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

.....

No. 9198

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2015

CERTIFYING 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 17–21 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 21 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 June 2015 were provided with the following documents:

- New Zealand Building Code Clause E1 – Surface 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 TWO functions of a gully trap on a foul drain water.

1 _____

2 _____

Total 2 marks

QUESTION 2

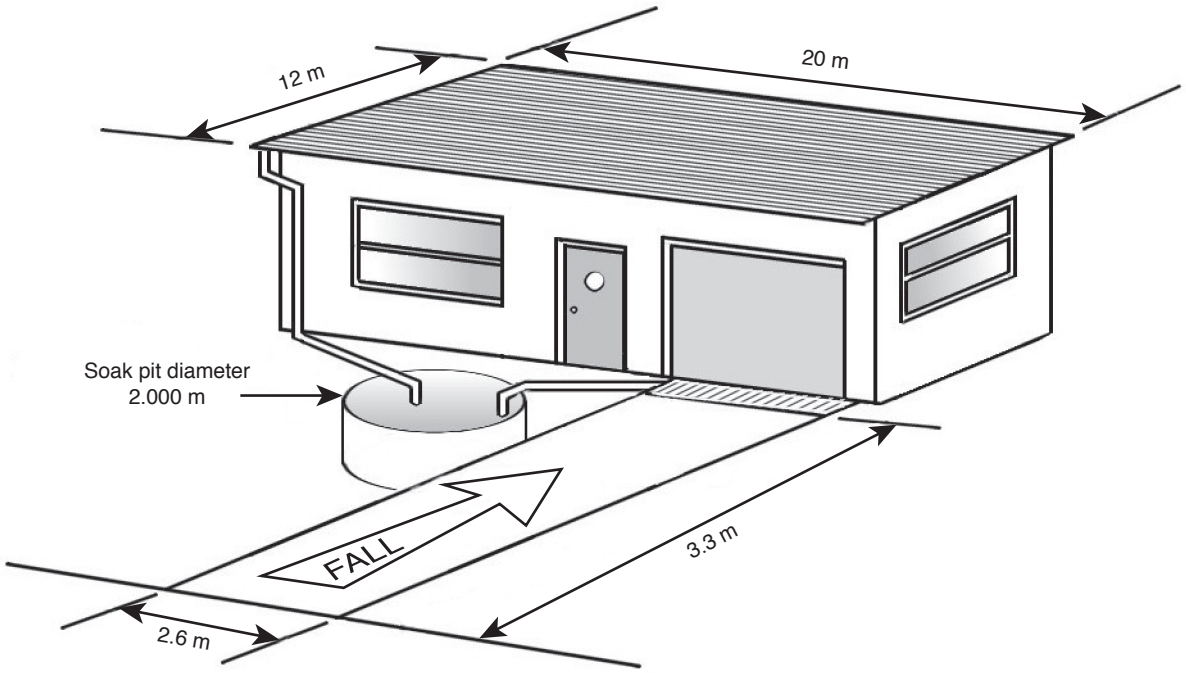
(a) The drawing below shows a house and driveway draining to a chamber soak pit.

A percolation (soakage) test of the soil has been carried out and the average water level drop is 0.42 m/h.

The expected rainfall intensity for the area is 0.0263 m/h.

The roof of the house is colour steel and the driveway is concrete.

Referring to New Zealand Building Code clause E1/VM1 Surface Water, complete the table on the opposite page to calculate the required depth of the soak pit.



QUESTION 2 (cont'd)

Calculation	Answer
Run-off coefficient for roof	
Run-off coefficient for driveway	
Expected water run-off from roof in m^3/h (= area of catchment in m^2 × run-off coefficient × rainfall intensity in m/h)	
Expected water run-off from driveway in m^3/hr	
Total volume of water conveyed from catchment to soak pit.	
Area of base of soak pit	
Absorption ability of soak pit in m^3/h (= area of base of soak pit in m^2 × average drop from percolation test in m)	
Required volume of soak pit	
Required depth of soak pit	

(9 marks)

(b) Excluding New Zealand Building Code clause E1/AS1 Surface Water, state TWO sources from which information regarding the average rainfall intensity for a site can be obtained.

1 _____

2 _____

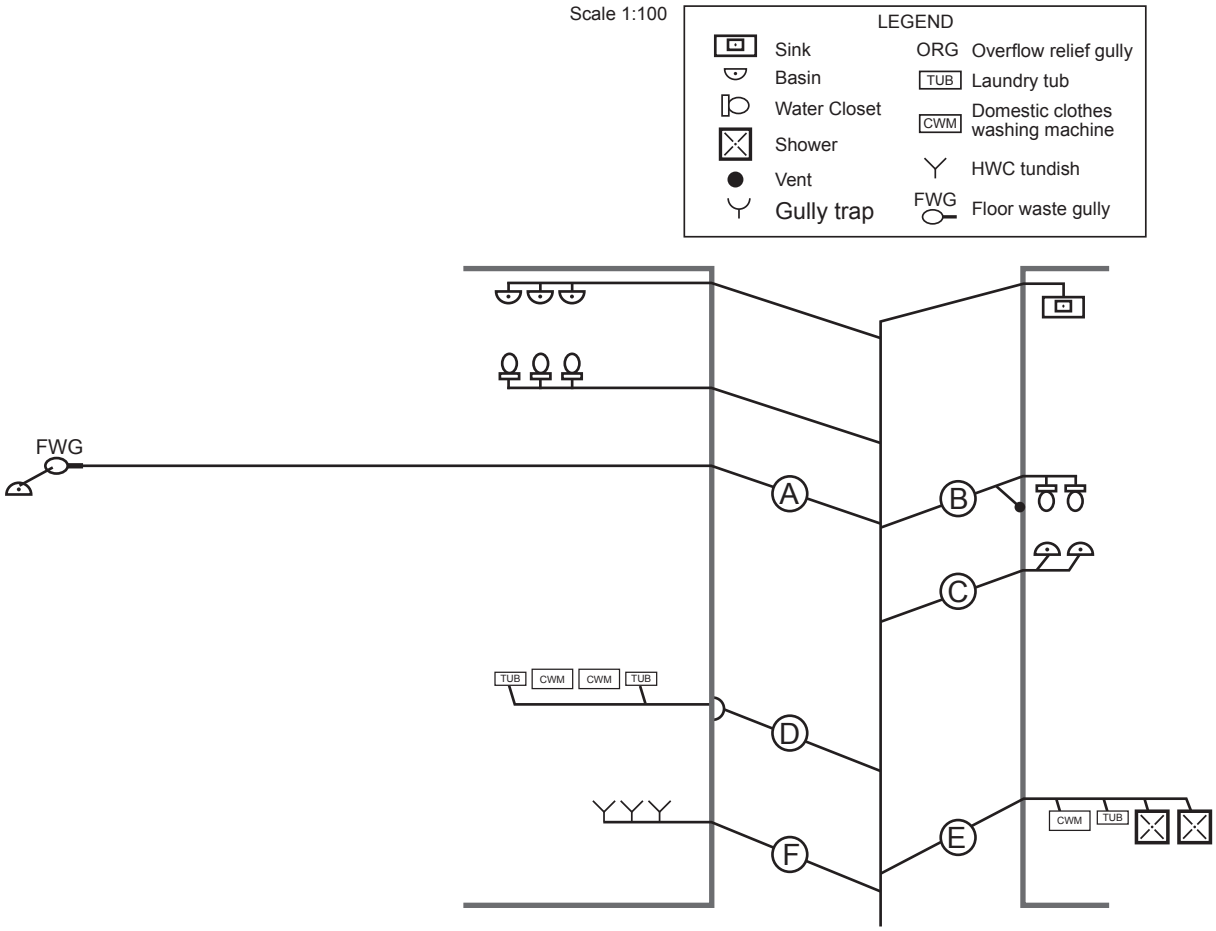
(2 marks)

Total 11 marks

QUESTION 3

The diagram below shows a plan view of part of a foul water drainage drawn to a scale of 1:100.

(a) Complete the diagram to show the required locations and diameters for any additional vent pipe work. The completed system is to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.



(b) Complete the table below to show the required minimum diameter and minimum gradient for the foul water discharge pipes labelled A – E.

Location	Minimum diameter	Minimum gradient
A		
B		
C		
D		
E		
F		

Total 14 marks

QUESTION 4

An excavation that is intended for a septic tank is $\frac{2}{3}$ full of water.

The excavation is 4.75 m long, 0.9 m wide and 1.4 m deep.

A dewatering pump has a discharge rate of 40 litres/minute.

Calculate the time required to dewater the excavation using this pump.

Total 4 marks

QUESTION 5

On approaching a trench, it is noticed that a work colleague has collapsed and is lying in the bottom of the trench. The colleague is unresponsive.

(a) Give THREE different possible reasons for this.

1 _____

2 _____

3 _____

(3 marks) ☐

(b) (i) Give the first action that should be taken in this situation.

_____

(1 mark) ☐

(ii) Give THREE other actions that could then be taken.

1 _____

2 _____

3 _____

(3 marks) ☐

(c) Name THREE pieces of workplace safety documentation that may need to be completed in this situation.

1 _____

2 _____

3 _____

(3 marks) ☐

Total 10 marks ☐

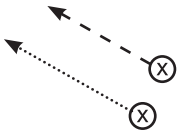
QUESTION 6

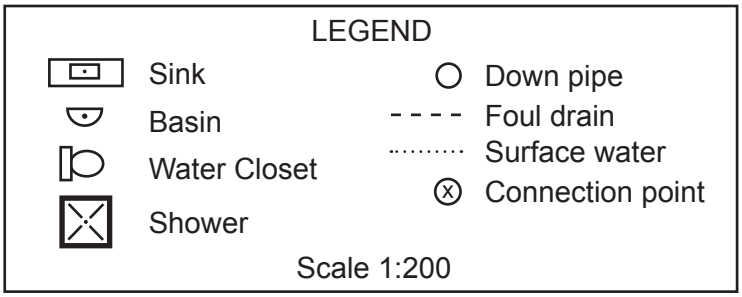
(a) The diagram below shows a plan view of a motel block with three separate units drawn to a scale of 1:200. The connection points for the surface water and foul water drain are also shown.

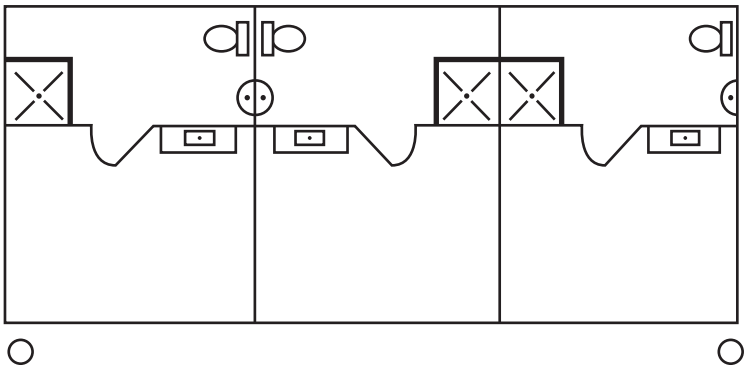
On the diagram, draw and label an economical drainage plan that complies with New Zealand Building Code Clauses G13/AS1 Foul Water and E1/AS1 Surface Water.

All drainage is to be exterior to the building.

(8 marks)







(b) The invert level at the head of the foul water drain in (a) is 500 mm below the finished floor level, and the drain is to be laid at a gradient of 1:60.

Calculate the depth below the finished floor level of the foul water connection point 'X'.

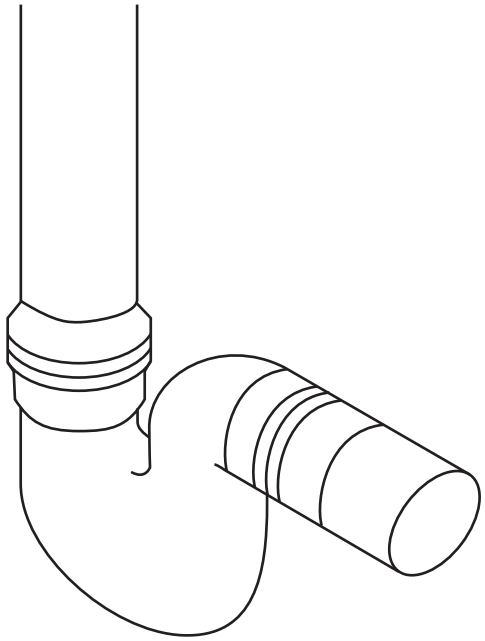
(3 marks)

Total 11 marks

QUESTION 7

The starter drawing below shows a gully trap and riser.

Complete the drawing to include the requirements that must be met when installing the gully trap and dish in a paved area so that the installation complies with New Zealand Building Code clause G13/AS2 Foul Water.



Total 5 marks

QUESTION 8

(a) Give the definition of the term ‘water table’.

_____

(1 mark) ☐

(b) Give TWO factors that can affect the depth to the water table.

1 _____

2 _____

(2 marks) ☐

(c) Name THREE types of effluent disposal designs that can be used in areas where the water table is too high for a gravity soakage trench effluent field system.

1 _____

2 _____

3 _____

(3 marks) ☐

(d) In addition to the water table, list FIVE factors that must be known before a suitable on-site sewage treatment system can be designed.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks) ☐

Total 11 marks ☐

QUESTION 9

(a) Describe operation of each type of pump listed below, and give an advantage each type of pump has over the other two types.

(i) Diaphragm pump

Features

Advantage

(2 marks)

(ii) Centrifugal pump

Features

Advantage

(2 marks)

QUESTION 9 (cont'd)

(ii) Macerating pump

Features

_____

_____

_____

Advantage

_____

_____

(2 marks)

(b) A pump is required to pump surface water to a kerb and channel. The head to be pumped is 8 m, and an allowance of 10% is to provide for frictional losses.

Calculate the static pipeline pressure at the pump outlet.

_____

_____

_____

(2 marks)

Total 8 marks

QUESTION 10

A sewage treatment system includes a two-chamber septic tank which discharges to a trench effluent field via a dosing system and distribution box.

(a) Sketch and label a cross-section of a two-chamber septic tank.

(b) Sketch and label a plan of the effluent bed system.

Total 7 marks

QUESTION 11

(a) Explain how a smoke test is carried out on a foul water drain.

(2 marks)

(b) Give THREE faults with the foul water system that would show up through the completion of a smoke test.

1

2

3

(3 marks)

Total 5 marks

QUESTION 12

(a) Give the meaning of the term ‘exempt building work’.

_____

(1 mark) ☐

(b) Give TWO examples of drainlaying work that would be classified as exempt building work.

1 _____

2 _____

(2 marks) ☐

(c) Give THREE categories of people who are permitted to complete drainlaying that is exempt building work.

1 _____

2 _____

3 _____

(3 marks) ☐

Total 6 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 no marks will be awarded for that question.

1. In the event that the minimum depth of cover required for a drain subject to light vehicular traffic and installed to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage cannot be achieved, which of the following is the minimum requirements to protect the drain from damage?

   A Cover the pipe with 50 mm of overlay followed by 50 mm of concrete paving.

   B Cover the pipe with 25 mm of overlay followed by 75 mm of reinforced concrete.

   C Cover the pipe with 50 mm of overlay followed by 75 mm of concrete paving.

   D Cover the pipe with 25 mm of overlay followed by 100 mm of concrete paving.

   E Cover the pipe with 50 mm of overlay followed by 100 mm of reinforced concrete.

   ☐

2. Which of the following is NOT classified as a significant hazard in relation to workplace health and safety?

   A A hazard that can potentially cause a bone fracture (broken bones).

   B A hazard that causes harm to a person that is not noticeable for a long period of time.

   C A hazard that causes the injury to become worse the more a person is exposed to it.

   D A hazard that can cause a burn requiring specialist care.

   E A hazard that cannot be eliminated or isolated or minimised.

   ☐

3. Which of the following is NOT classified as serious harm in relation to workplace health and safety?

   A Noise induced hearing loss.

   B An object penetrating an eye.

   C Losing consciousness due to lack of oxygen.

   D Temporarily losing eye sight.

   E Bruising to a large area of the body.

   ☐

4. Which of the following best describes the term ‘eliminate’ in relation to hazard management at a worksite?

A Constructing a barricade around a piece of machinery to prevent workers coming into contact with a hazard.

B Contracting another company or person to complete a hazardous task.

C Providing and wearing personal protective equipment to prevent injury.

D Having a Health and Safety representative assess a task before work commences.

E Replacing a noisy piece of machinery with a quieter model.

5. Which of the following best describes the term ‘minimise’ in relation to hazard management at a work site?

A Constructing a barricade around a piece of machinery to prevent workers coming into contact with a hazard.

B Contracting another company or person to complete a hazardous task.

C Providing and wearing personal protective equipment to prevent injury.

D Having a Health and Safety representative assess a task before work commences.

E Replacing a noisy piece of machinery with a quieter model.

6. Which of the following best describes the term ‘isolate’ in relation to hazard management at a work site?

A Constructing a barricade around a piece of machinery to prevent workers coming into contact with a hazard.

B Contracting another company or person to complete a hazardous task.

C Providing and wearing personal protective equipment to prevent injury.

D Having a Health and Safety representative assess a task before work commences.

E Replacing a noisy piece of machinery with a quieter model.

Total 6 marks

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
Section B		
Total		