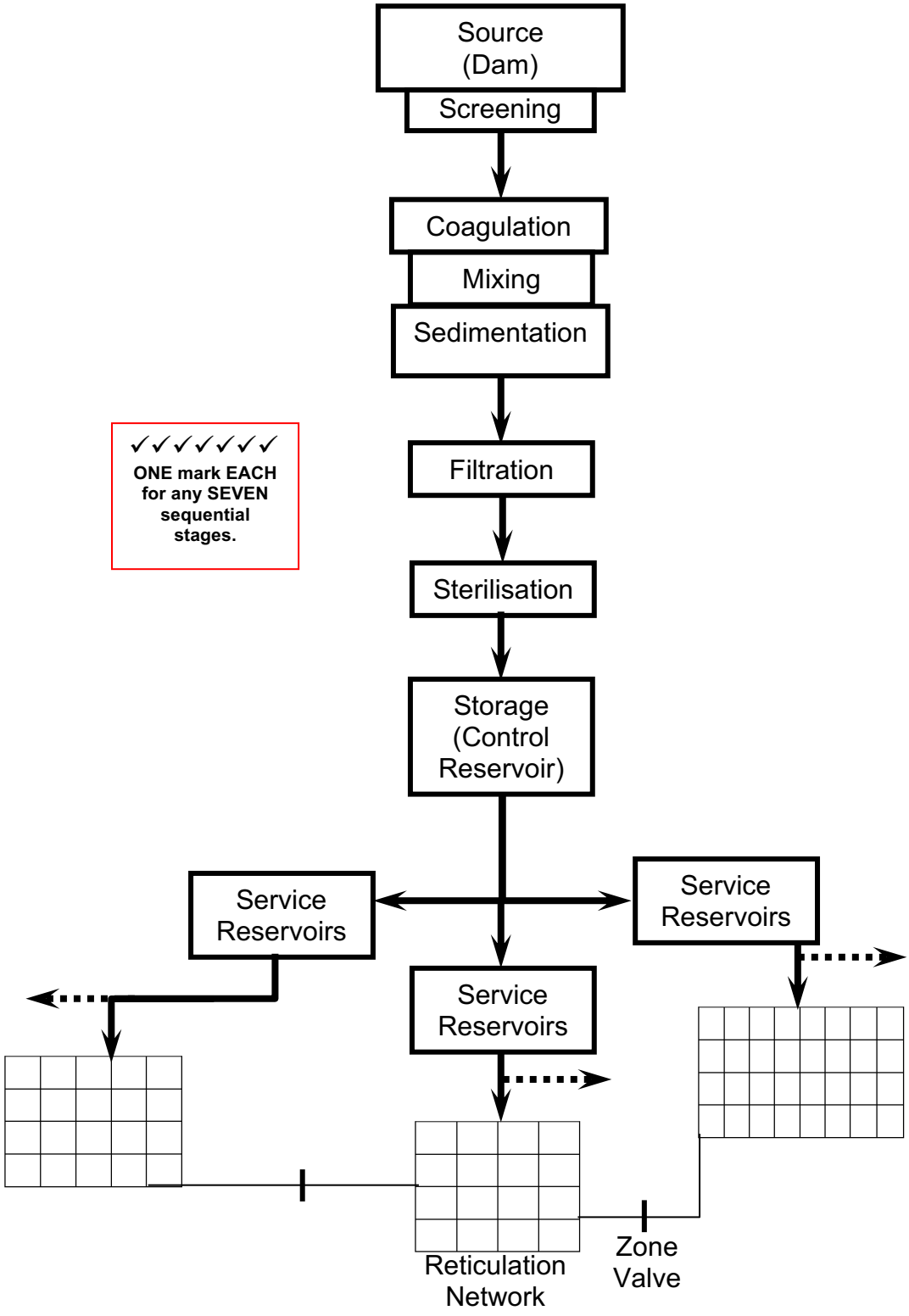
(Any 3 x 1) (3)

1.3 Permanent hardness is caused by the sulphates, chlorides and nitrates✓ of calcium and/or magnesium.✓ These salts are taken into solution without the presence of carbon dioxide.✓ (3)

1.4
- Being supplied from different service reservoirs (which are usually at different elevations), these reticulation networks will be operating under different water pressures (static).
- If the zone valve is open, the water from the higher reservoir will overflow out of the lower reservoir.

(Allocate TWO marks for any other reasonably correct exposition) (2)

1.5



✓✓✓✓✓✓✓
ONE mark EACH for any SEVEN sequential stages.

(7)

1.6
- Swing type non-return (check) valve
- Spring type non-return (check) valve
- Vacuum breakers

(Any TWO applicable valves or pipes fittings to be accepted as correct) (2)
[20]

QUESTION 2: HOT-WATER SUPPLY

2.1 **ON COLD-WATER SIDE**

- Break the siphon that could empty the hot-water cylinder to inlet level and burn out the element.
- Prevents backflow of hot water to cold-water taps.
- Prevents the contamination of fresh water supplies.

ON HOT-WATER SIDE

- Prevents the collapse of hot-water cylinders.
- Facilitates draining of the geyser when required.
- Prevents back siphonage on hot-water lines.

(Any 2 x 2) (4)

2.2 2.2.1 Vacuum breaker
2.2.2 Temperature and pressure safety valve
2.2.3 Pressure-control valve (combination of pressure-reducing valve and pressure-relief valve)
2.2.4 Fullway valve

(4 × 1) (4)

2.3 2.3.1 Cold-water service pipe/supply from meter
2.3.2 Cold-water feed pipe
2.3.3 Primary return pipe
2.3.4 Primary flow pipe
2.3.5 Expansion pipe/steam pipe
2.3.6 Secondary flow pipe
2.3.7 Tap-off points/terminal points

(7 × 1) (7)

2.4 The pressure-control valve reduces the incoming mains pressure✓ to a preset pressure rating✓ and maintains✓ and controls✓ this pressure when the system is not in use.✓ (5)

[20]

QUESTION 3: DRAINAGE

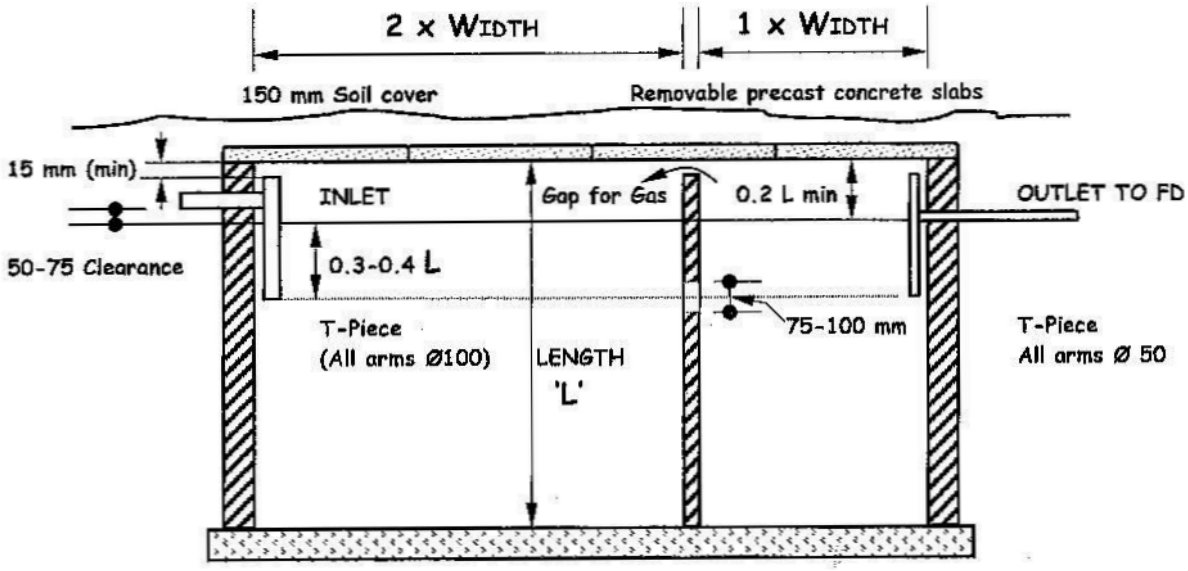
3.1 Sanitary group is a combination of sanitary fixtures that comprise not more than one of each✓ of a WC-pan, bath, shower, sink and either two wash-hand basins or one wash-hand basin and one bidet.✓✓ (3)

3.2 3.2.1 The soil stack is connected directly to the underground drain✓ by means of an open connection (two 45° bends OR one 90° long radius bend).✓ (2)

3.2.2 The waste stack discharges its contents into a gulley✓ that is connected to the underground drain via a gulley trap✓ (closed connection).✓ (3)

3.3 Except in the case of a separate vent pipe, a vent pipe is that portion of the stack above the last branch connection✓ that is extended vertically to above the eaves and terminates in accordance with certain regulations.✓ (2)

3.4



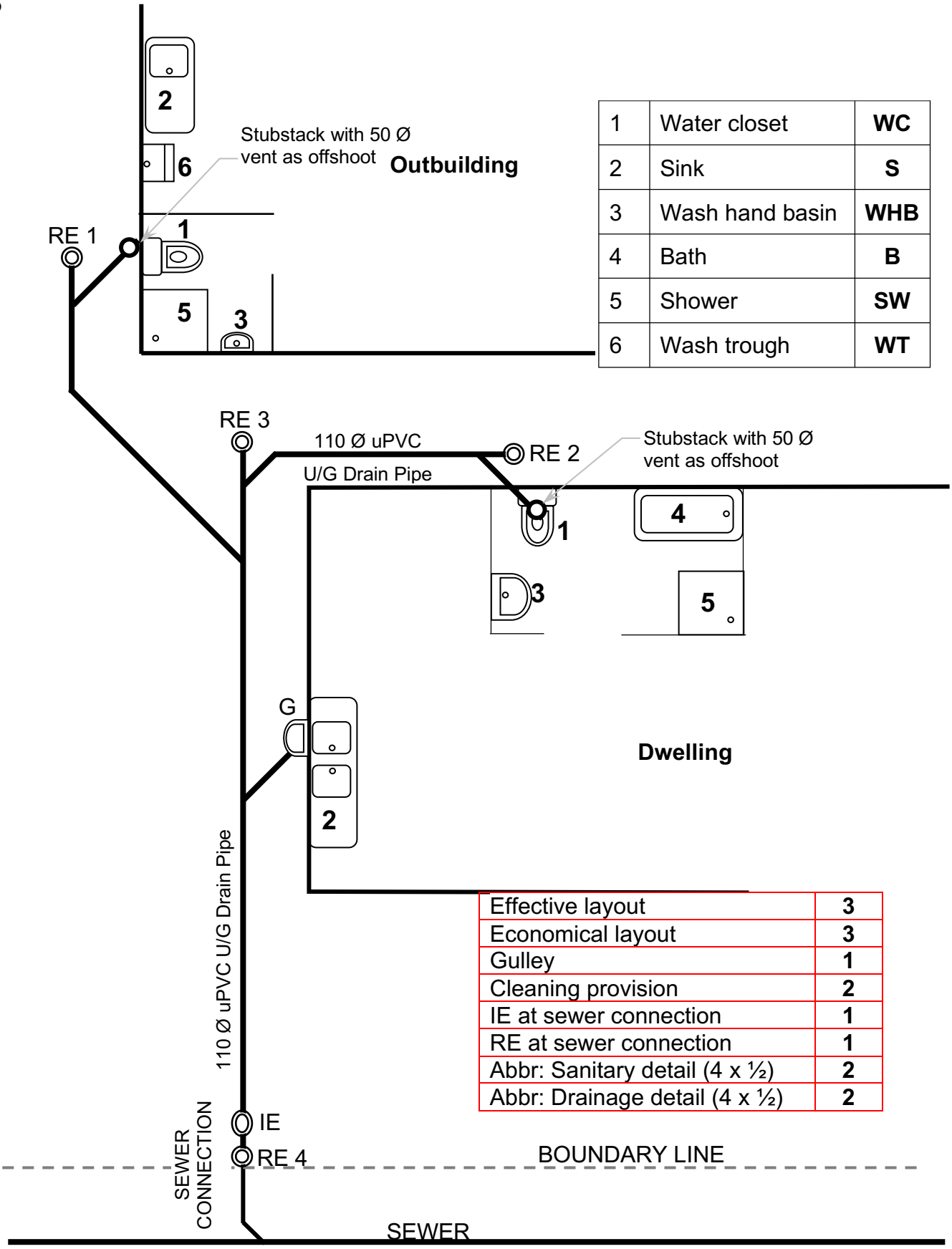
(7)

SKETCH:

- General correctness
- Inlet T correct
- Outlet T correct
- Screen wall
- Screen-wall opening½
- Screen-wall gap for gas½

(Any THREE labels x ONE mark each) (3)

3.5

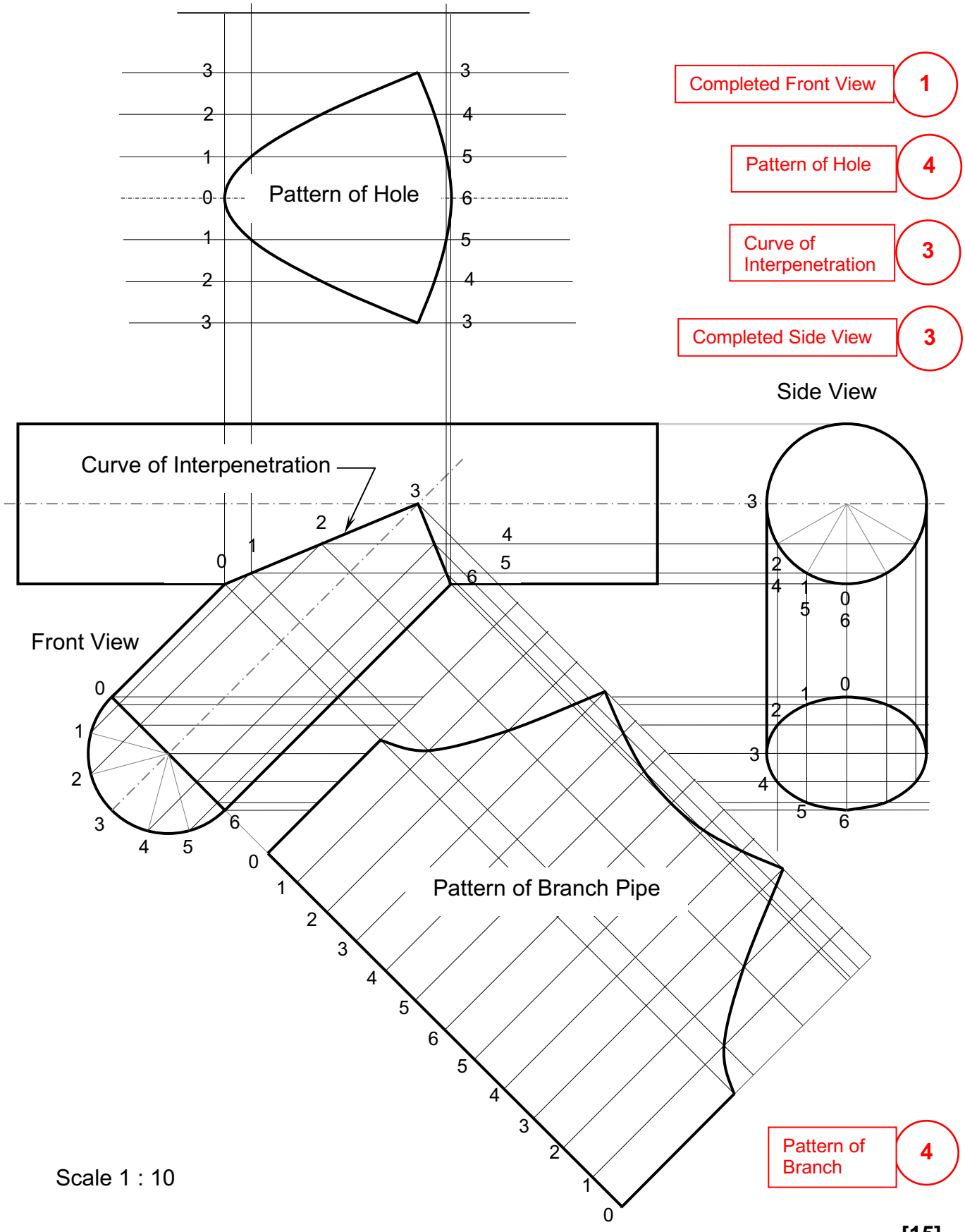


1	Water closet	**WC**
2	Sink	**S**
3	Wash hand basin	**WHB**
4	Bath	**B**
5	Shower	**SW**
6	Wash trough	**WT**

Effective layout	**3**
Economical layout	**3**
Gulley	**1**
Cleaning provision	**2**
IE at sewer connection	**1**
RE at sewer connection	**1**
Abbr: Sanitary detail (4 x ½)	**2**
Abbr: Drainage detail (4 x ½)	**2**

(15)
[35]

QUESTION 4: SHEET-METAL WORK AND FLASHING



Completed Front View **1**

Pattern of Hole **4**

Curve of Interpenetration **3**

Completed Side View **3**

Pattern of Branch **4**

[15]

QUESTION 5: CALCULATIONS

5.1

$$\text{Volume} = \frac{\pi D^2}{4} \times H \quad \checkmark$$

$$= \frac{\pi \times 0{,}8^2}{4} \times (0{,}75 - 0{,}1)$$

$$= \frac{\pi \times 0{,}8^2}{4} \times 0{,}65 \quad \checkmark$$

$$= 0{,}104 \text{ m}^3 \quad (\times 1\,000) \quad \checkmark$$

$$= 104 \text{ litres} \quad \checkmark\checkmark$$

(5)

5.2

$$p = \rho g H$$

$$= 1\,000 \times 10 \times (0{,}65 + 5{,}5) \quad \checkmark$$

$$= 61{,}5 \text{ kPa} \quad \checkmark$$

(2)

5.3

$$p = \rho g H$$

$$= 1\,000 \times 10 \times (0{,}65 + 5{,}5 + 10) \quad \checkmark\checkmark$$

$$= 161{,}5 \text{ kPa} \quad \checkmark$$

(3)
[10]

TOTAL: 100