No. 9193

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2010

LICENSED GASFITTER

ANSWER SCHEDULE

ANSWER 1

(a) (i) i. Pipework test with all appliances disconnected and open ends capped.
ii. Installation test with all pipework and appliances connected and all valves except last ones open.

(4 marks)

(ii) Leakage test – testing an existing installation prior to any addition or alteration.

(2 marks)

(iii) data plate
Appliance installation instructions

(2 marks)

(b) Ventilation is required to reduce the gas/air mixture below the lower explosive limit as quickly as possible.
OR
Prevent asphyxiation.

(2 marks)

(c) In a PIEZO igniter operation a cam causes a spring-loaded striker to impact on a crystal, which generates a high voltage current. The voltage is then discharged across a gap that is positioned in a stream of gas. This causes ignition of the gas.

(5 marks)

Total 15 marks

ANSWER 2

(a) Any TWO:

1 Able to transfer weight of pipework to host structure.
2 Restrain pipe against movement (including seismic).
3 Pipe and support made of compatible material.
4 Allow for expansion.

(2 marks)

(b) Any TWO:

PE is degraded by UV light
PE is easily physically damaged
PE is more readily damaged by fire

(2 marks)

Total 4 marks

ANSWER 3

(a) (i) Material: Denso and PVC tape (1 mark)
Purpose: Denso provides waterproof barrier
PVC applied over Denso to protect Denso from damage
Process: Denso spirally applied to bare pipe, overlapped to ensure double cover
(5 marks)

(ii) Sleeved to prevent shear forces
Sealed to prevent leakage into building
Sufficient depth to prevent physical damage
Avoid imposed load due to differential settlement
Protected against corrosion
Prevent weakening of structure. (Any four, 1 mark each), (4 marks)

(iii) An insulating joint provides electrical separation between buried and above ground pipework corrosion protection systems.
To protect against stray electrical currents. (2 marks)

(b) 1 Flame is non-luminous
2 It has a blue appearance
3 It has three well-defined cones
4 It is steady and almost silent in operation (2 marks)

(c) Overpressure shut off (OPSO) device, and Relief valve
(1 mark for each type), (2 marks)

Total 15 marks

ANSWER 4

(a) Energy input = 5 kW
Heating rate = 5 x 3.6 MJ/h
= 18 MJ/h (1 mark)

Gas input rate = $\frac{18\text{MJ/h}}{90\text{ MJ/ m}^3}$

= 0.2 m³/h (1 mark)
(2 marks)

(b) Room volume = 6 x 4.5 x 2.7
= 72.9 m³ (1 mark)

Heater output = 72.9 x 0.4
= 29.2 MJ/h (1 mark)
(2 marks)

(c) 15 x 0.50² x 0.7854 = 0.02945
30 x 0.025² x0.7854 = 0.014726
10 x 0.015² x 0.7854 = 0.001767

Total volume
0.02945 + 0.014726 + 0.001767 = 0.045943m³

Convert to litres: 0.045943x1000 = 45.94 litres (3 marks)

(d) 120 litres of water weighs 120 kg so total weight would be 170 kg

(1 mark)

(e) P1 x V1 = P2 x V2

$V2 = \frac{P1 \times V1}{P2}$ (1 mark)

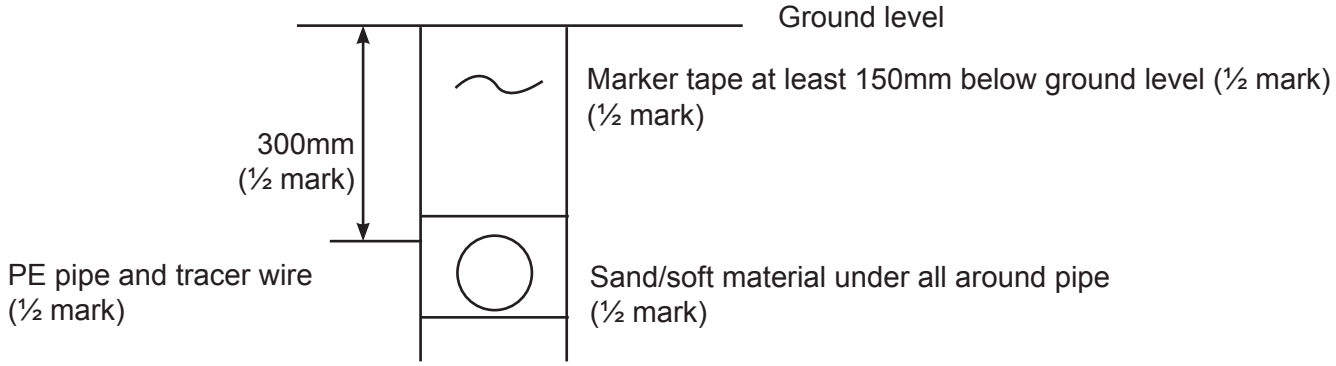
$V2 = (20 + 101.3) \times \frac{3000}{101.3}$ (1 mark)

V2 = 121.3 x 29.615 (1 mark)

V2 = 3592.3 m^3 (1 mark)

(4 marks)

(f)



(3 marks)

Diagram (½ mark)

Total 15 marks

ANSWER 5

(a) 1 A storage system is a vessel that contains a volume of water, heated by an energy source, which is available for drawn off to fixtures or appliances as and when required. (supply is limited)

2 A continuous flow system has no storage capacity but uses a heat exchanger to transfer heat energy to the water as it flows through the water heater.

3 An indirect system utilizes heat produced by a separate process and passing this through a sealed coil or heat exchanger immersed in a body of water. The heat is transferred to the body of stored water ready for discharge off. (Location remote. Transfer through heat exchanger).

(6 marks)

(b) Radiant heater heats persons not surrounding air
Can be positioned at high level and not occupying floor space
As the appliance is flueless no flue needed
Cost effective

(ANY TWO, 1 mark each), (2 marks)

(c) (i) At or above the level of the down draught diverter

(1 mark)

(ii) At or below the level of the burner

(1 mark)

Total 10 marks

ANSWER 6

(a) Any THREE:

1 For dilution purposes
2 To prevent excessive pull on the primary flue.
3 To prevent any down draught smothering the flame.
4 For lowering flue gas temperature.
5 For preventing condensation.

(3 marks)

(b) Any SIX:

1 Mild steel
2 Copper
3 Stainless steel
4 Aluminium
5 Galvanised Iron
6 Aluminium steel
7 P.V.C.

(½ mark each), (3 marks)

(c) Any TWO:

Ensure combustion is complete
Maximise boiler efficiency
Adjust excess air to optimum level

(ANY TWO, 1 mark each), (2 marks)

(d) Any SIX:

Gas control valve
Thermo-electric flame failure device
Pilot adjuster
Main burner regulator
Snap acting thermostat
Thermal energy cut off device
Integral Piezo Ignitor
Filter
Pressure test points

(6 marks)

(e) Any TWO:

1 Diaphragm
2 Rotary
3 Vanes
4 Roots
5 Bellows

(2 marks)

(f) Any FOUR (½ mark each)

Manufacturer's or supplier's name or trademark
Appliance type
Appliance model number
Type of gas for which appliance is suitable
Gas pressure at which the appliance is designed to operate
Input of appliance

(2 marks)

(g) (i) Extractor fans that discharge outside.

(2 marks)

(ii) Any TWO:

Air flow sensing device
Temperature limit switch
Flame failure device
Safety shut-off valve

(2 marks)

Total 22 marks

ANSWER 7

(a) Any ONE:

Hold a current licence and operate under the supervision of craftsment / certifying gasfitter.
Have an exemption for particular work.

(1 mark)

(b) Any TWO:

Provide adequate number of air changes to prevent contamination

Assist in removal products of combustion

Provide air for combustion (2 marks)

(c) Ant TWO: (½ mark each)

The PG&D Board

The certifying craftsman gasfitter

The consumer (1 mark)

(d) Any FOUR:

Act	Administrator
PG&D Act	PG&D Board
Gas Act	Ministry of Economic Development (ESS)
Building Act	DBH
HSNO Act	ERMA (Labour Department)
HSE Act	Labour Department

(4 marks)

Total 8 marks

ANSWER 8

(a) (i) Decomposition of organic matter. (2 marks)

(ii) Methane
Carbon dioxide (2 marks)

(b) A gas which does not react with any other substance
Any ONE: Carbon dioxide, Nitrogen, Argon, Helium (2 marks)

(c) Safety (detect gas leakage) (1 mark)

(d) Natural gas rises
LPG falls (2 marks)

(e)

	LPG	Natural gas
Main constituent gases	(Propane / Butane)	(Methane)
Air / gas mixture ratio	25 to 1 approximately	10 to 1 approximately
Heat (calorific) value	102MJ / m^3	40MJ / m^3
Flammability range	2.4% to 9.5%	5% to 14%
Relative density	1.55	0.65

(½ mark per line, total 2 marks)

Total 11 marks