higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

PLUMBING THEORY N2

17 April 2015

This marking guideline consists of 8 pages.

QUESTION 1: COLD-WATER SUPPLY

1.1 1.1.1
- Temporary hardness is caused by the bicarbonates of √
- calcium and/or magnesium √
- held in solution by carbon dioxide.√ (3 × 1) (3)

1.1.2
- 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) (3)

1.2
- Automatically expel any air in the main √
- without wasting water√ (2 × 1) (2)

1.3
- Provide water to emergency services to rinse/wash streets, etc. after accidents. √
- Provide access to fill municipal water tankers. √
- Provide access to municipal workers to use water off a metered standpipe√
- To be used as a temporary connection with approval by city engineers√.

(Any 3 × 1) (3)

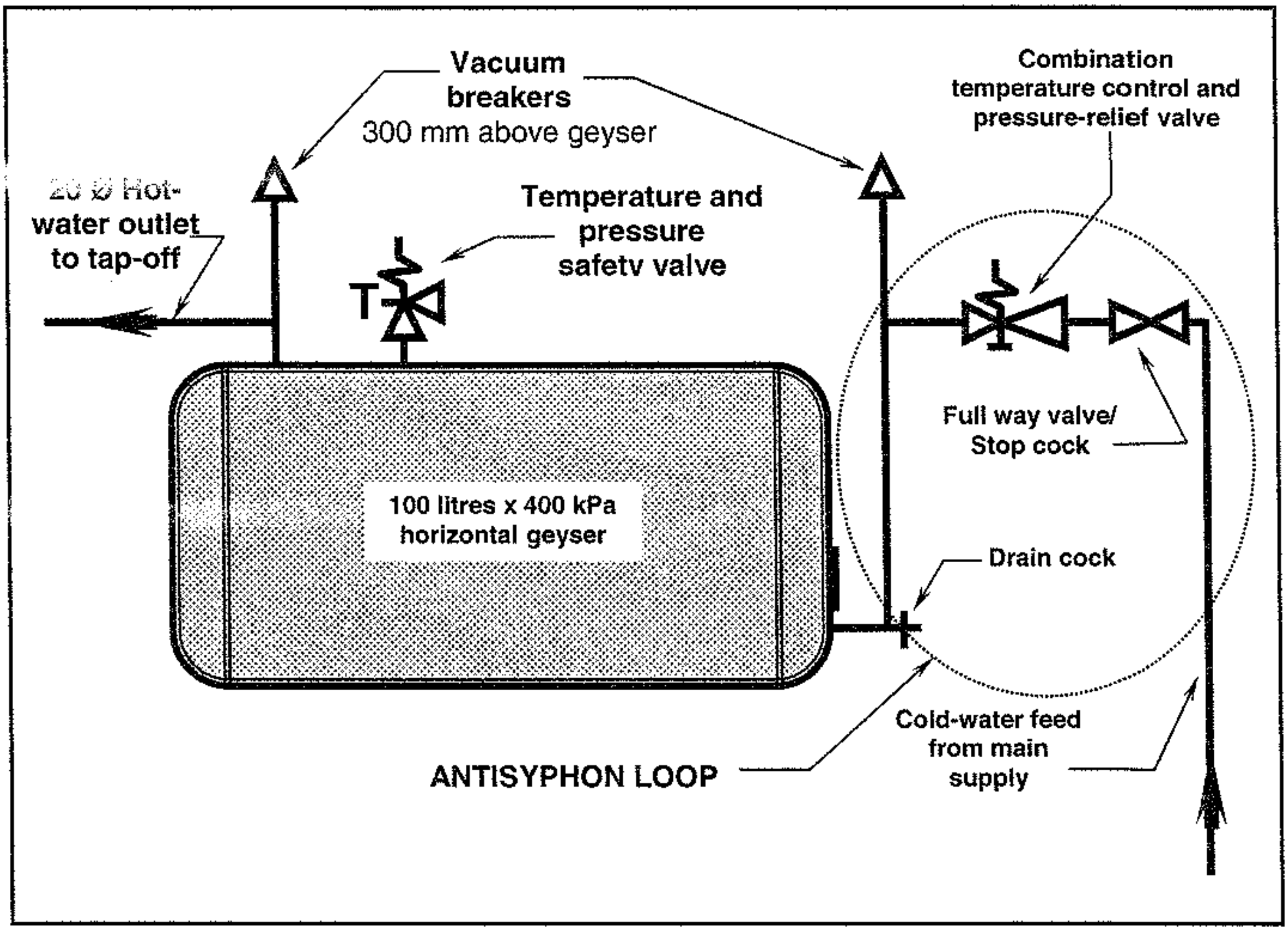
1.4
- This system is more economical as far as installation costs, operating costs and maintenance costs are concerned. √
- This system is more reliable and ensures a much more constant supply. The pump in a pump system must be interrupted to maintain or repair pumps. √
- A more constant pressure is ensured. The only fluctuations of pressure at terminal fittings will occur at peak demands and changes of the water level in the service reservoir. √ (3 × 1) (3)

1.5
- Boiling the water also releases the carbon dioxide√ and the salts are precipitated. √ This√ causes 'furring' (scaling) of hot-water systems. √
- This causes blockages√ of hot-water systems and also leads to wastage√ of heat energy. √ (6)

[20]

QUESTION 2: HOT-WATER SUPPLY

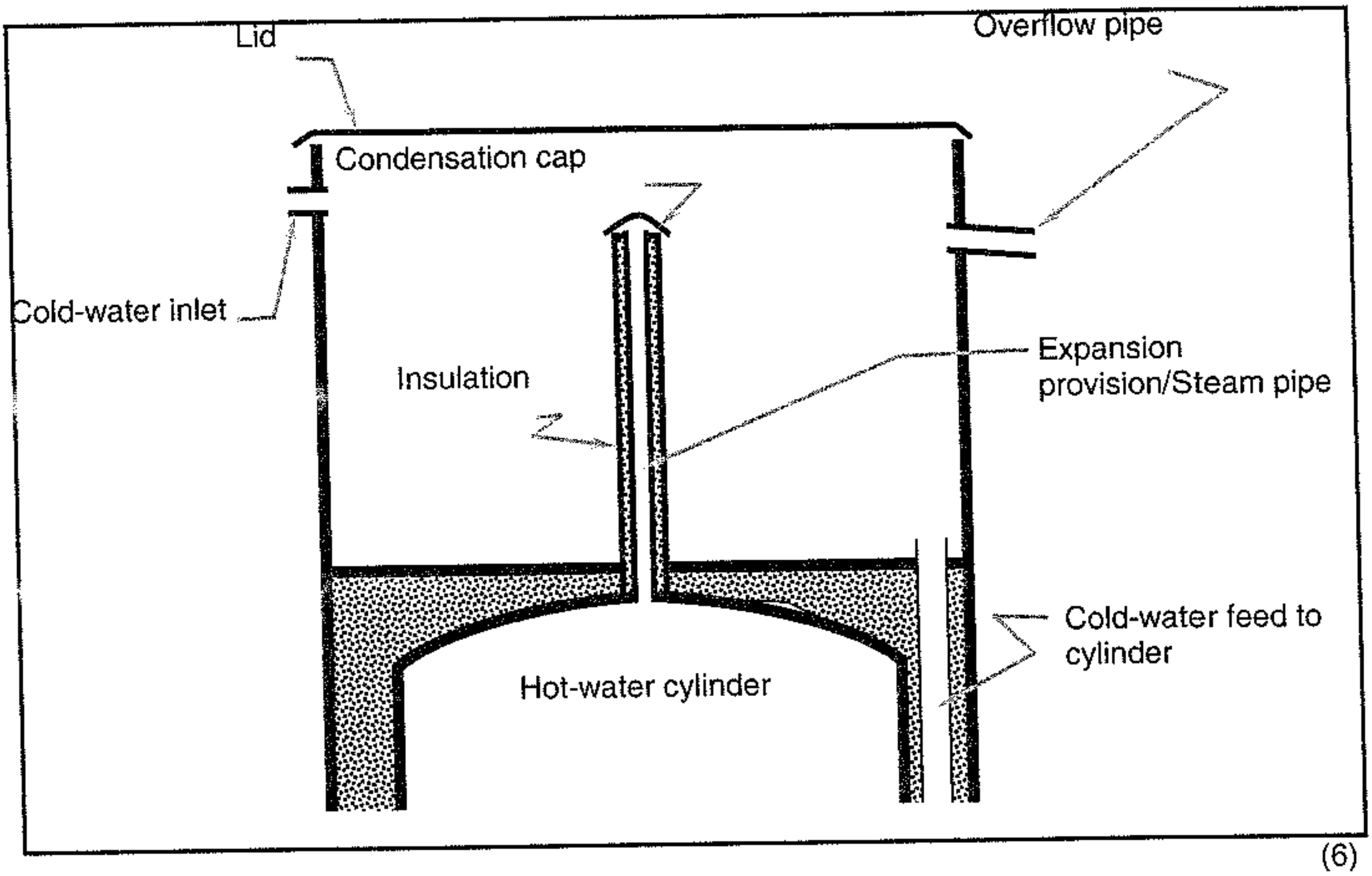
2.1



(7)

2.2
- If the system heats up (boils) temporary hard water, the carbon dioxide is driven off and √
- the bicarbonates of calcium and/or magnesium are thus not held in solution any more. √
- These salts then precipitate in the system and √
- settle to form the 'scaling'. √ (Any 3 × 1) (3)

2.3



(6)

2.4
- Reduce the incoming mains pressure√
- to a pre-set pressure rating √
- and maintain √
- and control this pressure √
- when the system is not in use√. (Any 4 × 1) (4)

[20]

QUESTION 3: DRAINAGE

3.1 3.1.1
- A drainage installation of a site is vested in the owner of the site√
- It is intended for the reception, conveyance, storage or treatment of sewage. √
- This includes sanitary fixtures, traps, discharge pipes, drains, ventilation pipes, septic tanks, sewage treatment works and mechanical appliances associated therewith. √ (3 × 1) (3)

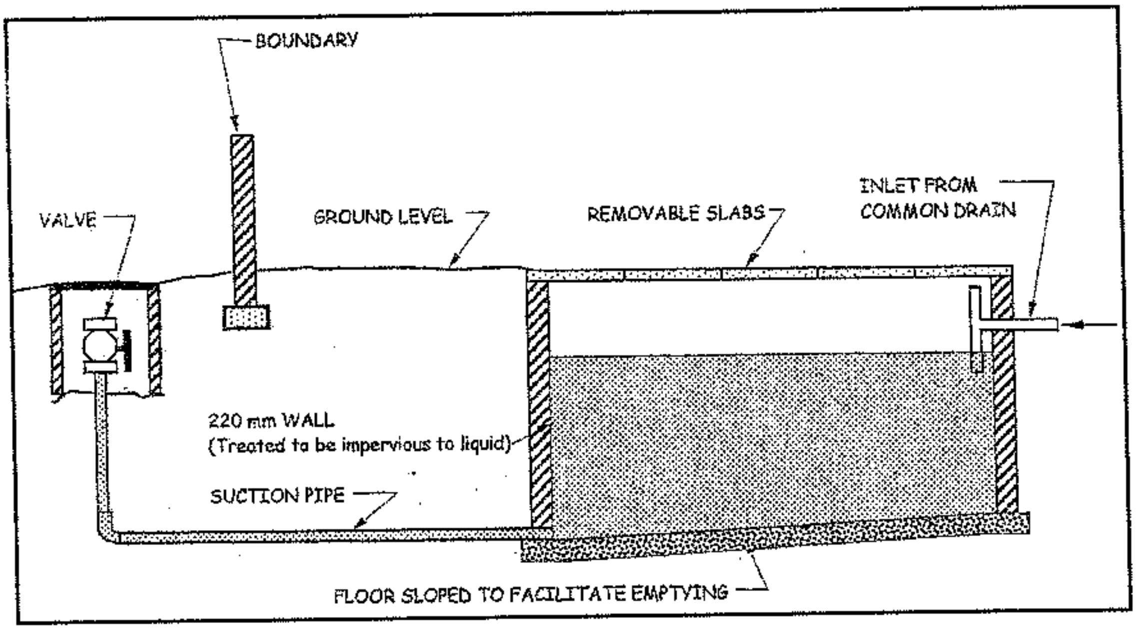
3.1.2
- A rodding eye is a permanent access opening to the interior of a drainage installation that √
- permits full bore access to the interior of a drain for internal cleaning. √ (2 × 1) (2)

3.1.3
- A manhole is a chamber of depth exceeding 750 mm and of such dimensions that √
- enables a person to enter such a chamber to obtain access to a drain√ (2 × 1) (2)

3.1.4
- A septic tank is a chamber designed to receive sewage and√
- to retain it for such a time and in such a manner as to √
- secure adequate decomposition of the sewage. √
- A septic tank is always installed with a French drain. √

(Any 3 × 1) (3)

3.2



(6)

3.3

$\text{Fall} = \text{Distance} \times \text{Gradient}$

$= 12{,}75 \times \frac{1}{26}$ √√

$= 490{,}4 \text{ mm}$

$\text{Invert Depth} = \text{Invert Depth}_{HEAD} + \text{Fall}$

$= 625 + 490{,}4$ √√

$= 1\,115{,}4 \text{ mm}$

OR

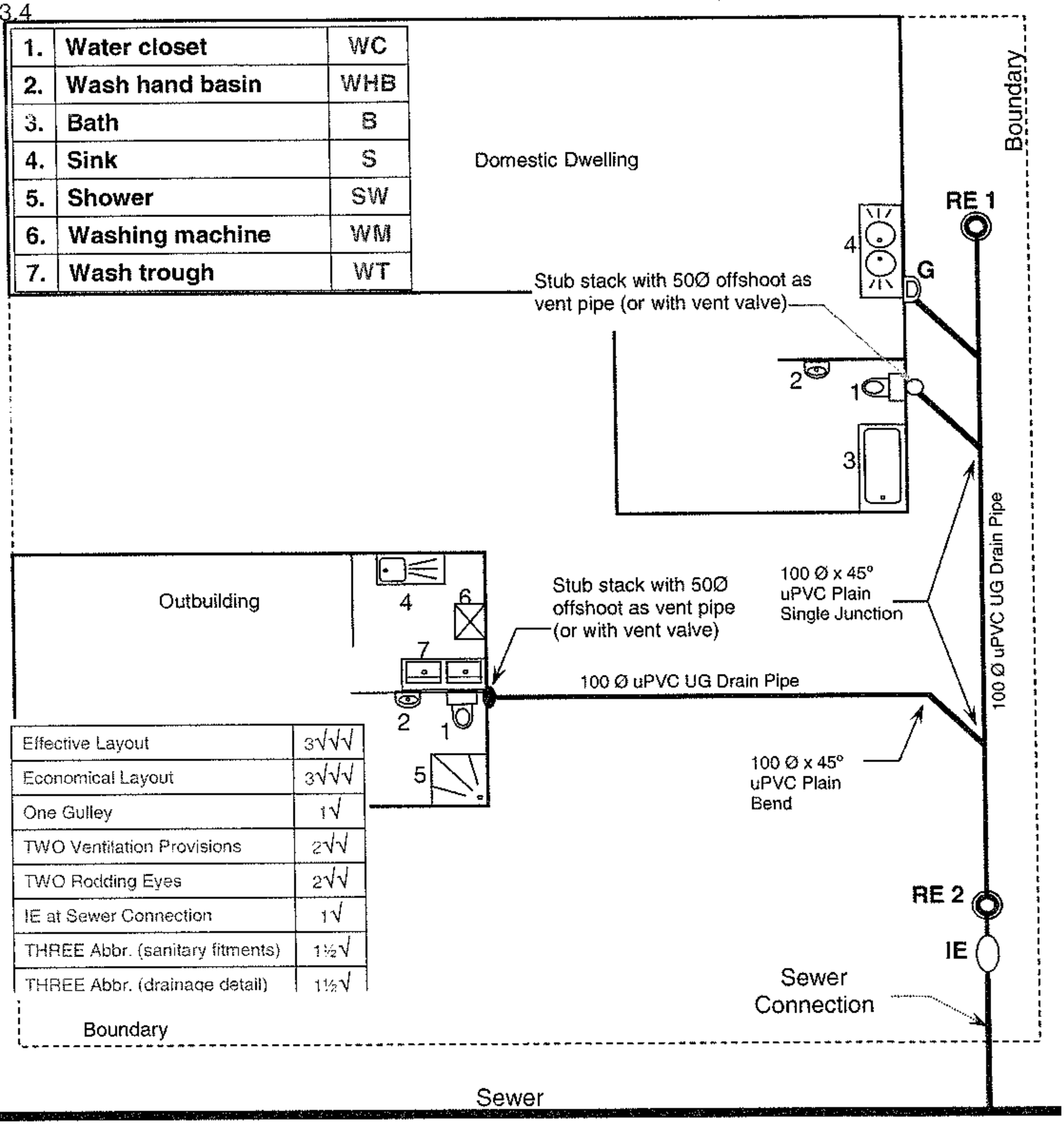
Fall = $\frac{\text{Distance of drain (m)}}{\text{gradient}}$

$= \frac{12{,}75}{26}$

$= 490{,}4$ mm√√ (4)

3.4

1.	Water closet	WC
2.	Wash hand basin	WHB
3.	Bath	B
4.	Sink	S
5.	Shower	SW
6.	Washing machine	WM
7.	Wash trough	WT

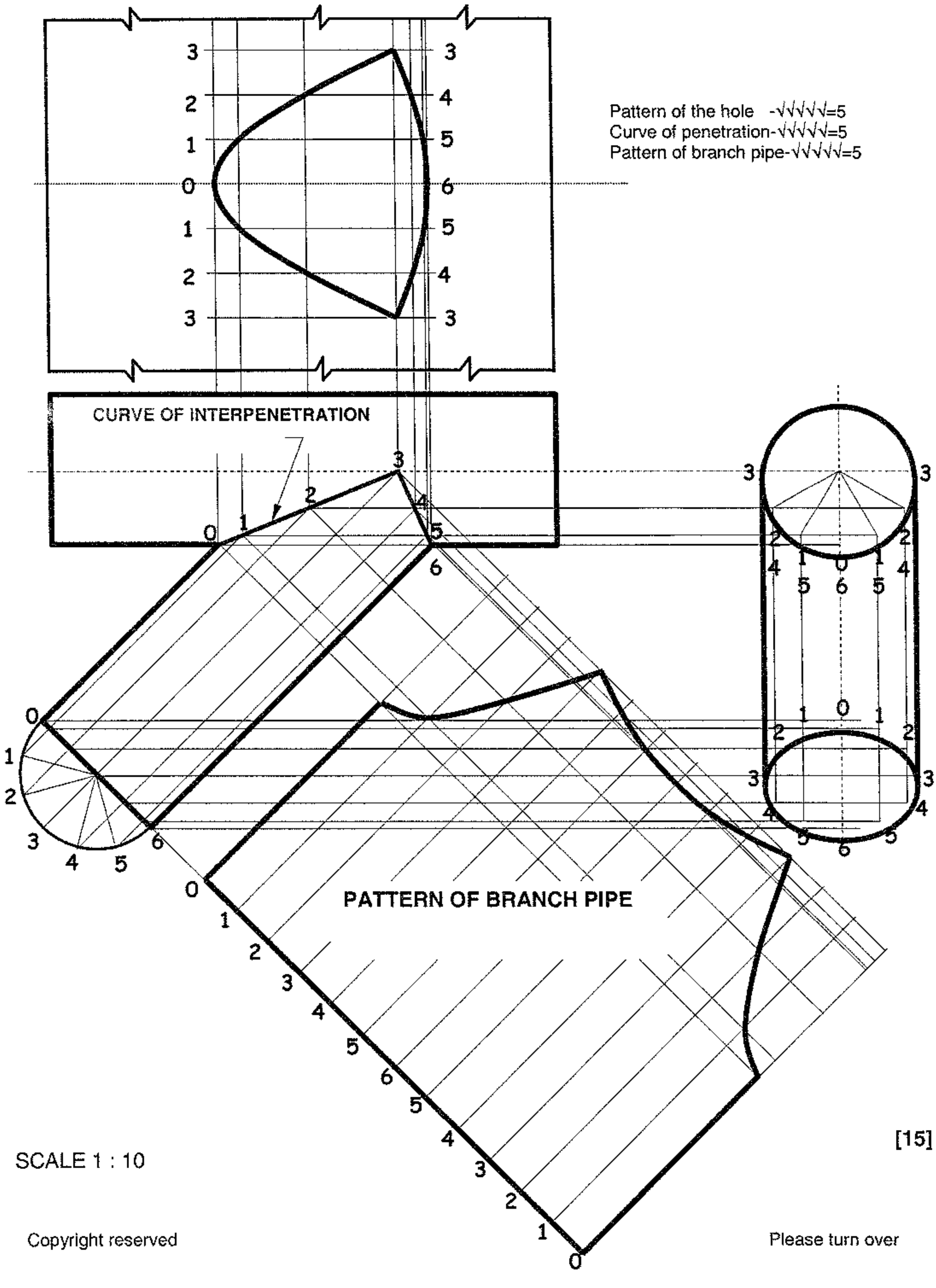


Effective Layout	3√√√
Economical Layout	3√√√
One Gulley	1√
TWO Ventilation Provisions	2√√
TWO Rodding Eyes	2√√
IE at Sewer Connection	1√
THREE Abbr. (sanitary fitments)	1½√
THREE Abbr. (drainage detail)	1½√

(15)
[35]

QUESTION 4

Pattern of the hole -√√√√√=5
Curve of penetration-√√√√√=5
Pattern of branch pipe-√√√√√=5



[15]

SCALE 1 : 10

QUESTION 5: CALCULATIONS

5.1 5.1.1 √√√

$$Volume = L \times B \times H$$
$$= 1{,}2 \times 1{,}2 \times (0{,}9 - 0{,}2)$$
$$= 1{,}2 \times 1{,}2 \times 0{,}7$$
$$= 1{,}008\ m^3$$

(3)

5.1.2 √√√√

$$\text{MASS}_{\text{TOTAL}} = m_{\text{TANK}} + m_{\text{WATER}}$$
$$= (D \times V \times g) + 250$$
$$= (1000 \times 1{,}008 \times 10) + 250$$
$$= 10\ 080 + 250$$
$$= 10\ 330\ \text{kg}$$

(4)

5.1.3 √√√

$$\text{AREA}_{\text{TOTAL}} = A_{\text{BASE}} + A_{\text{SIDES}}$$
$$= (1{,}2 \times 1{,}2) + 4(1{,}2 \times 0{,}9)$$
$$= 1{,}44 + (4 \times 1{,}08)$$
$$= 1{,}44 + 4{,}32$$
$$= 5{,}76\ \text{m}^2$$

(3)
[10]

TOTAL: 100