Affix label with Candidate Code Number here.
If no label, enter candidate Number if known

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No. 9197

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2013

LICENSED DRAINLAYER

QUESTION AND ANSWER BOOKLET

Time allowed THREE hours

INSTRUCTIONS

Check that the Candidate Code Number on your admission slip is the same as the number on the label at the top of this page.

Do not start writing until you are told to do so by the Supervisor.

Total marks for this examination: 100.

The pass mark for this examination is 60 marks.

Write your answers and draw your sketches in this booklet. If you need more paper, use pages 23–25 at the back of this booklet. Clearly write the question number(s) if any of these pages are used.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculators, document(s) provided.

Publications, Acts, Regulations, Codes of Practice, or Standards other than the ones provided are NOT permitted in the examination room.

Check that this booklet has all of 25 pages in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

Candidates that sat this examination in November 2013 were provided with the following documents:

- New Zealand Building Code Clause G13 Foul Water
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

USEFUL FORMULAE

Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

Area of circle = $\pi \times R^2$ or Area of circle = $0.7854 \times D^2$

Volume of cylinder = $\pi \times R^2 \times H$ or Volume of cylinder = $0.7854 \times D^2 \times H$

length = L
gradient = 1:G
fall = F

SECTION A

QUESTION 1

Give the purpose of each of the following admixtures (additives) to concrete and a situation in which each would be used.

(a) Retardants:

_____

When used:

_____

(2 marks)

(b) Accelerators:

_____

When used:

_____

(2 marks)

Total 4 marks

QUESTION 2

(a) State how to determine if the base of a trench is stable.

(1 mark)

(b) If the base of a trench is not stable, describe a method that would make it stable.

(2 marks)

(c) (i) State what boning rods are used for.

(1 mark)

(ii) Describe how boning rods are used.

(2 marks)

Total 6 marks

QUESTION 3

(a) Describe how geotextile (filter cloth) should be installed to help prevent the cloth blocking.

_____

_____

(1 mark)

(b) List TWO locations where geotextile cloth is used in drainlaying.

1 _____

2 _____

(1 mark)

Total 2 marks

QUESTION 4

Scouring or slippage can occur in a trench.

Describe each of these terms, and give TWO causes of each.

(a) (i) Scouring

_____

(1 mark) ☐

Causes

1 _____

2 _____

(1 mark) ☐

(ii) Slippage

_____

(1 mark) ☐

Causes

1 _____

2 _____

(1 mark) ☐

(b) Give THREE methods used to prevent scouring or slippage in an open trench.

1 _____

2 _____

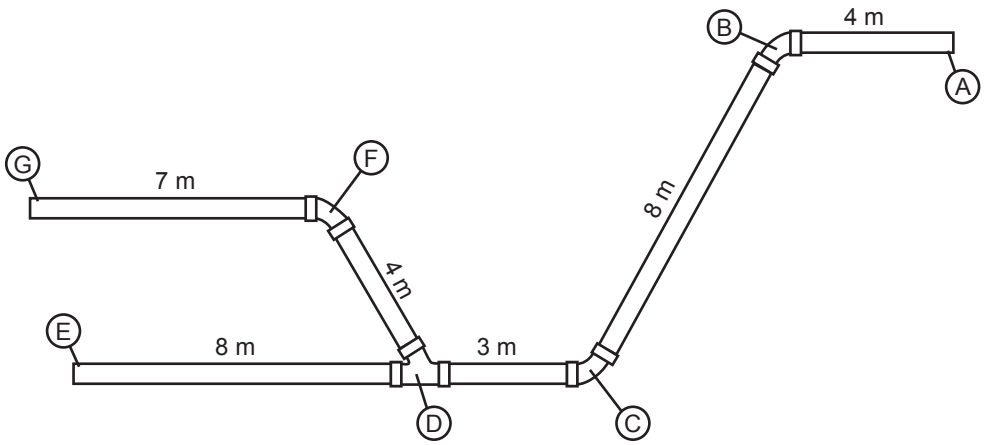
3 _____

(3 marks) ☐

Total 7 marks ☐

QUESTION 5

The diagram below shows a plan view indicating the position of a house drain on a level section.



The drain from point G to Point D has been laid at a gradient of 1:60 (1.65%).

The drain from point E to point A has been laid at a gradient of 1:80 (1.25%).

(a) Complete the following table to show the fall for each section listed.

Section	Fall
A – B	
B – C	
C – D	
D – E	
D – F	
F – G	

(b) The drain at point A is the sewer connection, and is 800 mm below the ground level. Complete the following table to show the depth below ground level for each point listed.

Point	Depth
B	
C	
D	
E	
F	
G	

Total 12 marks

QUESTION 6

(a) Sewage contains micro-organisms which can be harmful if they were to enter a human body.

List FOUR ways that micro-organisms present in sewage can enter the body.

1 _____

2 _____

3 _____

4 _____

(2 marks)

(b) A drainlayer may be required to work within a confined space.

Before entering a confined space it is essential that the space be made safe.

Answer the following questions with regard to safety precautions.

(i) List FOUR conditions regarding the atmosphere that must be checked before entering a confined space.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(ii) A fall hazard exists in a confined space.

List the safety equipment, excluding personal protection equipment (PPE), that must be worn before entering this space.

_____

_____

(1 mark)

QUESTION 6 (cont'd)

(c) When working in a trench, there is a potential danger from gases.

Explain why some gases may accumulate in the trench.

_____

_____

(1 mark)

Total 8 marks

QUESTION 7

Define the following terms as they relate to drainlaying.

(a) Main drain

(2 marks)

(b) Sullage (waste water)

(1 mark)

(c) Infiltration

(1 mark)

(d) Outfall

(1 mark)

(e) Surcharge

(1 mark)

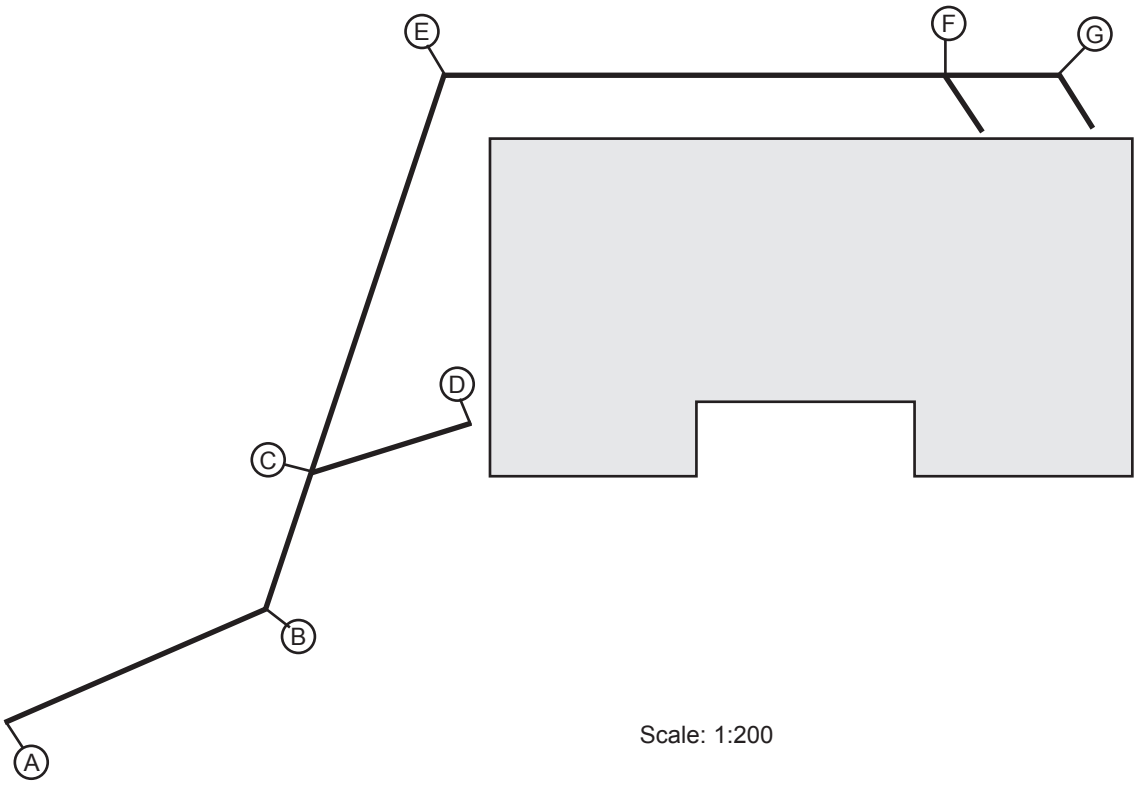
Total 6 marks

QUESTION 8

The diagram below shows a plan view of a house and foul water drainage system.

The diagram is drawn to a scale of 1:200

The drain shown is to be installed at a gradient of 1:60



Scale: 1:200

Complete the table below by giving the length in metres of each section of pipe and the fall in mm for each section of pipe listed.

Section	Length of the section (m)	Fall of the section (mm)
A – B		
B – C		
C – D		
C – E		
E – F		
F – G		

Total 6 marks

QUESTION 9

Sketch a diagram of a trade waste system suitable for use on a service station forecourt.

Total 5 marks

QUESTION 10

A trench has the following dimensions: 60 m long × 0.600 m wide with a depth of 0.820 m at the top end and 1.440 m at the bottom end.

Calculate the amount of material required to fill the trench, including an allowance of 25% for compaction.

Total 5 marks

QUESTION 11

Give FOUR adverse effects on a drainage system that could result from inadequate ventilation of the system.

1 _____

2 _____

3 _____

4 _____

Total 2 marks

QUESTION 12

(a) State a type of drainage system an absorption test (percolation test) is used for.

_____

(1 mark)

(b) State the purpose of an absorption test (percolation test).

_____

(1 mark)

Total 2 marks

QUESTION 13

(a) Give the steps in the procedure for jointing a short length of uPVC pipe to a socket by solvent welding.

(3 marks)

(b) A length of uPVC foul water drainage pipe is to be joined to a socketed fitting.

The method of joining is to be rubber ring.

Give, in order, the steps to be followed in making this joint.

(3 marks)

Total 6 marks

QUESTION 14

Using AS/NZS 3500 Part 2: Sanitary plumbing and drainage, list the options for joining the dissimilar pipe materials given.

(a) TWO permissible joints for cast iron to fibre reinforced cement pipe.

1 _____

2 _____

(2 marks) ☐

(b) THREE permissible joints for PVC-U to copper pipe.

1 _____

2 _____

3 _____

(3 marks) ☐

(c) TWO permissible joints for polypropylene to vitreous clay pipe.

1 _____

2 _____

(2 marks) ☐

Total 7 marks ☐

QUESTION 15

(a) List THREE fixtures that discharge grey water.

1 _____

2 _____

3 _____

(3 marks)

(b) Give TWO purposes of a detention tank in relation to surface water drainage.

1 _____

2 _____

(2 marks)

Total 5 marks

QUESTION 16

(a) Give an advantage that a dry inspection chamber has over a wet inspection chamber.

_____

(1 mark)

(b) Give an advantage that a wet inspection chamber has over a dry inspection chamber.

_____

(1 mark)

Total 2 marks

SECTION B

Answer the following multiple-choice questions by writing your answer (A, B, C, D or E) in the box provided after each one of the questions.

Each correct answer in this section of the examination is worth 1 mark.

Note that should your choice of answer be unclear in this section of the examination no marks will be awarded for that question.

1. A drain which is installed at a gradient of 1 in 30.

   What is this gradient as a percentage?

   A 0.85%.

   B 1.10%.

   C 1.45%.

   D 2.50%.

   E 3.35%.

   ☐

2. AS/NZS 3500 Part 2: Sanitary plumbing and drainage uses which of the following abbreviations to identify cross-linked polyethylene?

   A PP-R

   B PE-X

   C PE-CR

   D P-CR

   E CRP

   ☐

3. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, when two drains at grade are to be joined by means of a 45° unequal junction, the invert of the branch drain must meet which of the following requirements?

   A Level with the soffit of the drain to which it connects.

   B 25 mm lower than the soffit of the drain to which it connects.

   C 10 mm higher the soffit of the drain to which it connects.

   D 50 mm higher than the soffit of the drain to which it connects.

   E 10 mm higher than the invert of the drain to which it connects.

   ☐

4. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, where more than one jump-up is installed in a circular inspection chamber, what is the minimum allowable chamber diameter?

A 600 mm.

B 800 mm.

C 900 mm.

D 1200 mm.

E 1500 mm.

☐

5. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, what is the smallest permissible size of a circular inspection chamber opening lid?

A 400 mm.

B 500 mm.

C 550 mm.

D 600 mm.

E 650 mm.

☐

6. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, what is the maximum allowable depth of inspection chambers with individual rung ladders?

A 1.2 m.

B 1.8 m.

C 2.4 m.

D 2.8 m.

E 3.0 m.

☐

7. According to AS/NZS 3500 Part 2: Sanitary plumbing and drainage, a sullage tank requires cleaning out and desludging after what time period for satisfactory performance?

A Every year, or sooner if necessary.

B Every two years, or sooner if necessary.

C Every five years, or sooner if necessary.

D Every eight years, or sooner if necessary.

E Every ten years, or sooner if necessary.

☐

8. A trench is to be excavated to a depth of 1.5 metres.

When would the excavation become notifiable work?

A When the trench crosses a public access route.

B When the trench will be open for more than 48 hours.

C When the trench is in type B (saturated) soil.

D When the trench is 1.0 metres wide.

E When the trench is being excavated with large machinery.

☐

9. According to New Zealand Building Code Clause G13/AS2 Foul Water, what is the maximum angle permitted when a branch drain junction connects to a main drain?

A 15°

B 22°

C 45°

D 60°

E 88°

☐

10. A 150 mm drain is to be laid in a trench.

    According to New Zealand Building Code Clause G13/AS2 Foul Water, what is the minimum permitted width of the trench?

    A 250 mm.

    B 300 mm.

    C 350 mm.

    D 400 mm.

    E 450 mm.

    ☐

11. According to New Zealand Building Code Clause G13/AS2 Foul Water, what is the maximum allowable distance between rodding points installed in a straight length of drain to provide access for clearing blockages?

    A 24 m.

    B 30 m.

    C 36 m.

    D 42 m.

    E 50 m.

    ☐

12. A trench is to be dug in line with the footings of a building.

    The trench is expected to be open for 36 hours.

    The trench will be 1.5 metres deeper than the footings.

    How far away from the base of the footings must the trench be?

    A 0.5 m.

    B 1.0 m.

    C 1.5 m.

    D 2.0 m.

    E 2.4 m.

    ☐

13. New Zealand Building Code Clause G13/AS2 Foul Water is an acceptable solution for below ground gravity flow foul water drains with a diameter up to which of the following?

A 150 mm.

B 200 mm.

C 250 mm.

D 300 mm.

E 350 mm.

14. New Zealand Building Code Clause G13/AS2 Foul Water states that the minimum water seal depth of a gully trap is which of the following?

A 45 mm.

B 50 mm.

C 60 mm.

D 65 mm.

E 75 mm.

15. According to New Zealand Building Code Clause G13/AS2 Foul Water, where a drain enters or exits from under a building, an access point is to be provided within what distance of the outside of the building?

A 0.9 m.

B 1.2 m.

C 1.8 m.

D 2.0 m.

E 2.4 m.

Total 15 marks

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
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5		
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10		
11		
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Section B		
Total		