Affix label with Candidate Code Number here.
If no label, enter candidate Number if known

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No. 9193

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2013

LICENSED GASFITTER

QUESTION AND ANSWER BOOKLET

Time allowed THREE hours

INSTRUCTIONS

Check that the Candidate Code Number on your admission slip is the same as the number on the label at the top of this page.

Do not start writing until you are told to do so by the Supervisor.

Total marks for this examination: 100.

The pass mark for this examination is 60 marks.

Write your answers and draw your sketches in this booklet. If you need more paper, use pages 19–21 at the back of this booklet. Clearly write the question number(s) if any of these pages are used.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculators, document(s) provided.

Publications, Acts, Regulations, Codes of Practice, or Standards other than the ones provided are NOT permitted in the examination room.

Check that this booklet has all of 21 pages in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

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Candidates that sat this examination in November 2013 were provided with the following document:

- AS/NZS 5601 Part 1: General installations

USEFUL FORMULAE

Circumference of circle = $2 \times \pi \times R$ or Circumference of circle = $\pi \times D$

Area of circle = $\pi \times R^2$ or Area of circle = $0.7854 \times D^2$

Volume of cylinder = $\pi \times R^2 \times H$ or Volume of cylinder = $0.7854 \times D^2 \times H$

$$\text{Heating time} = \frac{\text{mass of water (kg)} \times 4.2 \times \text{temp diff (°C)} \times 100}{\text{heat energy input per hour in kJ} \times \text{efficiency (\%)}}$$

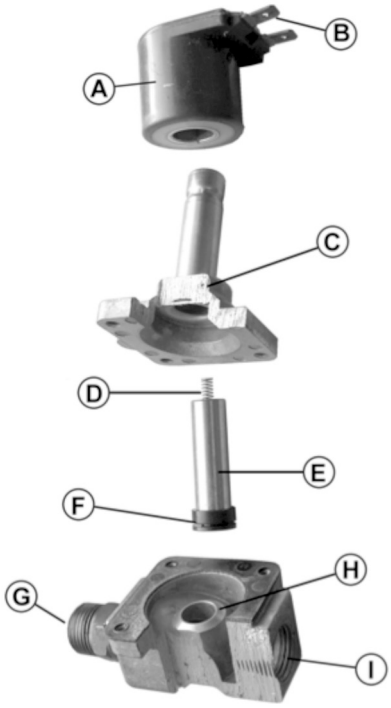
$$\text{Correction factor} = \frac{\text{atmospheric pressure + supply pressure}}{\text{atmospheric pressure}}$$

$$\text{Gas rate (m}^3\text{)} = \frac{\text{volume (m}^3\text{)} \times 3600}{\text{time (seconds)}}$$

SECTION A

QUESTION 1

The diagram below is an exploded view of a gasfitting device.



(a) Name the device.

_____

(½ mark)

(b) Complete the table below by naming the components listed.

Letter	Name
A	
B	
C	
D	
E	
F	
G	
H	
I	

(4½ marks)

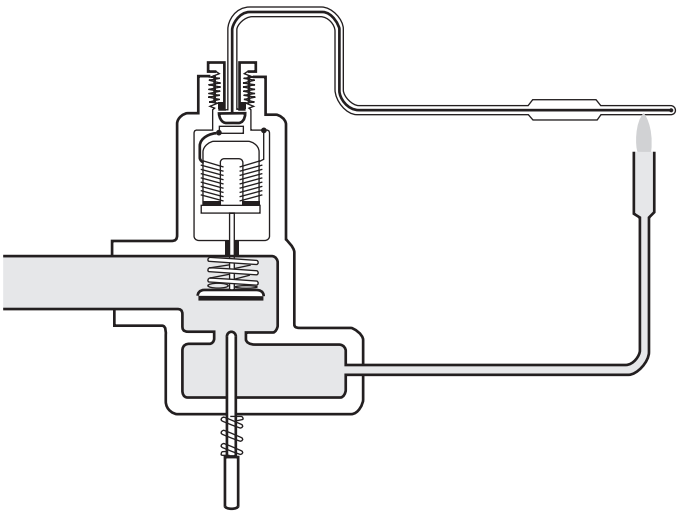
Total 5 marks

QUESTION 2

For each flame failure system/device shown, give the following information.

- Name of the system/device
- Description of its sequence of operation
- Name of an appliance which uses the system/device

(a)



(i) Name:

_____

(1 mark)

(ii) Sequence of operation:

_____

_____

_____

_____

_____

_____

(3 marks)

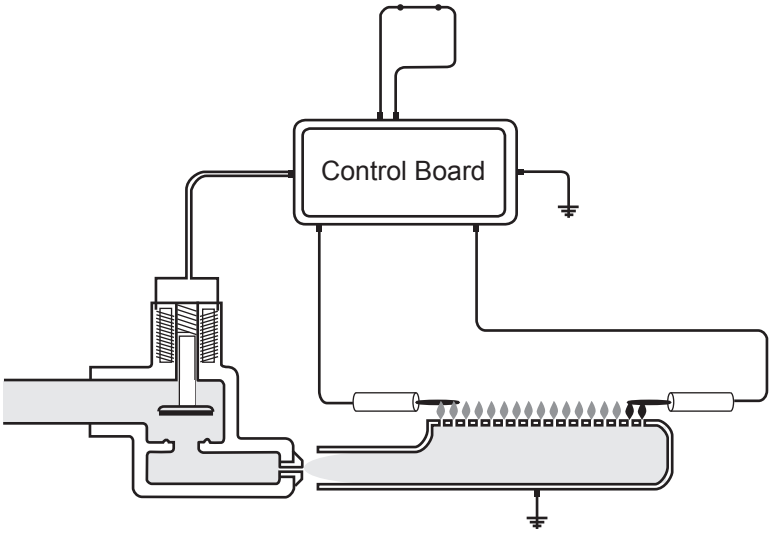
(iii) Name of an appliance that uses this type of flame failure system/device:

_____

(1 mark)

QUESTION 2 (cont'd)

(b)



(i) Name:

_____

(1 mark)

(ii) Sequence of operation:

_____

_____

_____

_____

_____

_____

(3 marks)

(iii) Name of an appliance that uses this type of flame failure system/device:

_____

(1 mark)

Total 10 marks

QUESTION 3

(a) A fault has developed on a natural draught flued gas decorative fire.

The appliance starts up correctly, but after it has been running for half an hour it shuts down and will not restart.

If the appliance is left for ten minutes, it can be manually restarted but it will shut down again after half an hour.

Give TWO likely reasons for the fault to occur.

1 _____

_____

2 _____

_____

(2 marks)

(b) A fault has developed on a gas-fired electronic continuous-flow water heater.

When the water tap is turned on, the appliance starts and the gas ignites, but the appliance shuts down after a few seconds.

An error code is displayed which indicates failed ignition.

Give FOUR reasons for the fault to occur.

1 _____

2 _____

3 _____

4 _____

(4 marks)

Total 6 marks

QUESTION 4

Give TWO functions a gas pressure regulator may perform.

1 _____

2 _____

Total 2 marks

QUESTION 5

(a) Name FOUR thermostat types and state in what appliance type each one is commonly incorporated.

1 Thermostat type:

_____

Appliance:

_____

2 Thermostat type:

_____

Appliance:

_____

3 Thermostat type:

_____

Appliance:

_____

4 Thermostat type:

_____

Appliance:

_____

(8 marks) ☐

(b) List THREE safety devices you would expect to find in a portable space heater.

1 _____

2 _____

3 _____

(3 marks) ☐

Total 11 marks ☐

QUESTION 6

Carbon monoxide is a by-product of incomplete combustion.

Give FOUR circumstances in relation to gas appliances that can lead to the production of carbon monoxide.

1 _____

2 _____

3 _____

4 _____

Total 4 marks

QUESTION 7

(a) An existing gas installation has multiple gas appliances.

When testing the installation for gas tightness, a pressure drop is observed, suggesting a possible leak.

Describe the procedure to be followed when checking for leaks.

_____

_____

_____

(3 marks)

(b) After searching for a leak on the installation in (a), no leak can be found.

List THREE probable causes of the observed pressure drop.

1 _____

2 _____

3 _____

(3 marks)

(c) While checking the static pressure on the installation in (a), the reading rises rather than staying level.

Give TWO probable causes of this occurring.

1 _____

2 _____

(2 marks)

Total 8 marks

QUESTION 8

(a) When natural gas and LPG disperse from a gas leak, they behave differently.

State the behaviour of each gas when a leak occurs, and give the reason for that behaviour.

Natural gas:

_____

_____

LPG:

_____

_____

(4 marks)

(b) Select either natural gas or LPG.

Complete the table below for your selected gas.

Type of gas	
Main constituent(s)	
Relative density	
Heating (calorific) value (MJ/m^3)	
Volume of air required for combustion of 1 cubic metre of gas	
Lower explosive limit (% gas in air)	
Upper explosive limit (% gas in air)	

(6 marks)

Total 10 marks

QUESTION 9

(a) Give TWO reasons why polyethylene pipes cannot be used above ground.

1 _____

2 _____

(2 marks)

(b) Give THREE advantages of using polyethylene pipe rather than steel pipe for underground gas service lines.

1 _____

2 _____

3 _____

(3 marks)

(c) Give TWO methods of protecting composite polyethylene pipes when used above ground.

1 _____

2 _____

(2 marks)

Total 7 marks

QUESTION 10

Three terms used in relation to gas pressure in an installation are given below.

Give the meaning of each term, and state where in the gas installation this pressure should be measured.

(a) Static or lock-up pressure

Meaning:

_____

Place where measured:

_____

(2 marks)

(b) Installation working pressure

Meaning:

_____

Place where measured:

_____

(2 marks)

(c) Appliance burner pressure

Meaning:

_____

Place where measured:

_____

(2 marks)

Total 6 marks

QUESTION 11

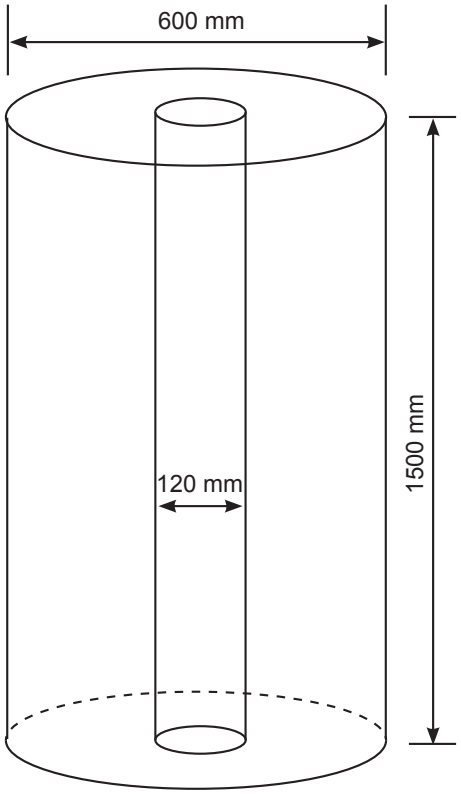
Sketch a cutaway drawing of a domestic room-sealed gas-fired ducted warm air furnace.

In your drawing:
- show all major internal components
- show the pathways of combustion gas flow and room air flow.

Total 6 marks

QUESTION 12

The diagram below shows a gas-fired storage water cylinder.



(a) Calculate the capacity of the cylinder. Give your answer in litres.

(6 marks)

(b) When empty, the water heater weighs 40 kg.

Give the weight of the water heater when full.

(1 mark)

Total 7 marks

SECTION B

Answer the following multiple-choice questions by writing your answer (A, B, C, D or E) in the box provided after each one of the questions.

Each correct answer in this section of the examination is worth 1 mark.

Note that should your choice of answer be unclear in this section of the examination no marks will be awarded for that question.

1. Which device found in LPG pigtails and regulators limits the amount of gas flow to prevent a large accumulation of gas in the event of a leakage?

   A Excess flow device.

   B Back-check module.

   C Overpressure relief.

   D Over pressure shut off.

   E Pressure limiting valve.

   ☐

2. According to AS/NZS 5601 Part 1, what is the minimum cross-sectional area a chimney serving as a flue for an open-flame type decorative flame-effect fire is allowed to have?

   A 10,000 mm^2.

   B 20,000 mm^2.

   C 40,000 mm^2.

   D 60,000 mm^2.

   E 80,000 mm^2.

   ☐

3. Which of the following can be used to calculate meter pressure correction factor?

   A (101.3 × burner pressure) ÷ 101.3

   B (101.3 + 2.5) ÷ 101.3

   C (9.81 + atmospheric pressure) ÷ 101.3

   D (101.3 + supply pressure) ÷ 101.3

   E (atmospheric pressure + heating value) ÷ 101.3

   ☐

4. Which of the following is the chemical symbol for methane?

A CO_2

B M

C NG

D CH

E CH_4

☐

5. Which of the following is an odorant added to natural gas and LPG to make them smell?

A Butane.

B Phthalates.

C Hydrogen sulphide.

D Mercaptan.

E Ethane.

☐

6. Which of the following shows the chemical symbol for soot?

A C

B CO

C CO_2

D CO_4

E CM

☐

7. Which of the following is NOT required on a gas appliance data plate?

A Burner injector sizes.

B Gas type.

C Gas consumption.

D Supplier name.

E Operating pressure.

☐

8. According to AS/NZS 5601 Part 1, what is the minimum height above roof level an open flue must terminate if the roof is designed for public use?

A 800 mm.

B 1200 mm.

C 1500 mm.

D 1800 mm.

E 2000 mm.

☐

9. Which of the following shows 35,000 BTU (British thermal units) when converted to MJ (mega joules)?

A 36.9 MJ.

B 49.2 MJ.

C 73.4 MJ.

D 35.0 MJ.

E 350.2 MJ.

☐

10. According to AS/NZS 5601 Part 1, reversion fittings are required where a proprietary multilayer piping system exceeds what length?

A 5 m.

B 10 m.

C 15 m.

D 20 m.

E 25 m.

☐

11. According to AS/NZS 5601 Part 1, what is the minimum depth of cover when a gas pipe is installed passing under a driveway?

A 300 mm.

B 350 mm.

C 400 mm.

D 450 mm.

E 600 mm.

☐

12. According to AS/NZS 5601 Part 1, the operating pressure of consumer gas piping which passes through a ventilating duct must not exceed which of the following?

A 3.0 kPa.

B 5.0 kPa.

C 7.0 kpa.

D 7.5 kPa.

E 10 kPa.

☐

13. Which fuel gas mainly consists of methane and carbon dioxide?

A Propane.

B LPG.

C Natural gas.

D Biogas.

E Simulated natural gas.

☐

14. According to AS/NZS 5601 Part 1, what is the maximum allowable spacing for supports on 32 mm multilayer pipe?

A 1.5 m.

B 2 m.

C 2.5 m.

D 3 m.

E 3.5 m.

☐

15. When not specified in the appliance manufacturer's instructions, what is the minimum height of a natural draught flue?

A 0.6 m.

B 0.9 m.

C 1.0 m.

D 1.2 m.

E 1.6 m.

☐

16. According to AS/NZS 5601 Part 1, what is the minimum horizontal clearance between the flue terminal of a 260 MJ/h forced draught gas appliance and a door?

A 150 mm.

B 300 mm.

C 500 mm.

D 1000 mm.

E 1500 mm.

☐

17. According to AS/NZS 5601 Part 1, an exhaust duct is required to be fitted to a gas dryer if the gas consumption exceeds which of the following?

A 10 MJ/h.

B 18 MJ/h.

C 20 MJ/h.

D 24 MJ/h.

E 40 MJ/h.

☐

18. According to AS/NZS 5601 Part 1, overhead radiant tube heaters must not be installed less than what height from floor level?

A 1.2 m.

B 1.8 m.

C 2.4 m.

D 3.5 m.

E 4.0 m.

☐

Total 18 marks ☐

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
Section B		
Total		