

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 2011

### **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 22–25 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 25 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**

Candidates that sat this examination in June 2011 were provided with the following document:

- NZS 5261 Gas installation

## SECTION A

### QUESTION 1

(a) Give TWO functions of a down draught diverter.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(b) Give THREE causes of down draught in a flue system.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

(c) Give THREE reasons for ventilating a cupboard containing an open-flued internal gas-fired storage water heater.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

**Total 8 marks**

## QUESTION 2

- (a) Three tests are used to pressure test gas installations.

Give the name and a brief description of when each test is used.

1 Name: \_\_\_\_\_

When used: \_\_\_\_\_

\_\_\_\_\_

2 Name: \_\_\_\_\_

When used: \_\_\_\_\_

\_\_\_\_\_

3 Name: \_\_\_\_\_

When used: \_\_\_\_\_

\_\_\_\_\_

(6 marks)

- (b) Give TWO precautions to be taken before commencing a purge of consumer piping.

1 \_\_\_\_\_

2 \_\_\_\_\_

(1 mark)

**Total 7 marks**

### QUESTION 3

- (a) Some appliance flue terminals are designed to allow rain water to enter the flue.

Give the reason for this.

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(2 marks)

- (b) Give FOUR important installation points to ensure while installing a condensate drain from a high efficiency appliance.

1 

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2 

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3 

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4 

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(4 marks)

- (c) Give FOUR items of information that must be supplied on a gas appliance rating/data plate.

1 

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2 

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3 

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4 

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(2 marks)

**Total 8 marks**

#### QUESTION 4

The list below gives 12 steps in the operation of a ducted warm air heater.

Rearrange the list to show the correct sequence of steps. Write the letter for each step in the lines numbered 1-12.

- A. Gas valve closes.
- B. Room circulation starts.
- C. Room air circulation fan turns off once appliance has cooled.
- D. Combustion air fan starts pre purge.
- E. Ignition function commences.
- F. Gas ignites and flame is sensed.
- G. Combustion chamber pressure switch activates.
- H. Combustion air fan completes a post purge.
- I. Room temperature rises above the thermostat set temperature.
- J. Gas valve switches to the full rate.
- K. Gas valve opens at low rate.
- L. Room temperature falls below thermostat set temperature.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_
- 7 \_\_\_\_\_
- 8 \_\_\_\_\_
- 9 \_\_\_\_\_
- 10 \_\_\_\_\_
- 11 \_\_\_\_\_
- 12 \_\_\_\_\_

Total 6 marks

## QUESTION 5

- (a) Appliances in an existing commercial kitchen are connected to a reticulated natural gas supply.

The owner wants to install four additional appliances.

Give THREE checks regarding the current gas supply that should be carried out before the new appliances are installed.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

(3 marks)

- (b) A hob was removed from a house and taken to a workshop.

At the workshop a faulty hotplate control valve was replaced.

Give FOUR safety checks/tests that must be carried out once the repaired appliance is refitted at the house.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(4 marks)

**Total 7 marks**

## QUESTION 6

- (a) Briefly give the meaning of each of the following.

Installation working pressure

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Appliance burner test point pressure

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Installation static pressure

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(3 marks)

- (b) While taking a static pressure reading of an installation, the reading slowly continues to rise.

Give TWO possible causes of this.

1 

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2 

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(2 marks)

**Total 5 marks**



## QUESTION 7

- (a) A gas storage water heater is in need of attention.

The pilot does light but once the button is released it goes out.

Give FOUR likely causes of this fault.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(4 marks)

- (b) The burner on a newly installed hob keeps going out when it is turned down to low.

Give the most likely reason for this.

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(1 mark)

- (c) When a ducted warm air furnace is turned on at the thermostat the burner ignites explosively.

Give TWO likely causes of this.

- 1 \_\_\_\_\_  
\_\_\_\_\_
- 2 \_\_\_\_\_  
\_\_\_\_\_

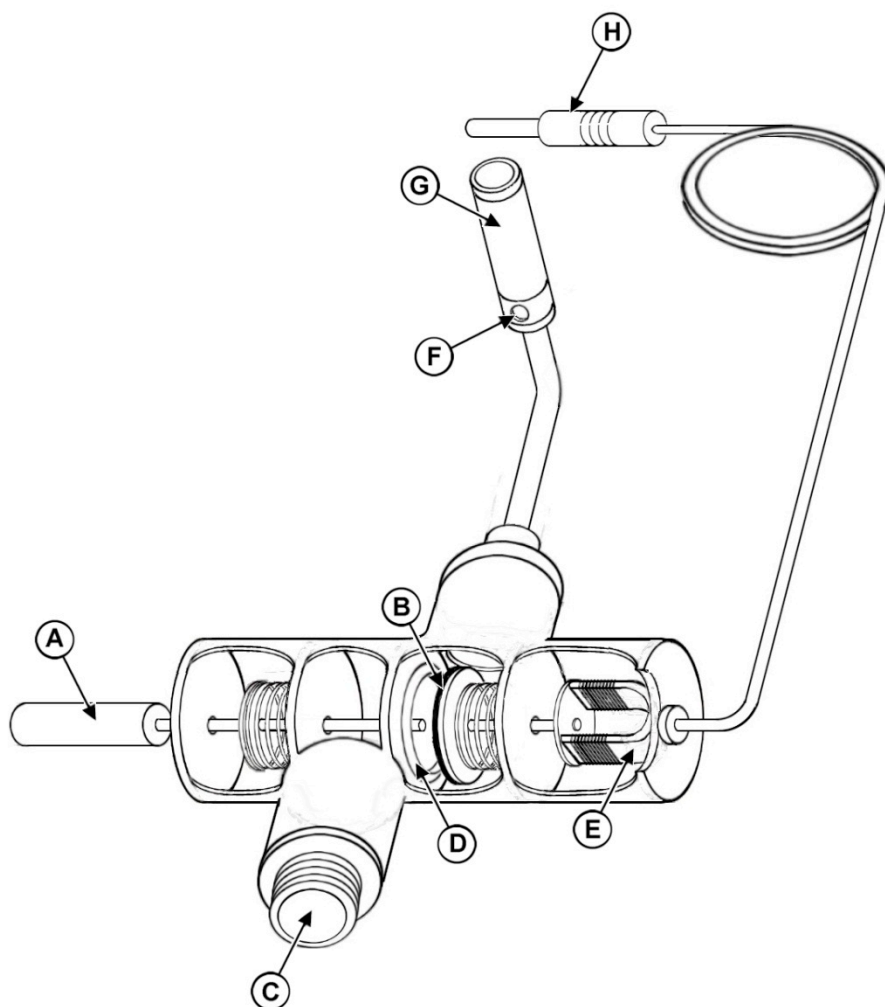
(2 marks)

**Total 7 marks**

## QUESTION 8

(a) (i) Name the flame failure device shown in the following diagram.

(1 mark)



(ii) Name each part labelled A – H.

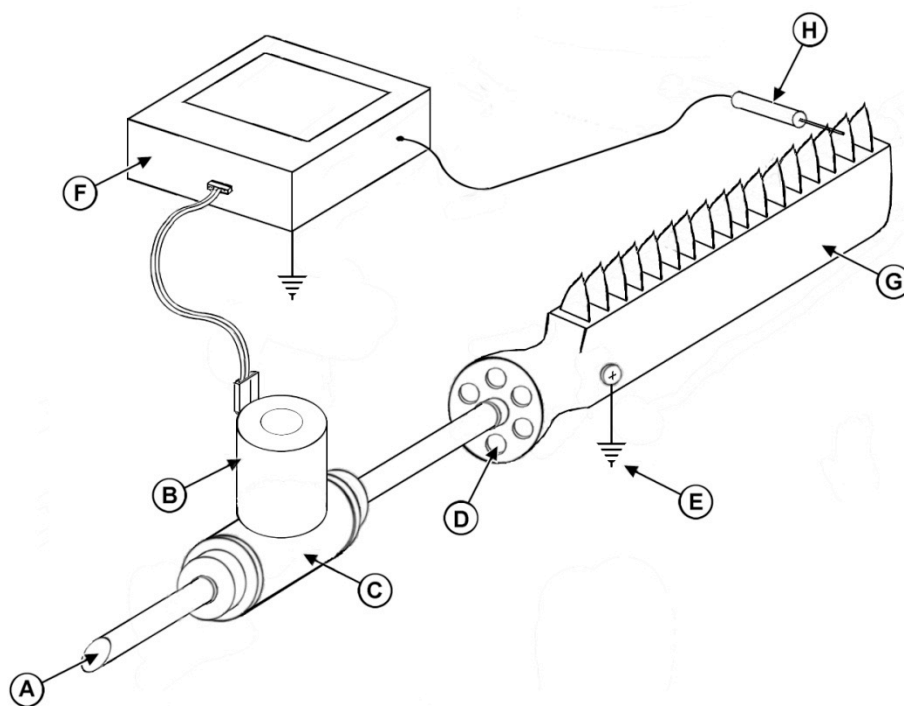
- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_
- D \_\_\_\_\_
- E \_\_\_\_\_
- F \_\_\_\_\_
- G \_\_\_\_\_
- H \_\_\_\_\_

(4 marks)

## QUESTION 8 (cont'd)

(b) (i) Name the flame failure system shown in the following diagram.

(1 mark)



(ii) Name each part labelled A – H.

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_
- D \_\_\_\_\_
- E \_\_\_\_\_
- F \_\_\_\_\_
- G \_\_\_\_\_
- H \_\_\_\_\_

(4 marks)

**Total 10 marks**

### QUESTION 9

A consumer complains of flu-like symptoms including headaches and dizziness while a gas appliance is operating.

State what these symptoms indicate.

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Total 1 mark

### QUESTION 10

(a) State when it is permissible to install copper piping underground beneath a building.

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(1 mark)

(b) Give TWO actions that must be performed on a section of gas pipe-work which has been disconnected from an installation.

1

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2

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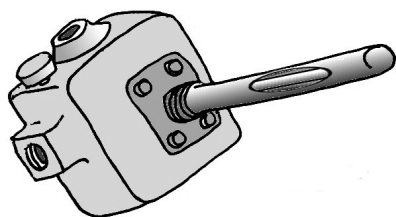
(1 mark)

Total 2 marks

## QUESTION 11

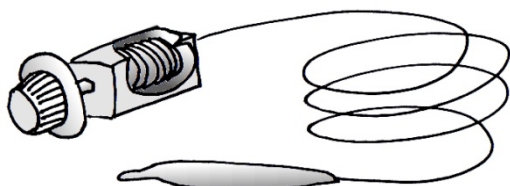
Name each type of thermostat drawn below.

(a)



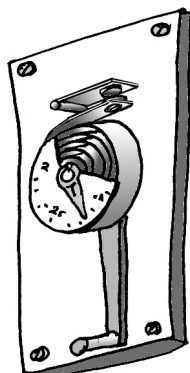
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(b)



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(c)



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Total 3 marks

### QUESTION 12

Give TWO requirements that must be met when clearing a blockage in consumer piping.

1 \_\_\_\_\_

2 \_\_\_\_\_

**Total 2 marks**

### QUESTION 13

Give TWO reasons why odourants are added to natural gas and LPG.

1 \_\_\_\_\_

2 \_\_\_\_\_

**Total 2 marks**

### QUESTION 14

Give TWO measurements an electronic flue gas analyser can display.

1 \_\_\_\_\_

2 \_\_\_\_\_

**Total 1 mark**

### QUESTION 15

(a) State the purpose of a flame retention device.

\_\_\_\_\_

(1 mark)

(b) List THREE types of flame retention used on gas appliance burners.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

**Total 4 marks**

## QUESTION 16

A package burner consumes 7 m<sup>3</sup>/h of natural gas.

The burner is being converted to LPG.

- The heating value of natural gas is 40 MJ/m<sup>3</sup>
- The heating value of LPG is 90 MJ/m<sup>3</sup>
- 1 × 45 kg cylinder will deliver 54 MJ/h
- Natural gas fuel to air ratio is 10:1
- LPG fuel to air ratio is 25:1

- (a) Calculate how many cubic meters of LPG per hour the package burner will consume once the conversion is complete.

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(1 mark)

- (b) Calculate the number of 45 kg cylinders that are required to supply the package burner, including a reserve bank of cylinders.

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(1 mark)

- (c) Calculate in cubic metres the additional volume of air the burner will consume when it has been converted to LPG.

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(2 marks)

**Total 4 marks**



## QUESTION 17

The pipe work for a Natural gas installation consists of:

- 15.5 m of 50 mm diameter pipe
- 18 m of 30 mm diameter pipe.

(a) Calculate the total volume of the pipe work.

Formula:

Volume = Diameter<sup>2</sup> × 0.7854 × length

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(2 marks)

(b) Calculate how many MJ of heat 0.54 m<sup>3</sup> of natural gas will generate.

The heating value of natural gas is 40 MJ/m<sup>3</sup>.

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(1 mark)

**Total 3 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. According to NZS 5261 Gas Installation, what is the specification for how far polyethylene coating on a steel pipe must extend above where the pipe emerges from the ground?

A 200 mm.  
B 300 mm.  
C 400 mm.  
D 3 times the diameter of the pipe.  
E To the first above ground fitting.

2. Piping is to be installed underground.

According to NZS 5261 Gas Installation, what is the minimum distance the pipework may be installed to an underground, unprotected, electrical supply cable which lacks marker identification tape?

A 100 mm.  
B 300 mm.  
C 500 mm.  
D 900 mm.  
E 1200 mm.

3. According to NZS 5261 Gas Installation, what standard gives the minimum requirements for copper piping materials and fittings?

A AS/NZS 1477  
B NZS 5262  
C AS 2944.1  
D NZS/BS 1387  
E NZS 3501

4. What length of pipe should not be exceeded between an LPG cylinder and the first stage regulator or a manifold?

- A 300 mm.
- B 500 mm.
- C 600 mm.
- D 800 mm.
- E 1000 mm.

☐

5. According to NZS 5261 Gas Installation, what condition applies to proprietary systems?

- A They must be used only where conventional materials are not suitable for the installation.
- B They must be used as a complete entity as per the manufacturer's instructions.
- C They are not permitted to supply gas to installations in excess of 350 MJ/h.
- D They must not use liquid sealants on pipe jointing connections.
- E They are not permitted for use in plant rooms.

☐

6. According to NZS 5261 Gas Installation, what condition applies to pipes and fittings removed from an installation?

- A They must be tested for gas tightness before being reused in an installation.
- B They must be free of damage and defects before being reused in an installation.
- C They must be disposed of and not be reused in another installation.
- D They must be rendered unusable so as not to be reused in another installation.
- E They must not be used for conveyance of any gas type other than the type contained prior to removal.

☐

7. According to NZS 5261 Gas Installation, what is the minimum thickness of a 250 mm diameter mild steel flue?

- A 0.05 mm.
- B 0.5 mm.
- C 0.6 mm.
- D 0.9 mm.
- E 1.0 mm.

☐

8. According to NZS 5261 Gas Installation, what colour must gas pipes be painted for identification purposes?

- A BS07G38 (yellow).
- B AS08H44 (green).
- C NZ34A35 (bright yellow).
- D BS08C35 (buff).
- E BS09Y07 (grey).

☐

9. According to NZS 5261 Gas Installation, what condition applies to consumer piping which is concealed and inaccessible other than piping that is underground or embedded in concrete?

- A It must have provision provided for replacement of faulty sections of pipe-work.
- B It can not be installed at all.
- C It must not be installed if the operating pressure of the installation is greater than 7 kPa.
- D It is permitted only if the material is copper or galvanized steel.
- E It is permitted if the installation provides over pressure protection.

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10. According to NZS 5261 Gas Installation, what is the maximum allowable spacing for supports on 32 mm steel pipe?

- A 1.5 m.
- B 2 m.
- C 2.5 m.
- D 3 m.
- E 3.5 m.

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11. According to NZS 5261 Gas Installation, what standard gives further information on cathodic protection of pipes?

- A NZS 5258
- B NZS 5262
- C AS/NZS 2430
- D AS/NZS 2648
- E NZS 3501

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12. According to NZS 5261 Gas Installation, what is the minimum separation between any underground consumer piping and an electrical earthing electrode for an electrical supply not exceeding 1000 Volts?

- A 100 mm.
- B 300 mm.
- C 500 mm.
- D 600 mm.
- E 900 mm.

☐

13. According to NZS 5261 Gas Installation, for which of the following appliances is a means of isolation not required if the appliance is installed in a single dwelling?

- A Storage water heater.
- B Space heater.
- C Pool heater.
- D Ducted heater.
- E Cooker on a hose assembly.

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14. According to NZS 5261 Gas Installation, what is the minimum clearance for a balanced flue terminal from a 60 MJ/h gas appliance vertically below an openable window?

- A 150 mm.
- B 300 mm.
- C 500 mm.
- D 1000 mm.
- E 1500 mm.

☐

15. According to NZS 5261 Gas Installation, what is the minimum clearance between an oven flue outlet on an elevated gas cooking appliance and an overhead surface?

- A 200 mm.
- B 300 mm.
- C 400 mm.
- D 500 mm.
- E 600 mm.

☐

16. According to NZS 5261 Gas Installation, what is the minimum permissible clearance above an 8 MJ/h overhead radiant heater to a combustible surface?

- A 200 mm.
- B 400 mm.
- C 600 mm.
- D 800 mm.
- E 900 mm.

☐

17. According to NZS 5261 Gas Installation, in relation to purging, a large volume gas installation has a volume exceeding which of the following?

- A 0.03 m<sup>3</sup>.
- B 0.05 m<sup>3</sup>.
- C 0.3 m<sup>3</sup>.
- D 0.5 m<sup>3</sup>.
- E 3.0 m<sup>3</sup>.

☐

18. Which statement best describes a thermistor?

- A A vapour or liquid filled sensing vial.
- B A bimetallic temperature operated switch.
- C An electronically controlled capacitor.
- D A temperature dependant resistor.
- E A mercury temperature sensing bulb.

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19. Which of the following can be confirmed by gas rating an appliance?

- A The burner injector size is correct.
- B The appliance efficiency.
- C Correct air to gas ratio.
- D The operation of the appliance safety devices.
- E Correct operation of the appliance flue.

☐

20. Biogas mostly consists of methane and which other gas?

- A Propane.
- B Butane.
- C Pentane.
- D Carbon dioxide.
- E Nitrogen.

☐

**Total 20 marks**

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For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
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Section B		
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