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 2010

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

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Candidates that sat this examination in November 2010 were provided with the following documents:

- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
- New Zealand Building Code clause E1 Surface Water
- New Zealand Building Code clause G13 Foul Water

SECTION A

QUESTION 1

A drain is 25 m long.

Calculate in metres (m) the fall of the drain for each of the following. Show your working.

(a) The drain has a gradient of 2%.

(1 mark)

(b) The drain has a gradient of 1:40

(1 mark)

Total 2 marks

QUESTION 2

(a) Give the meaning of the term compaction rate (compaction factor).

(1 mark)

(b) A 110 mm diameter uPVC drain pipe 85 metres long is to be laid.

The pipe is to be laid on 50 mm of granular bedding and backfilled to 100 mm above the pipe using the same material.

The trench width is to be 450 mm.

Allowance is to be made for compaction of 25%.

Calculate in cubic metres (m^3) the volume of granular bedding required to complete the job. Show your working.

Formula:
Volume of pipe = L × D × D × 0.7854
where
L = length
D = diameter

(5 marks)

Total 6 marks

QUESTION 3

At times, work done by a drainlayer must be notified under the Health and Safety in Employment Act.

Name the organisation to which the notification is given.

_____

Total 1 mark

QUESTION 4

(a) The power lead being used on a dewatering pump has been damaged by a shovel.

The damage exposes the inner brown insulation.

State TWO actions that should be taken.

1 _____

2 _____

(2 marks)

(b) The plug and socket joining two power leads together is getting quite warm to touch.

State TWO actions that should be taken.

1 _____

2 _____

(2 marks)

Total 4 marks

QUESTION 5

Workers are installing a new access chamber.

The benching and channels are to be plastered.

(a) State the hazard that is present when using concrete or plaster.

_____

(1 mark) ☐

(b) State the precaution that should be taken to minimise the hazard in (a).

_____

(1 mark) ☐

Total 2 marks ☐

QUESTION 6

Drainlayers can be exposed to serious infections such as hepatitis A and gastroenteritis.

List THREE precautions that should be taken to reduce the risk of such exposures.

1 _____

2 _____

3 _____

Total 3 marks ☐

QUESTION 7

A trench is being excavated on a site using a small diesel-powered digger.

There is a sudden roar with a strong smell of gas coming from the excavation.

Give FOUR actions that should be taken.

1 _____

2 _____

3 _____

4 _____

Total 2 marks

QUESTION 8

Dry cutting of concrete pipes by grinding in a confined space may create an explosive situation.

Explain how this hazard can be minimised.

_____

_____

Total 1 mark

QUESTION 9

A new uPVC branch drain is to be joined at right angles to an existing ceramic foul water drain.

(a) Describe EIGHT steps required to install the junction.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

(4 marks)

(b) Sketch a plan view of the completed drain. Show and label all the fittings used.

(2 marks)

Total 6 marks

QUESTION 10

A rubber ring joint is to be made in a 110 mm uPVC drain pipe.

The end of the pipe that is to be inserted into the rubber ring joint has been cut.

Describe SIX steps in the procedure that should be followed to make the joint.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

Total 3 marks

QUESTION 11

Drainage is to be designed for a new house on a lifestyle block.

There is no sewage system available, so a septic tank system will be installed.

(a) Name the organisation from which the performance requirements for the septic tank and effluent disposal system should be sourced.

_____

(1 mark)

(b) Name the Act in relation to the environment with which the system must comply.

_____

(1 mark)

Total 2 marks

QUESTION 12

The New Zealand Building Code Clause G13/AS2 states that a gully dish must be installed as close as possible to the grease trap it discharges to.

State the maximum allowable distance between the gully dish and the grease trap.

_____

Total 1 mark ☐

QUESTION 13

Give THREE advantages of HDPE pipe compared with uPVC pipe.

1 _____

2 _____

3 _____

Total 3 marks ☐

QUESTION 14

(a) Explain the term percolation rate (soakage rate) in relation to effluent disposal.

_____

_____

(1 mark) ☐

(b) State the units in which percolation rate is measured.

_____

(1 mark) ☐

Total 2 marks ☐

QUESTION 15

Give FOUR methods of locating drains prior to any excavation being carried out.

1 _____

2 _____

3 _____

4 _____

Total 2 marks

QUESTION 16

A normally dry watercourse is to be piped.

The drain is to be laid on a concrete base with concrete haunching.

Describe EIGHT steps in the construction procedure that should be followed, from the excavation to the finished job.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

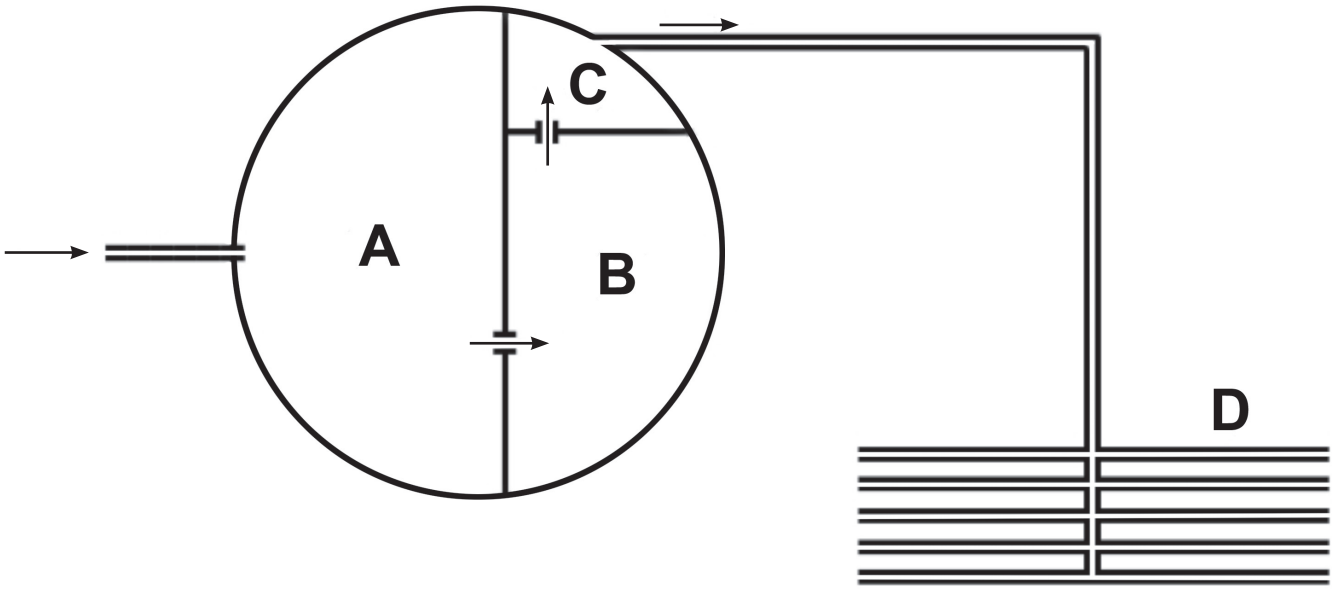
8 _____

Total 8 marks

QUESTION 17

The diagram below shows a domestic waste water system.

Name and describe the purpose of each section labelled A – D.



A Name _____

Purpose _____

B Name _____

Purpose _____

C Name _____

Purpose _____

D Name _____

Purpose _____

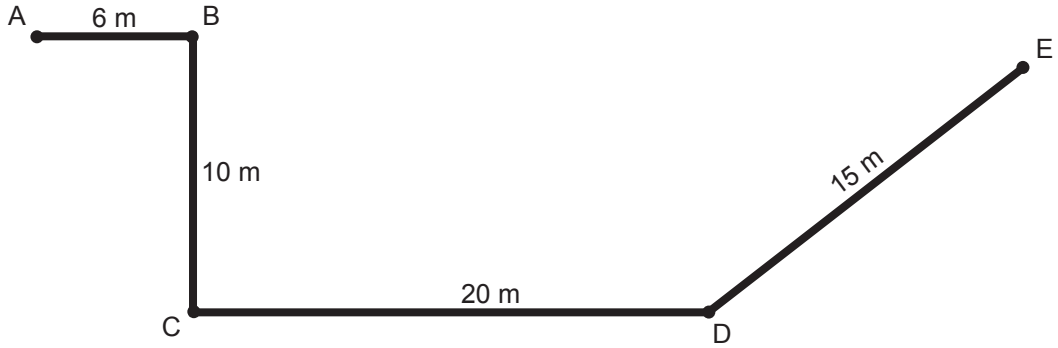
Total 8 marks

QUESTION 18

The diagram below shows a plan view indicating changes of direction for a drain.

The drain invert at peg A is 400 mm below the datum.

The drain has been laid at a gradient of 1:80 (1.25%).



Plan View
Not to scale

Formula:

$$\text{Fall} = \frac{\text{length}}{\text{gradient}}$$

Complete the following table to show the depth of excavation at points B, C, D and E. (A has been completed for you.) Show your working.

Point	Depth
A	400 mm
B	
C	
D	
E	

Total 8 marks

QUESTION 19

The drawing on the opposite page shows a plan view of a proposed commercial premises.

The foul water connection is marked X.
The stormwater connection is marked O.

On the plan view, show the foul water and stormwater drains, including any inspections and fittings that are needed.

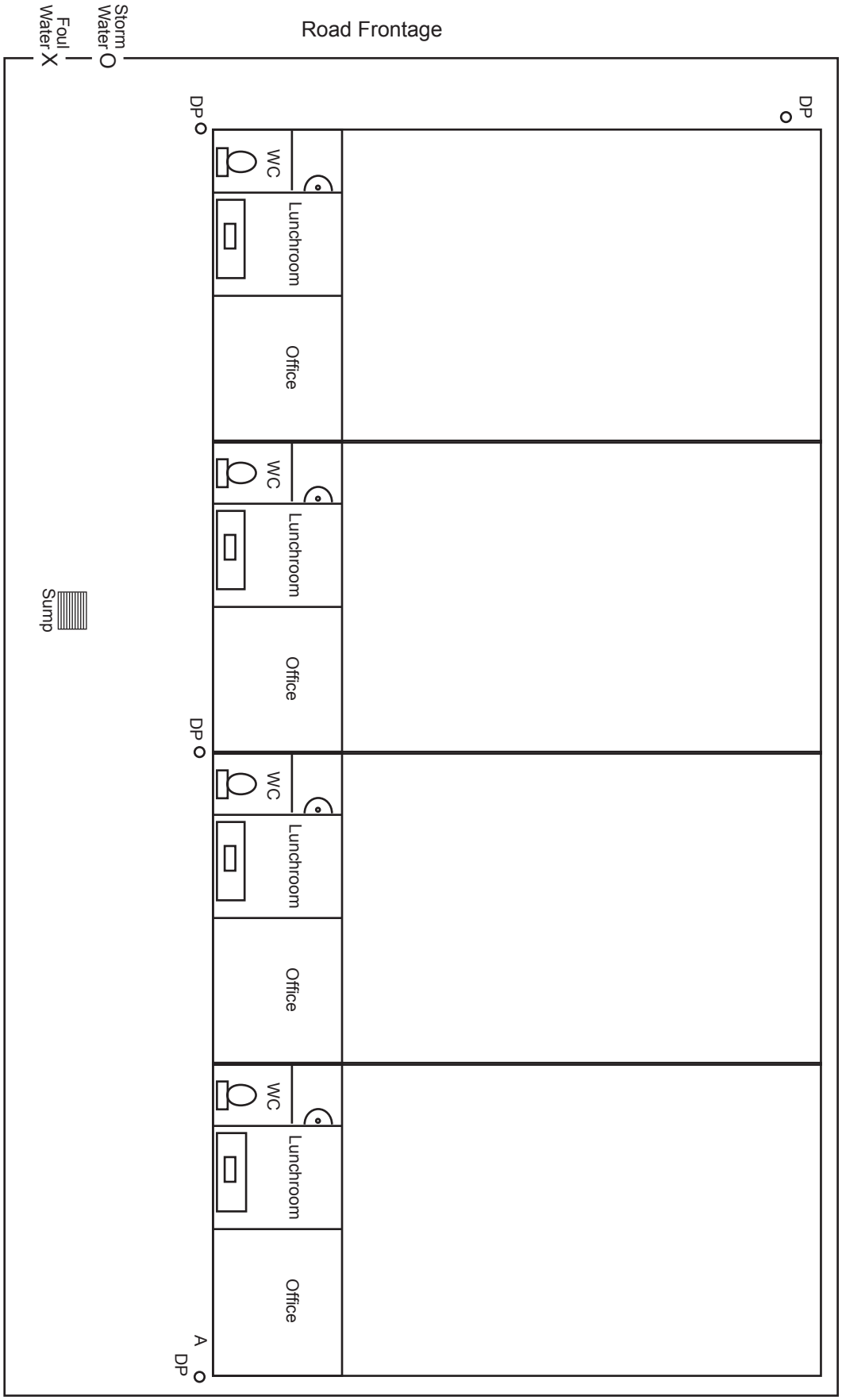
On your drawing, show the following information for the stormwater drains:

- The minimum allowable size for the branch drain serving downpipe 'A'
- The minimum allowable size for the branch drain serving the Type 2 water sump
- The minimum size of the main drain from the boundary to the first branch drain.

The drawing must show an economical solution that is consistent with sound trade practice and that complies with the New Zealand Building Code Clauses E1 and G13.

Total 13 marks

QUESTION 19 (cont'd)



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 foul water drain is to be laid under a concrete floor.

   Which New Zealand Building Code Clauses, in addition to G13, must the drain comply with?

   A G12

   B E2

   C E1

   D B2

   E B1

   ☐

2. A drain 12.5 m long has been laid at a gradient of 1:60.

   The head of the drain is 1.2 metres below the datum point.

   How far below the datum is the end of the drain?

   A 1.408 m.

   B 1.608 m.

   C 1.808 m.

   D 1.908 m.

   E 2.008 m.

   ☐

Answer questions 3 - 8 in relation to AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

3. At which gradient does it become necessary to install anchor blocks to a drain?

   A Greater than 5.0%.

   B Greater than 10.0%.

   C Greater than 15.0%.

   D Greater than 20.0%.

   E Greater than 25.0%.

   ☐

4. What is the maximum distance allowed between anchor blocks installed on an inclined drain?

A 2.500 m.

B 3.000 m.

C 3.500 m.

D 4.000 m.

E 4.500 m.

☐

5. What is the minimum diameter of the reinforcing rods that must be used in anchor blocks on drains up to 150 mm?

A 5 mm.

B 6 mm.

C 7 mm.

D 8 mm.

E 9 mm.

☐

6. A 125 mm drain has been laid at a reduced gradient of 1:100.

What is the minimum number of discharge units (fixture unit loadings) that can discharge into the drain?

A 18

B 27

C 38

D 75

E 160

☐

7. What is the minimum clearance allowed between a drain and an unprotected or unmarked electrical or gas supply?

A 300 mm.

B 400 mm.

C 500 mm.

D 600 mm.

E 700 mm.

☐

8. How much clear space must be provided above the top of a gully grate to allow for maintenance access?

A 0.500 m.

B 1.000 m.

C 1.500 m.

D 2.000 m.

E 2.500 m.

☐

Answer questions 9 - 23 in relation to New Zealand Building Code Clause G13

9. What is the maximum angle permitted for a branch drain junction with a main drain?

A 15°

B 22°

C 45°

D 60°

E 88°

☐

10. How far above an unpaved surface must the grate of a gully dish be situated?

A 25 mm.

B 50 mm.

C 75 mm.

D 100 mm.

E 125 mm.

☐

11. What is the maximum allowable distance between the grate of a gully dish and the water seal in the gully trap?

A 500 mm.

B 600 mm.

C 700 mm.

D 800 mm.

E 900 mm.

☐

12. What requirement must be met when waste pipes enter through the back of a gully dish?

A Entry point must be sealed water tight.

B Waste pipes must be 40 mm or greater.

C Waste pipes must be fitted with a bend to direct flow downwards.

D Waste pipes can be no larger than 32 mm.

E Entry holes must provide 10 mm clearance around the diameter of the waste pipe to allow for seismic movement.

☐

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

What is the minimum permitted width of the trench?

A 250 mm.

B 300 mm.

C 350 mm.

D 400 mm.

E 450 mm.

☐

14. What must be fitted to the drain when a kitchen sink is going to discharge to a soak pit?

A A grease trap.

B A reflux valve.

C An inspection point.

D A terminal vent.

E A high level alarm.

☐

15. What is the minimum capacity of a grease trap that takes the discharge from a 140 seat restaurant?

A 100 litres.

B 140 litres.

C 500 litres.

D 700 litres.

E 880 litres.

☐

16. What is the minimum allowable capacity of a grease trap?

A 50 litres.

B 100 litres.

C 125 litres.

D 150 litres.

E 200 litres.

☐

17. A 100 mm drain is to be installed.

The drain will convey 205 discharge units of waste.

What is the minimum gradient the drain can be laid at?

A 1:20

B 1:40

C 1:60

D 1:80

E 1:100

☐

18. A gully dish is being installed in an area where it could become damaged.

A concrete surround is to be built around the dish for protection.

What is the minimum thickness the concrete is permitted to be?

A 35 mm.

B 45 mm.

C 55 mm.

D 65 mm.

E 75 mm.

☐

19. Under what conditions is an 80 mm pipe an acceptable size for a main drain?

A When the drain services only a WC pan.

B When the drain is serving waste water fixtures only.

C Where the drain is less than 3 metres in developed length.

D Where the drain is discharging to a grease trap.

E Where the drain is taking waste of less than 10 discharge units and includes the discharge of a commercial dishwasher.

☐

20. What is the maximum distance the head of a drain can be situated upstream from the terminal vent connection?

A 8 m.

B 10 m.

C 12 m.

D 14 m.

E 16 m.

☐

21. How far apart can rodding points be installed in a straight length of drain to provide access for unblocking?

A 24 m.

B 30 m.

C 36 m.

D 42 m.

E 50 m.

22. A drain travels under a building and then under a front lawn to the Territorial Authority connection.

An inspection point must be installed where the drain comes out from under the building.

What is the maximum distance from the building at which the inspection point can be installed?

A 1 m.

B 2 m.

C 3 m.

D 4 m.

E 5 m.

23. What is the minimum diameter for an inspection chamber allowing access to a 150 mm diameter drain?

A 450 mm.

B 500 mm.

C 550 mm.

D 600 mm.

E 650 mm.

Total 23 marks

For Examiner's use only

Question number	Marks	Marks
1		
2		
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Section B		
Total		