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, JUNE 2015

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 June 2015 were provided with the following documents:

- AS/NZS 5601.2013 Part 1: General installations
- AS/NZS 5601.2013 Part 2: LP Gas installations in caravans and boats for non-propulsive purposes

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 = $0.7854 \times D^2 \times H$

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

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

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

SECTION A

QUESTION 1

(a) List THREE ways in which a natural gas or LPG leakage can cause harm to people.

1 _____

2 _____

3 _____

(3 marks) ☐

(b) When either natural gas or LPG disperse from a leak, they behave differently.

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

(i) Natural gas

_____

_____

(ii) LPG

_____

_____

(2 marks) ☐

(c) Explain why LPG can be more dangerous than natural gas when a leak occurs.

_____

_____

(1 mark) ☐

Total 6 marks ☐

QUESTION 2

Give the meaning of each of the following in relation to gasfitting.

(a) Maximum over-pressure

_____

(1 mark)

(b) Installation operating pressure

_____

(1 mark)

(c) Appliance burner pressure

_____

(1 mark)

(d) Installation static pressure

_____

(1 mark)

Total 4 marks

QUESTION 3

(a) Sketch a thermoelectric flame failure device.

Label all of the main components.

(5 marks)

(b) Describe the operation of a thermoelectric flame failure device.

(4 marks)

(c) List THREE flame failure systems/devices, other than thermoelectric, found in gas appliances.

1 _____

2 _____

3 _____

(3 marks)

Total 12 marks

QUESTION 4

(a) Name THREE different gas tightness tests, and describe a situation when each test would be performed.

(i) Name

_____

Situation

_____

(ii) Name

_____

Situation

_____

(iii) Name

_____

Situation

_____

(6 marks)

(b) Give the purpose of a final connection test.

_____

_____

_____

(1 mark)

QUESTION 4 (cont'd)

(c) An installation is to have an operating pressure of 4.0 kPa.

(i) State the minimum pressure to which new pipework for the installation must be tested.

_____

(1 mark) ☐

(ii) State the minimum pressure to which the installation must be tested once the appliances have been installed and connected.

_____

(1 mark) ☐

(d) While performing a gas tightness test on an existing installation with several appliances, a leak is detected.

The owner is advised, and requests that the leak be located and repaired.

Describe the procedure that should be followed to locate the leak.

Do not describe the gas tightness test procedure.

_____

_____

_____

_____

_____

(4 marks) ☐

(e) AS/NZS 5601 Part 1 states that when performing a gas tightness test on an existing installation an acceptable pressure drop is permitted.

State the maximum acceptable pressure drop permitted for an existing installation with a volume of 22 litres.

_____

(1 mark) ☐

Total 14 marks ☐

QUESTION 5

A customer has an external gas-fired continuous flow water heater.

The customer reports that the appliance is no longer heating the water.

The other gas appliances in the property are still operating.

Give FIVE initial checks that should be carried out.

1 _____

2 _____

3 _____

4 _____

5 _____

Total 5 marks

QUESTION 6

(a) State the function of an excess flow valve.

_____

_____

(1 mark) ☐

(b) Give TWO items of gas equipment where an excess flow valve is commonly found.

1 _____

2 _____

(2 marks) ☐

(c) Describe a situation which would cause an excess flow valve to activate.

_____

(1 mark) ☐

Total 4 marks ☐

QUESTION 7

(a) Explain why it is permitted to install a balanced flue space heater in a bedroom without providing additional ventilation.

(2 marks)

(b) A twin-skin circular natural draught flue is to be installed on the outside of a house.

Sketch a cross-sectional view showing how the outer and inner flues should be lapped.

(2 marks)

(c) Explain why the inner and outer flues should be lapped in this way.

(2 marks)

Total 6 marks

QUESTION 8

Give TWO situations when a bonding strap would be used.

1 _____

2 _____

Total 2 marks

QUESTION 9

(a) Describe each of the following situations in relation to gas appliances, and state how each one becomes evident.

(i) Flame impingement

Description:

_____

How evident:

_____

(2 marks) ☐

(ii) Flame vitiation

Description:

_____

How evident:

_____

(2 marks) ☐

(iii) Under-aeration

Description:

_____

How evident:

_____

(2 marks) ☐

(iv) Over-aeration

Description:

_____

How evident:

_____

(2 marks) ☐

QUESTION 9 (cont'd)

(b) When a gas-fired storage water heater turns on, the main burner ignites explosively.

Give TWO likely causes for the explosive ignition.

1 _____

2 _____

(2 marks)

Total 10 marks

QUESTION 10

List FIVE safety devices other than flame failure devices found in gas appliances and give the function of each.

1 Device

_____

Function

_____

2 Device

_____

Function

_____

3 Device

_____

Function

_____

4 Device

_____

Function

_____

5 Device

_____

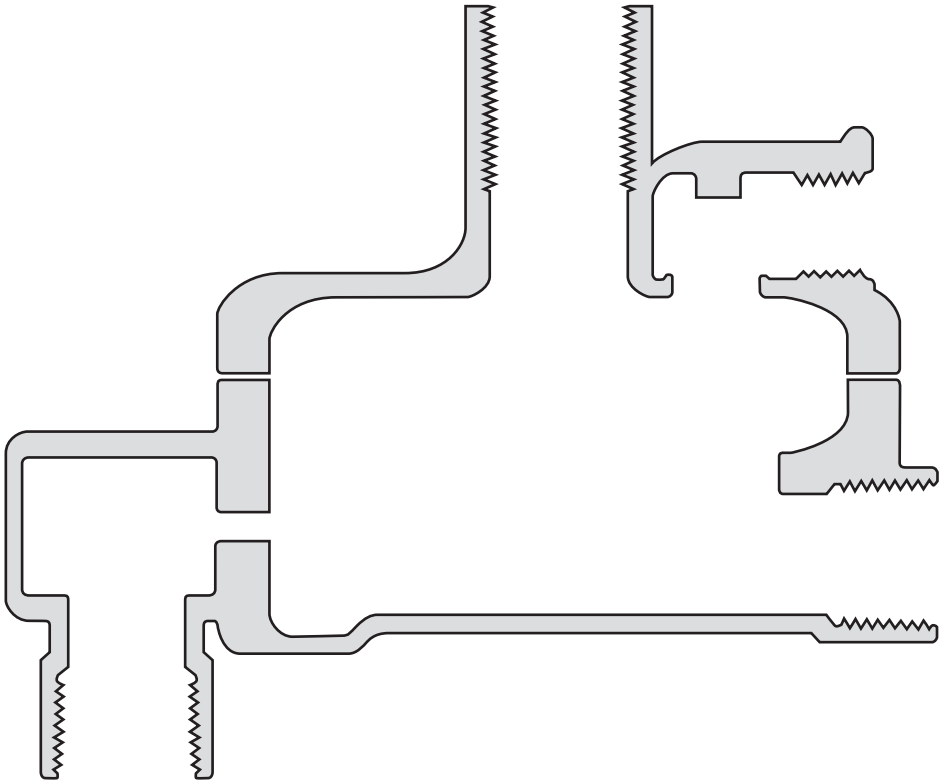
Function

_____

Total 10 marks

QUESTION 11

Complete the starter drawing below by sketching and labelling the components for a gas service regulator suitable for a domestic residence.



Total 6 marks

QUESTION 12

(a) A natural gas-fired storage water heater is to be gas rated.

While the water heater is operating of high it takes 4 minutes 10 seconds to consume 0.05 m^3 of gas.

Calculate the thermal input of the heater in MJ/h.

The heating value of natural gas is 40 MJ/m^3.

(4 marks)

(b) Convert the answer in (a) to kW/h.

(1 mark)

Total 5 marks

QUESTION 13

(a) Give FOUR probable causes of gas piping on a motorhome developing a leak.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(b) Give TWO requirements which must be met when gas pipework penetrates a bulkhead on a boat.

1 _____

2 _____

(2 marks)

Total 6 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 no mark will be awarded for that question.

1. A soaker flashing is required to be installed on a flue penetrating a roof.

   Which of the following is the New Zealand Building Code clause that provides an acceptable solution for the installation?

   A B2.

   B B4.

   C E1.

   D E2.

   E E4.

   ☐

2. Which of the following gives the purpose of a flame retention device?

   A To prevent a flame lighting explosively.

   B To extinguish the flame if it gets too large.

   C To limit the heat of the flame.

   D To keep the flame trapped inside it.

   E To prevent flame lift off.

   ☐

3. According to AS/NZS 5601 Part 1, what basic identification colour paint must be used to identify natural gas pipework if the pipework is painted?

   A AS08H44 (green).

   B BS07G38 (yellow).

   C BS08C35 (buff).

   D BS089Y07 (grey).

   E NZ34A35 (bright yellow).

   ☐

4. According to AS/NZS 5601 Part 1, what is the minimum horizontal clearance required between a balanced flue terminal and a gas meter fitted with a venting regulator?

A 300 mm.

B 400 mm.

C 600 mm.

D 800 mm.

E 1000 mm.

☐

5. What can occur within an appliance that has an efficiency exceeding 85%?

A Condensation.

B Excessive CO_2 creation.

C Excessive flame noise and lift.

D Flame cooling.

E Vitiation due to low temperatures.

☐

6. According to AS/NZS 5601 Part 2, what is the minimum clearance required between installed gas piping and any electrical service?

A 10 mm.

B 25 mm.

C 50 mm.

D 100 mm.

E 150 mm.

☐

7. According to AS/NZS 5601 Part 2, what is the minimum distance allowed between a fuel filler cap and a gas appliance with a permanent pilot (or its vent) in a motorhome?

A 150 mm.

B 250 mm.

C 400 mm.

D 600 mm.

E 1000 mm.

☐

8. Which of the following is the closest conversion of 28,000 BTU/h?

A 2.8 MJ/h.

B 30 MJ/h.

C 77 MJ/h.

D 100 MJ/h.

E 280 MJ/h.

9. What is the minimum height at which work being carried out becomes notifiable work?

A 2.4 m.

B 3.0 m.

C 5.0 m.

D 7.5 m.

E 12.0 m.

10. For what minimum period of time must a gasfitting trainee holding a limited certificate work in the presence of his/her supervisor?

A 2 months.

B 3 months.

C 6 months.

D 12 months.

E 24 months.

Total 10 marks

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
Section B		
Total		