No. 9198

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2019

CERTIFYING DRAINLAYER

ANSWER SCHEDULE

ANSWER 1

(a) A main through which water or sewage is pumped at pressure. (1 mark)

(b) Rising mains shall be free of leaks when subject to a pressure test at a pressure of not less than twice the shut-off head of the pump connected to the rising main, for a period of not less than 10 minutes.

(2 marks)

(c) Any TWO (½ mark each)

- Inspection chamber.
- Boundary trap shaft.
- A stack below the lowest fixture connection on any floor.
- A drain or combined discharge pipe, provided the connection is at least 2.5 m from any other connection.
- Downstream of a reflux valve or at least 2.5 m upstream of a reflux valve.
- A minimum of 1 m downstream of a boundary trap.
- Direct to the network utility operator's sewer where approved by the network utility operator.

(2 marks)

Total 5 marks

ANSWER 2

(a) Any FOUR (1 mark each)

- Sewer gas.
- Carbon monoxide (exhaust fumes).
- Fuel gas.
- Carbon dioxide.
- Hydrogen sulphide. (4 marks)

(b) 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)

(c) Any TWO (1 mark each)
- Contact electricity/cable detection company.
- Carefully hand dig enough 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.
- Support the pipework if necessary. (2 marks)

(d) (i) Make the area safe. (1 mark)

(ii)
- Call emergency services.
- Provide first aid.
- Support or remove any crushing load.
- Start digging out the worker using hand tools.

(2 marks)

Total 13 marks

ANSWER 3

(a) (i) Waste that cannot be discharged to a network utility operator's sewer system. (1 mark)

(ii) Waste that must be treated before it can be disposed of to a network utility operator's sewer system. (1 mark)

(iii) Waste that does not require treatment and can be disposed of directly to the network utility operator's sewer system. (1 mark)

(b)
- Store the waste in a holding tank and subsequently transport it to a suitable site.
- Treat the waste until it reaches a standard acceptable to be discharged to the sewer or water course. (2 marks)

(c) Any TWO (1 mark each)
- G14 – Industrial Liquid Waste.
- F3 – Hazardous Substances and Processes.
- B2 – Durability.
- G13 – Foul Water. (2 marks)

(d) Any FOUR (1 mark each)
- Harmful solids and material which can combine with water to form a cemented mass.
- Asbestos.
- Flammable or explosive material.
- Genetic wastes.
- Medical wastes.
- Highly radioactive material.
- Metal compounds e.g. arsenic.
- Chlorine pesticides. (4 marks)

(e)
- Oil / petrol trap. (1 mark)

Total 12 marks

ANSWER 4

Depth of invert of drain	
Point	Depth (mm)
A	1075
B	1215
C	1201
D	1293
F	1218

(2 marks each)
Total 10 marks

ANSWER 5

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

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

(iii) Any TWO (1 mark each)
- Car parking area.
- Tank.
- Pond.
- Depression storage. (2 marks)

(b) 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 NUO.
- The valve is controlled remotely. (3 marks)

Total 8 marks

ANSWER 6

(a)
- Before work starts each day.
- After rain.
- After any occurrence that could affect the stability of an excavated face. (3 marks)

(b) 310 mm. (1 mark)

Total 4 marks

ANSWER 7

(a)

Employee	Licence category	Minimum period 'in the presence of'
New apprentice	Limited certificate trainee	12 months
Unskilled labourer	Exemption under supervision	24 months
An ex-apprentice who has not passed the Licencing exam, within 12 months of receiving National Certificate	EITHER Exemption under supervision	24 months
	OR Journeyman	Certifier's discretion

(6 marks)

(b)
- Direct.
- General.
- Broad. (3 marks)

Total 9 marks

ANSWER 8

(a) Any TWO (2 marks each)
- Air diffusers or jet aerators - Pumping air via a spreader into the aeration chamber.
- An aspirated propeller – a rotating shaft that causes a vacuum to pull air down to the base of the tank.
- Rotating Biological Contactor – rotating the biofilter where the bacteria live so that it raises out of the liquid and bacteria can access oxygen above the fluid level. (6 marks)

(b) Any THREE (1 mark each)
- The effluent produced by an aerated system is of a higher quality.
- Less likelihood of waterways and soil being contaminated with untreated or partially treated sewage.
- More flexibility in disposal field construction.
- Less dependent on good quality, well-draining soil. (3 marks)

(c) Any THREE (1 mark each)
- Requires electricity to introduce oxygen and to pump the treated effluent to the disposal field.
- Has mechanical parts that will require maintenance.
- Has less tolerance to overloading or underloading than a septic system.
- Aerated systems are not recommended for holiday homes that are only used for short periods at a time. This will effectively starve the aerobic bacteria and it will take some weeks for the colonies to grow to a size where they can digest and treat the sudden increase in discharged waste.

(3 marks)

Total 12 marks

ANSWER 9

(a) • A tank that receives grey water waste only. (1 mark)

(b) Any ONE (1 mark)
- When grey water is to be recycled as a non-potable water supply.
- When greywater is discharged directly to ground. (1 mark)

(c)
- Diagram with tanks. (1 mark)
- Correct fixtures to sullage tank. (1 mark)
- WC to septic tank. (1 mark)
- Vents installed at correct locations. (2 marks)
- Inspection points and fresh air inlets where required. (4 marks)
- Overflow relief gully. (1 mark)

(10 marks)

Total 12 marks

ANSWER 10

(a) Volume of trench = 4.6 m × 0.9 m × 1.4 = 5.796 m^3 (1 mark)
Volume of water = 5.796 m^3 ÷ 2 = 2.898 m^3 (1 mark)
2.898 m^3 = 2,898 litres (1 mark)
Time required to dewater
$= \frac{2898}{100}$ = 28.98 minutes (30 minutes) (1 mark)

(4 marks)

(b) Volume of drain = 0.7854 × 0.150 × 0.150 × 50 = 0.8835 m^3 (1 mark)
= 883.5 litres (1 mark)
Allowance (10%) = 88.4 litres (1 mark)
Volume of water required = 883.5 + 88.4 = 971.9 litres (1 mark)
Weight of water required = 971.9 kg (1 mark) (5 marks)

Total 9 marks

SECTION B

1. A 1.339 m.
2. E A preferred work guideline.
3 C To recover plant and equipment from the site.
4. D A trench that is 1,500 mm deep and 1,000 mm wide.
5. A 24 hours.
6. E 1:50 (2.00%)
7. D An unplanned incident in the workplace that endangers the health and safety of workers.
8. B The company.
9. D 3 months.
10. C 10 m^2.

Total 10 marks