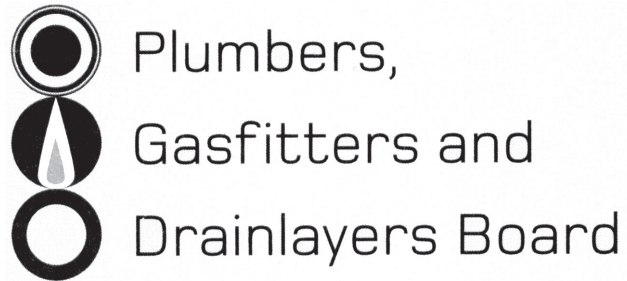


No. 9198



REGISTRATION EXAMINATION, JUNE 2018
CERTIFYING DRAINLAYER

ANSWER SCHEDULE

ANSWER 1

(a) Any SIX (1 mark each)

- Land area.
- Proximity of water ways.
- Location of bores/wells.
- Water table level.
- Secondary flow paths.
- House and boundary location.
- Plantings, domestic, landscaping, woodlots/natives/gorse/vegetable gardens etc.
- Location of retaining walls/embankments.
- Topography of the land (contour lines).
- Slope.
- Exposure, sun, wind.

(6 marks)

(b) Any FOUR (1 mark each)

- Install a front loading washing machine instead of a top loader.
- Replace the bath with a shower.
- Remove the waste disposal unit.
- Install a low water use dishwasher.
- Install dual flush toilet cisterns.
- Install flow restrictors/ water reduction valves.
- Install a recycled water system.

(4 marks)

(c) Any FOUR (½ mark each)

- The septic tank requires emptying.
- The filter on the outlet of the septic tank is blocked.
- The pumping system has failed (no power, worn impellor etc).
- The effluent disposal field has failed.
- The tank inlet is blocked.

(2 marks)

Total 12 marks

ANSWER 2

Total 10 marks

ANSWER 3

(a) Any TWO (1 mark each)

- Pump system (dry or wet well).
- Bubble up chamber.
- Displacement system (reverse fall system).
- Soak hole.

(2 marks)

(b) Pump system drawing to show

- Chamber
- Pump
- Float switch of similar
- Access or chain to pump for servicing
- Non-return valve
- Disconnectable union

OR

Soak hole drawing to show

- Filter cloth
- Lid if chamber style
- Size of rocks indicated for chamber or rock filled option
- Inlet at top of soak pit

OR

Bubble up chamber drawing to show

- Access lid
- Concrete seal at base
- Chamber depth < 1 metre
- Inlet 200 mm above base
- Outlet at top and at least 150 mm below FGL

OR

Displacement system drawing showing

- Inlet and outlet points
- Direction of fall
- Flushing point

(4 marks)

Total 6 marks

ANSWER 4

- (a) • The angle of a slope where the material in the face will remain stable under all anticipated conditions of work and weather. (1 mark)
- (b) Any THREE (1 mark each)
- The soil type.
 - Ground moisture content.
 - Weather conditions.
 - Ground vibrations in the area (traffic etc). (3 marks)
- (c) Any THREE (1 mark each)
- Harmful gases from the soil or machinery.
 - Contact with dangerous underground services – gas pipe/electricity cables.
 - Exposure to falling objects from above the excavation.
 - Falling into the excavation. (3 marks)
- (d) Any FOUR (1 mark each)
- Keep spoil and machinery away from the edge of the trench.
 - Use shoring/trench shield etc.
 - Use a ladder to access and exit the trench.
 - Put up barricades around the perimeter of the trench to prevent objects and people falling into the trench.
 - Monitor the air quality in the trench.
 - Check the soil moisture levels regularly – too dry or too wet can cause trench collapse.
 - Dewatering.
 - Safe slope. (4 marks)

Total 11 marks

ANSWER 5

- (a) Any TWO (1 mark each)
- If the excavation is 1.5 metres deep and having a depth greater than the horizontal width at the top.
 - If any person is required to work with a ground cover overhead.
 - If any face has a vertical height of more than 5 metres and an average slope steeper than a ratio of 1 horizontal to 2 vertical.
 - If explosives are being used or stored. (2 marks)
- (b) Any FOUR (1 mark each)
- How to adjust guards.
 - PPE to be worn.
 - Method of isolation – turning on and off.
 - Pre-use inspections.
 - Procedure to be followed in emergency.
 - Operating procedure instructions. (4 marks)
- (c) A larger diameter pipe results in greater force on the drain plug (because the pipe has greater cross-sectional area) (1 mark)

Total 7 marks

ANSWER 6

- (a) Any TWO (1 mark each)
- The underground service may not be metallic and the locator cannot detect them.
 - Hum detectors only pick up live electricity cables that have a current flowing through them.
 - The locator may not be able to distinguish between two services running closely together and indicate them as a single service.
 - There could be interference from other metallic objects in the area.
 - The surface area of the service may not be large enough for the locator to detect.
 - The locators often do not accurately indicate the depth of the service.
 - The locator may detect a different service from the service required. (2 marks)
- (b)
- Plans.
 - Hand digging until services are positively located. (2 marks)
- (c)
- A 300 mm.
 - B 100 mm.
 - C 600 mm. (3 marks)

Total 7 marks

ANSWER 7

(a)

Length of pipe sections		
Pipe section	Distance	Fall
A - B	12 metres	198 mm
B - C	10 metres	165 mm
C - X	8 metres	132 mm

(3 marks)

- (b)
- Ground levels (3 marks)
 - Depth of drain invert below the datum. (3 marks)
 - Depth of drain invert below the ground. (3 marks)

Total 12 marks

ANSWER 8

Volume of water = $4.75 \text{ m} \times 0.9 \text{ m} \times 1.4 \text{ m}$
= 5.985 m^3 (2 marks)
= 5985 litres (1 mark)

Time = $\frac{5985}{40} = 149.6$ minutes (1 mark)

Total 4 marks

ANSWER 9

- (a) Soil that has the ability to pass rapidly into suspension in water. (1 mark)
- (b) The rate at which liquid infiltrates a particular soil. (1 mark)
- (c) An area set aside for future use for land application to replace original land application area when required. (1 mark)
- (d) Expected waste water volumes allowing for peak occupancy and usage for the system to be designed to manage. (1 mark)

Total 4 marks

ANSWER 10

- (a) Office: 227 m²
Factory: 870 m²
Carpark: 359 m² (3 marks)
- (b) A 150 mm.
B 225 mm.
C 150 mm. (3 marks)
- (c) Total modified area = 1456 m²
Main drain diameter = 225 mm (1 mark)
Gradient 1:130 (1 mark) (2 marks)
- OR
Main drain diameter = 150 mm (1 mark)
Gradient 1:18 (1 mark)
- (d) Type 2 sump (1 mark)

Total 9 marks

SECTION B

1. C Cover the pipe with 50 mm of overlay followed by 75 mm of concrete paving.
2. E 50 years.
3. B The main pump should stop.
4. C A drain that serves two or more properties.
5. B 500 mm
6. D 5.1 m³
7. C 30 minutes
8. C 19%

Total 8 marks