No. 9193

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2007

GASFITTING

ANSWER SCHEDULE

ANSWER 1

(a) Leakage test for existing installations.

The leakage test for existing installation should be carried out as follows:

1 Depressurise the installation and ensure that the installation is disconnected at the meter or from the cylinder

2 Ensure all gas appliance pilots are turned off and all but the last control device (or tap) on each gas appliance is in the open position

3 Attach a suitable test instrument

4 Pressurise the installation to operating pressure or 2.0kPa, whichever is the greater

5 Isolate the pressure source and allow a suitable period (2 minutes) for the temperature of the testing medium within the consumer piping to stabilise,

6 Measure the loss of pressure during a test period of 5 minutes

(6 marks)

(b) Any THREE:

Gas pressure

Required gas flow

Length of pipeline

Type of gas

Type of pipe

(3 marks)

Total 9 marks

ANSWER 2

(a) The regulator controls the varying pressure in the supply pipework to ensure a constant pressure and steady flow rate to the appliance burner.

(2 marks)

(b) Lock up pressure is the pressure at which a regulator closes off tight under no flow conditions.

(1 mark)

Total 3 marks

ANSWER 3

(a) Efficiency is calculated by dividing the heat output of an appliance by the heat input and expressing it as a %.

(2 marks)

(b) 2 x 40 = 80MJ/hr (1 mark)
80 x 0.7 = 56MJ/hr (1 mark)

(2 marks)

(c) It is the gas pressure in the installation when the gas is flowing at full rate.
OR the gas pressure in the appliance when the appliance is working efficiently.

(2 marks)

(d) To light the burners from a central pilot.

(2 marks)

(e) Upper limit 15% gas in air (1 mark)
Lower limit 5% gas in air (1 mark)

(2 marks)

(f) (i) Sinks to low levels being heavier than air.
(ii) Being lighter than air it rises.

(2 marks)

(g) (i) The contamination of the air supply, by products of combustion, to a gas burner.

(ii) Any THREE:

Incomplete combustion
Flame lift off
Noise
Unstable flame

(4 marks)

Total 16 Marks

ANSWER 4

(a) Any FIVE:

1 External to the building

2 Away from areas of physical damage

3 Position not liable to flooding

4 Upright and on a firm base

5 Means of securing to prevent tipping

6 Well ventilated

7 Clear of openings into building

8 Clear of combustion sources (ignition)

9 Clear of readily combustible materials

10 Clear of gullies and drains

Total 5 marks

ANSWER 5

Table 1

Appliance	Input Rating
A Instantaneous Water Heater	42 kW
C Cooker	75.6 MJ/h
D Cylinder location	

Table 2

Pipe Run	Length	Gas Flows	Size (mm)
A-B	8m	151.2	20
B-C	6m	75.6	20
B-D	8m	226.8	25

(1 mark for gas flow, 1 mark for pipe diameter)

Total 7 marks

ANSWER 6

(a) High to Low pressure service regulator.

(½ marks)

(b)
- A Adjusting disc
- B Breather hole
- C Vent
- D Excess pressure relief valve
- E Relief valve
- F Lever or fulcrum arm
- G Valve
- H Fulcrum
- I Diaphragm
- J Relief valve spring
- K Adjusting spring (loading spring)

(5½ marks)

Total 6 marks

ANSWER 7

(a) 1 Air is heated over a heat exchanger within a furnace and forced by a fan from the plenum chamber through insulated ducts to diffuser outlets in each room. (2 marks)

2 Warm air circulates around the rooms warming the spaces. Air is returned from a central point through a return duct back to the furnace for recirculation with some fresh air. (2 marks)

3 Room thermostat controls the temperature in the living areas. Individual dampers can be adjusted in each room. Variable fan speed. Zoned damper control. (2 marks)
(6 marks)

(b) Any FOUR:

Accessible for maintenance

Provision for ventilation

Support on a firm and level base

Positioned clear of combustible materials

No load imposed on pipes, flue or ducts

Gas Supply accessible

Power supply available

Seismic restraint

Positioned over wall (Any four, ½ mark each)
(2 marks)

(c) (i) Return air inlet too close to kitchen

(ii) System not balanced correctly

(iii) Air velocity too high

(iv) Room thermostat too close to diffuser or set too low OR

Incorrect position of room thermostat OR

Over temperature switch operating due to blocked outlet – any one.

(4 marks)

Total 12 marks

ANSWER 8

Any FIVE:

What to do if there is a smell of gas.

Need to keep combustible material clear of heater and flue.

Need to keep ventilators clear.

Need to keep DDD clear.

Not to store any flammable material in cupboard e.g. solvents etc.

Not to store chemicals in cupboard.

How to recognize the smell of gas.

How to turn gas supply to heater off.

Need for regular maintenance.

Demonstrate safe operation of the appliance.

Total 5 marks

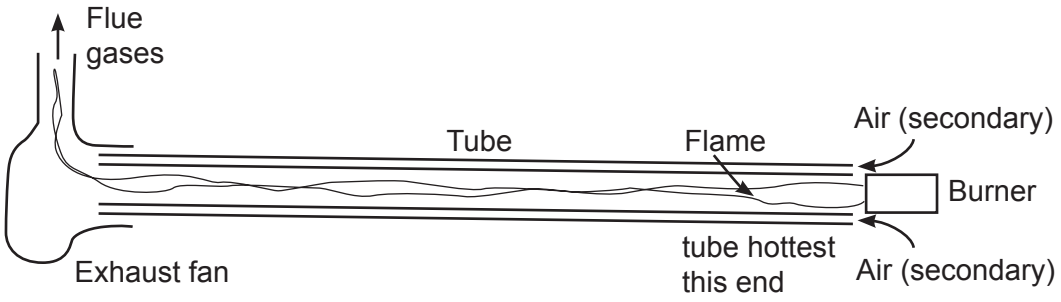
ANSWER 9

Adventitious ventilation around doors, windows and through the structure provides sufficient ventilation.

Total 2 marks

ANSWER 10

(a)



(2 marks)

A non-luminous radiant tube heater consists of a burner firing into a heavy duty tube. At the far end of the tube is a fan that sucks the products of combustion through the tube and pushes them out through a short flue. The suction draws in the appropriate combustion air with the gas. The units have automatic controls. Reflectors are often fitted above the tube to reflect the heat downwards.

(Any FOUR) (4 marks)

(b) Positioned at high level away from damage and sprinkler systems to radiate down onto work areas.

(2 marks)

(c) Hoods are provided with extractor fans that discharge outside.

(2 marks)

(d) Any TWO:

Air flow sensing device.

Temperature limit switch.

Flame failure device.

Safety shut-off valve.

(2 marks)

(e) The purge period is to ensure that the heater, combustion chamber and outlet ductwork are swept clear with air before the ignition cycle starts.

(2 marks)

Total 14 marks

ANSWER 11

(a) Aerated or pre-aerated burner.

(1 mark)

(b)

T	Aeration adjustment
U	Mixing tube
V	Burner port
W	Flame retention port
X	Venturi
Y	Injector

(3 marks)

(c) As gas emerges from injector and passes into the venturi mouth the gas velocity creates a low pressure and draws air into the gas stream.

(2 marks)

(d) Restricted primary air supply causes flames to become longer, softer and yellow (or luminous) in colour.

(Yellow 1 mark, any other 1 mark)
(2 marks)

(e) Soot or carbon is deposited on cool surfaces or flame chilling occurs causing incomplete combustion.

(Soot/carbon or incomplete combustion sufficient) (1 mark)

Total 9 marks

ANSWER 12

(a) Isolate any appliances and seal off all open ends.

Fit a test piece and connect a gauge. Pressurise to test pressure.

Isolate pressure source

Allow to stabilise for 2 minutes.

Measure pressure loss in next 5 minutes.

Check that there is no loss of pressure (shows gas tightness)

(6 marks)

(b) Pilot closed.

All appliance control valves closed.

All isolating valves open.

(3 marks)

(c) A pipework test = 7 kPa.

An installation test = 2.0 kPa.

A leakage test = 2.0 kPa.

(3 marks)

Total 12 marks