No. 9198

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2016

CERTIFYING DRAINLAYER

ANSWER SCHEDULE

ANSWER 1

(a)
- Temporarily hold back discharge.
- Release it in a controlled manner. (2 marks)

(b)
- The drain outfall can only cope with a set amount. (1 mark)

(c) Any TWO (1 mark each)
- Car parking areas.
- Tanks.
- Ponds.
- Depression storage. (2 marks)

(d) Any THREE (1 mark each)
- A tank is used.
- Foul water detention uses a valve to control flow from the tank.
- The valve is controlled by the network utility operator.
- The valve is controlled remotely.

(3 marks)

Total 8 marks

ANSWER 2

(a)
- 1 m^3 = 1000 litres volume = L x W x D
- A: volume = 4.6 m x 0.9 m x 1.4 m
  = 5.796 m^3 (5.8 m^3) (1 mark)
- ⅔ of volume = $\frac{5.796\ m^3 \times 2}{3}$ or 5.8 m^3 × 0.67
  = 3.863 m^3 (1 mark)
- Litres = 3.863 x 1000 = 3863 L (1 mark)
- Minutes = 3863 ÷ 400
  = 9.66 minutes (10 minutes) (1 mark)

(4 marks)

(b)
- Either total volume 6 m × 2 m × 1.6 m = 19.2 m^3 (1 mark)
- Course sand = 19.2 m^3 × 60100 = 11.52 m^3 (1 mark)
- Fine sand = 19.2 m^3 × 40100 = 7.68 m^3 (1 mark)

Or :
- Course sand = 60% of 1.6 m = 0.96 m (½ mark)
- Volume = 6 m × 2 m × 0.96 m = 11.92 m^3 (1 mark)
- Fine sand = 40% of 1.6 m = 0.64 m (½ mark)
- Volume = 6 m × 2 m × 0.64 m = 7.68 m^3 (1 mark)

(3 marks)

(c)
- $VM^3 = 0.7854 \times 0.100 \times 0.100 \times 50$
- $= 0.3927\ m^3$ (1 mark)
- Litres $= 0.3927\ m^3 \times 1000$ (1 mark)
- $= 392.7$ litres (1 mark)
- $= 392.7$ kg (1 mark)
- Allow 10% = 432 kg (5 marks)

Total 12 marks

ANSWER 3

(a) Any TWO (½ mark each)
- Make the area safe to work in.
- Turn off electricity, support or remove any crushing load (to ensure a double accident does not occur).

(1 mark)

(b) Any TWO (½ mark each)
- Trench collapse.
- Electrocution.
- Asphyxiation.
- Poisoning. (1 mark)

(c) Any FOUR (½ mark each)
- Sewer gas.
- Carbon monoxide or exhaust fumes.
- Fuel gas.
- Dust.
- Carbon dioxide.
- Trench collapse. (2 marks)

(d)
- 19.5% (1 mark)

(e) Any EIGHT (½ mark each)
- Trench shoring.
- Ladders.
- Dewatering pumps.
- Barriers/traffic access plates.
- Gas detector.
- Certified lifting equipment.
- First aid box.
- Signage.
- Retrieval equipment.
- Communication systems. (4 marks)

(f) Any TWO (1 mark each)

- Contact electricity/cable detection company.
- Carefully hand dig sufficient to lay the new drain.
- Get the property plans from the Territorial Authority.
- If in an area of gas supply, contact gas supplier.
- Look for signs of services on the property such as service boxes, drain inlet/outlet, pipe diameters.

(2 marks)

Total 11 marks

ANSWER 4

(a)

Section	Distance	Fall
A – B	5 m	0.100 m
B – C	13 m	0.260 m
C – D	6 m	0.120 m

Peg	Dist. below datum	Dist. below ground
Y	0.900 m	0.900 m
C	0.880 m	0.880 m
B	0.520 m	0.820 m
A	0.420 m	0.920 m

(12 marks)

(b) 1:12 or 8.5% (3 marks)

Total 15 marks

ANSWER 5

Any THREE (3 marks each; name 1 mark, situation 2 marks)

1. Name: Bubble-up system.
   Situation: Where the building floor level is located above the Territorial Authority connection point but not enough grade to get to the outfall.
2. Name: Soak pit.
   Situation: Where the building was below the Territorial Authority connection point or outfall and the site permitted disposal of S/W via a soakage pit, i.e. permeable soil, adequate space etc.
3. Name: Pumping station.
   Situation: Where the building was located below the Territorial Authority connection point or outfall and the ground is unsuitable for a soak pit.
4. Name: Charge system.
   Situation: A charge system can be used when the spouting of the house (usually 1 metre or more) is above the outfall. It has a reverse gradient with a flushing point at the lowest part of the system.
5. Name: Discharge to a water course.
   Situation: Where gradient allows discharge to a water course.

Total 9 marks

ANSWER 6

(a) Surface water that overflows from a drainage system (down a secondary or overland flow path).
(1 mark)

(b) To protect buildings from flooding. (1 mark)

(c) Any FOUR (1 mark each)
- Existing structures.
- Finished floor levels
- Height of the crown of the road
- Any feature that may cause a building to flood

or
- The rainfall volume for a site.
- The flow capacity of the surface water drainage system.
- The potential water level if the surface water cannot discharge through the system and backs up.
- The surrounding ground level (will the excess water be caught until it can travel through the system or will it overflow and bypass the system?).
- Ground contour.
- The flow capacity of the surface water drainage system.
- Maintenance of the flow path.
- Plants, trees, shrubs etc. (4 marks)

Total 6 marks

ANSWER 7

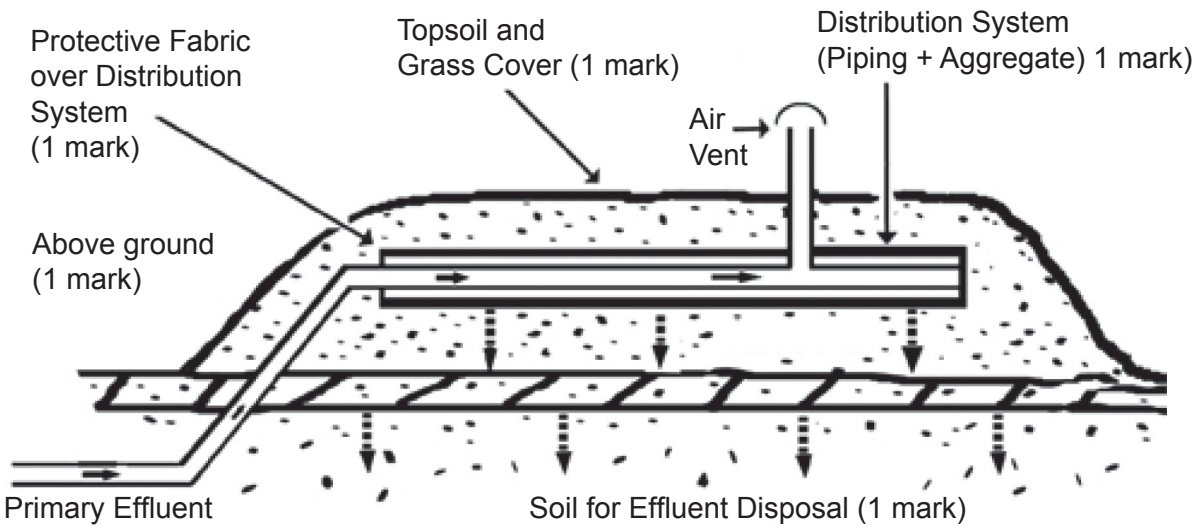
Any SIX (½ mark each)
- An excavation that is more than 1.5 metres deep and deeper than it is wide at the top.
- Any work that in connection with asbestos fibres.
- Any excavation more than 5 metres deep with a battered slope steeper than 1 horizontal to 2 vertical.
- Any work where explosives are used or stored.
- Any form of tunnel or drive where workers work underground.
- Work that involves lifting loads of 500 kg or more by mechanical means (excluding mobile crane, excavator or forklift.
- Where there is a risk of falling 5 metres or more.
- Where compressed air/breathing apparatus is being used.

Total 3 marks

ANSWER 8

(a) Any ONE (1 mark)
- When the ground has poor drainage.
- High water table. (1 mark)

(b)



This is one example, other above ground evapo transpiration systems are accepted.

(5 marks)

(c) Any THREE (1 mark each)

- Make sure any plants in the area are suitable.
- Do not allow stock or heavy machinery/vehicles to have access to the mounds.
- Have the septic tank pumped out regularly.
- Do not flush unsuitable products into the system.
- Ensure surface water is diverted from the mound.
- Have a rested area if possible (split system). (3 marks)

Total 9 marks

ANSWER 9

Marks for:

- Dosing
- Septic tank inspection openings
- Septic tank fresh air inlet
- Right hand drain
- Plain Y to gully trap
- Vent
- WC inspection opening Y
- Left hand drain
- WCs inspection openings Ys
- 2 × 45s + 1 inspection opening
- Basins plain Y
- Vent and WCs

Total 10 marks

ANSWER 10

(a) Any EIGHT (1 mark each)

- Harmful solids and material which can combine with water to form a cemented mass.
- Oils, fats, grease.
- Paint.
- Asbestos.
- Flammable or explosive material.
- Genetic wastes.
- Medical wastes.
- Highly radioactive material.
- Metal compounds e.g. arsenic.
- Pesticides.
- Chlorine. (4 marks)

(b) Any THREE (1 mark each)

- Settling.
- Intercepting traps.
- Neutralizing.
- Grease arrestors.
- Dilution systems.
- Cooling systems. (3 marks)

Total 7 marks

SECTION B

1. E 2.500 m
2. E Drip line irrigation system
3 C 1 in 80 or less
4. A The PCBU
5. E The sludge, scum and effluent separating while in the septic tank.
6. A To recover valuable plant and equipment from the site.
7. B 175 mm
8. E 1000 mm
9. B 12 months
10. B Drainlayer B

Total 10 marks