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 2011

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 21–25 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 2011 were provided with the following documents:

- AS/NZS 2500 Part 2
- New Zealand Building Code clause G13

SECTION A

QUESTION 1

(a) Give TWO reasons why septic tanks are buried in the ground.

1 _____

2 _____

(1 mark)

(b) Give FOUR factors that impact on how often a septic tank will need to be emptied.

1 _____

2 _____

3 _____

4 _____

(2 marks)

(c) List SIX items that should not be flushed into an on-site sewage treatment system because they disrupt the growth of bacteria within the system.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(d) Give THREE reasons why stormwater should not be disposed of through a septic tank system.

1 _____

2 _____

3 _____

(3 marks)

Total 9 marks

QUESTION 2

Sketch a diagram showing a boundary trap riser or inspection shaft installed within a recess on an external wall of a building.

The installation is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage and relevant measurements must be shown.

Total 4 marks

QUESTION 3

(a) Briefly explain the purpose of a reflux valve.

(1 mark)

(b) Describe a situation that would make the installation of a reflux valve necessary.

(2 marks)

(c) State where, in relation to a boundry trap, a reflux valve should be located.

(1 mark)

Total 4 marks

QUESTION 4

Answer the following questions with reference to AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

(a) State the TWO values that are required to calculate the size of a vented main drain.

1 _____

2 _____

(2 marks)

(b) Give SIX instances where inspection openings must be provided on a drain.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(c) Complete the table below to show the minimum permitted diameter for an inspection opening on each diameter drain listed.

Diameter of drain	Diameter of inspection opening
80 mm	
100 mm	
150 mm	
300 mm	

(2 marks)

Total 7 marks

QUESTION 5

(a) Give THREE provisions that are included in the New Zealand Building Code Clause G13 Foul Water to prevent stormwater entering a foul water drain through a gully dish.

1 _____

2 _____

3 _____

(3 marks)

(b) List the steps in the procedure for jointing a short length of PVC pipe to a socket by solvent welding.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3 marks)

(c) Any section of drain that is no longer going to be used must be disconnected from the remaining drainage system.

Give TWO reasons for this.

1 _____

2 _____

(2 marks)

Total 8 marks

QUESTION 6

(a) Sketch and label a side elevation diagram of a trade waste interceptor trap for a service station forecourt.

(5 marks)

QUESTION 6 (cont'd)

(b) Sketch and label a cross sectional diagram of a silt trap to prevent extraneous matter from entering a drainage system. The trap is to comply with the New Zealand Building Code Clause E1/AS1: Surface Water.

(4 marks)

Total 9 marks

QUESTION 7

(a) Complete the table below to give each gradient as a percentage and the fall over a 6 metre length of drain.

Gradient	Percentage	Fall over 6 metres
1:20		
1:40		
1:60		
1:90		

(5 marks)

(b) 30 metres of drain have been laid at a gradient of 1:40.

A riser is to be connected to the head of the drain so that it can be hydrostatically tested.

Calculate the maximum height the riser can be to test this installation in accordance with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

(3 marks)

Total 8 marks

QUESTION 8

(a) State the TWO conditions under which a grease trap is required on an installation.

1 _____

2 _____

(2 marks)

(b) A commercial kitchen has a pot sink of 55 litres capacity.

The pot sink discharges to a grease trap.

Calculate the minimum allowable volume of the grease trap so that the installation complies with the New Zealand Building Code Clause G13/AS2 Foul Water.

_____

_____

(2 marks)

Total 4 marks

QUESTION 9

(a) State FOUR conditions that can increase the risk of an un-shored trench collapsing.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(b) (i) A drainlayer is going to enter an access chamber on a stormwater drain.

Give FOUR conditions that should be checked before the drainlayer enters the access chamber.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(ii) Give TWO of the safety measures that must be provided for the drainlayer entering the access chamber.

1 _____

2 _____

(2 marks)

Total 10 marks

QUESTION 10

State what should occur on a wet well pumping system at each of the following.

(a) The low level float sensor is activated.

(1 mark)

(b) The high level float sensor is activated.

(1 mark)

(c) The high level alarm is activated.

(1 mark)

Total 3 marks

QUESTION 11

Sketch a diagram of a dry inspection chamber and a diagram of a wet inspection chamber to show their essential difference.

Dry inspection chamber.

Wet inspection chamber.

Total 3 marks

QUESTION 12

A uPVC drain is being installed in a trench across a field.

The maximum amount of coverage that can be provided for the drain is 325 mm.

The field will occasionally be used as a carpark for a nearby events centre.

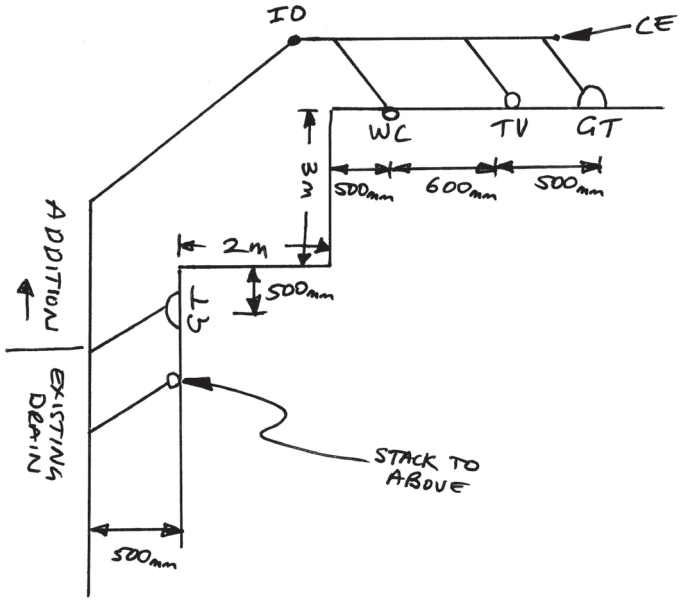
Draw a diagram showing the coverage requirements which must be met to ensure the drain is not damaged when the field is being used as a carpark. The installation is to comply with minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

Total 3 marks

QUESTION 13

The sketch below shows the alterations made to the foul water drain serving a bathroom addition on a house.

Draw an as-built plan of the sketch using a scale of 1:50



Total 8 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. What is the maximum allowable angle for a junction that connects one drain to another?

   A 11½°

   B 15°

   C 22°

   D 45°

   E 60°

   ☐

2. What is the minimum gradient for a surface water drain with an internal diameter of 150 mm?

   A 1:40

   B 1:90

   C 1:120

   D 1:200

   E 1:350

   ☐

3. What is the minimum separation distance that must be achieved when a 150 mm stormwater drain and a sewer drain are being installed in the same trench, as specified in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

   A 150 mm.

   B 175 mm.

   C 200 mm.

   D 250 mm.

   E 300 mm.

   ☐

4. What is the maximum number of discharge units permitted to be conveyed by a 100 mm pipe laid at a gradient of 1:40?

A 61

B 205

C 215

D 255

E 515

☐

5. How far below the overflow level of the lowest sanitary fixture in a building must the top of a gully dish be situated?

A 100 mm.

B 150 mm.

C 200 mm.

D 250 mm.

E 300 mm.

☐

6. A hole has been dug for a percolation test.

The test is being carried out in accordance with New Zealand Building Code Clause E1/VM1 Surface Water.

The hole is still holding water.

What is the minimum time the test should be carried out for?

A 1 hour.

B 2 hours.

C 3 hours.

D 4 hours.

E 5 hours.

☐

7. Why must at least one gully trap be included in a drainage system serving a building?

A To collect the waste from sanitary fixtures.

B To allow the drain to vent positive pressure.

C To provide a point of overflow should the drain become blocked.

D To prevent foul odours entering the building.

E To keep the terminal vent connection flushed (wet).

☐

8. Which of the following fittings must be installed at the inlet and outlet of a grease trap?

A A 45° junction.

B A 50 mm vent.

C 2 × 45° bends.

D An 88° bend.

E An inspection or access point.

☐

9. Which of the following is not permitted to discharge into a grey water/sullage tank?

A A toilet.

B A bath.

C A kitchen sink.

D A washing machine.

E A trapped floor waste.

☐

10. Which of the following correctly describes evaporation in relation to effluent disposal?

A A plant absorbing liquid through its root system and releasing the moisture to the air through its leaves.

B How quickly the soil will absorb the moisture from the effluent.

C The moisture from the effluent field vaporising into the atmosphere.

D The breaking down of the effluent by bacteria to make a clearer liquid.

E The sludge, scum and effluent separating while in the septic tank.

☐

11. Which of the following correctly describes transpiration in relation to effluent disposal?

A A plant absorbing liquid via the root system and releasing the moisture to the air through its leaves.

B How quickly the soil will absorb the moisture from the effluent.

C The moisture from the effluent field vaporising into the atmosphere.

D The breaking down of the effluent by bacteria to make a clearer liquid.

E The sludge, scum and effluent separating while in the septic tank

☐

12. Which of the following correctly describes stratification in relation to sewage treatment?

A A plant absorbing liquid via the root system and releasing the moisture to the air through its leaves.

B How quickly the soil will absorb the moisture from the effluent.

C The moisture from the effluent field vaporising into the atmosphere.

D The breaking down of the effluent by bacteria to make a clearer liquid.

E The sludge, scum and effluent separating while in the septic tank.

☐

13. What is the purpose of an aerated chamber on a septic tank system?

A To convey the effluent evenly over the disposal field.

B To mix the tank contents thoroughly.

C To supply oxygen to the bacteria within the tank.

D To prevent grease from travelling through the system.

E To make sure all sludge is retained within the system.

☐

14. Which of the following offers an alternative to shoring when excavating a trench?

A Well pointing.

B Waling.

C Benching.

D Thrusting.

E Sheeting.

☐

15. When must thrust blocks be installed on a drain?

A At any change of direction greater than 45°.

B At any change of direction that may be under strain due to hydraulic load.

C When the drain is installed in unstable soil.

D Where any branch drain connects to the main drain.

E When the drain is laid at a gradient greater than 1:40.

☐

16. What is the purpose of a wing wall?

A To support a retaining wall until the drainage system has been laid.

B To stabilise the top section of shoring.

C To prevent public access to an excavation site.

D To prevent erosion of soil where a stream enters a culvert.

E To divert surface water away from an excavation site.

☐

17. Which of the following correctly describes compaction rate?

A The percentage a material can be compressed.

B The amount of water a material can absorb.

C The volume of soil excavated from a trench.

D The rate that effluent will soak into the disposal field.

E The firmness of the bedding material for a drain.

☐

18. What is the advantage of installing a submersible pump system on the outlet of a septic tank?

A To supply oxygen to the bacteria within the tank.

B To mix the tank contents thoroughly.

C To help convey the effluent evenly over the disposal field.

D To prevent grease from travelling through the system.

E To make sure all sludge is retained within the system.

☐

19. Which of the following is a plumb bob used for?

A To measure the fall or gradient of a pipe.

B To check a pipe is completely vertical.

C To chamfer the end of a uPVC pipe.

D To roughen the external surface of a earthenware pipe.

E To seal the outlet of a pipe for testing purposes.

20. 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.

Total 20 marks

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
Section B		
Total		