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

No. 9196

Plumbers, Gasfitters and Drainlayers Board

CRAFTSMAN EXAMINATION, JUNE 2007

GASFITTING

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, ask the Supervisor for extra sheets. Write your Candidate Code Number and the number 9196 on any extra sheets used, and attach them to this booklet. NO SEPARATE ANSWER BOOKLET IS TO BE USED. Write the number of extra sheets used in the box on the last page of this booklet. Write NIL if you have not used any.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculators

The following are NOT permitted in the examination room:

Any publications, Acts, Regulations, Codes of Practice, or Standards

Check that this booklet has all of 14 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

QUESTION 1

(a) If a gasfitter is asked to add an additional appliance to a gas installation and believes that an existing appliance in that installation is dangerous, state the actions that should be taken.

_____

_____

_____

(2 marks)

(b) Apart from new installations, state TWO types of gasfitting work which must be certified.

1 _____

2 _____

(2 marks)

Total 4 marks

QUESTION 2

When designing a gas installation, state THREE factors to be considered for each of the following.

(a) Ensuring adequate support for pipework.

1 _____

2 _____

3 _____

(3 marks)

(b) Positioning a flueless gas appliance.

1 _____

2 _____

3 _____

(3 marks)

(c) Terminating a flue.

1 _____

2 _____

3 _____

(3 marks)

Total 9 marks

QUESTION 3

(a) For each of the following gases, list the main components of the gas.

Gas	Main Components
Natural Gas (NG)	
Liquefied Petroleum Gas (LPG)	
Tempered Liquefied Petroleum Gas (TLP)	
Town Gas (TG)	
Biogas	

(5 marks)

(b) Liquified petroleum gas (LPG) bottles are exchanged at a ski field. It is found that the bottles appear to contain significant quantities of unused gas.
State what will have prevented the use of this gas.

_____

_____

_____

(2 marks)

(c) State TWO ways in which the problem in (b) can be rectified.

1 _____

2 _____

(2 marks)

(d) There are several factors that can govern the vaporisation rate of LPG in a container.
List TWO of these.

1 _____

_____

2 _____

_____

(2 marks)

Total 11 marks

QUESTION 4

(a) The pressure regulator in a gas installation may fail.

Name FOUR devices designed to prevent over-pressurisation of an installation in this situation.

1 _____

2 _____

3 _____

4 _____

(4 marks) ☐

(b) Define the term hunting in relation to a regulator, and explain how it can be overcome in the design phase of an installation.

_____

_____

_____

_____

_____

(3 marks) ☐

(c) State SIX factors that should be considered when selecting a site for a gas meter/regulator installation.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(6 marks) ☐

Total 13 marks ☐

QUESTION 5

(a) If gas is metered at high pressure, state the adjustment that is necessary to obtain the true consumption.

_____

(1 mark)

(b) State TWO ways in which the adjustment in (a) can be carried out.

1 _____

2 _____

(2 marks)

Total 3 marks

QUESTION 6

Calculate the gas input rate, in m^3/h, for an instantaneous water heater with the following specification:

maximum water flow = 15 litres/min

water inlet temperature = 12º C

water outlet temperature = 40º C

specific heat capacity of water = 4.2 kJ

heater efficiency = 75%

heating value of gas = 40 mJ/m^3

Give your answer to three decimal places. Show all working in calculations.

Formula: Heater Output = Waterflow x Temperature Rise x Specific Heat

Total 4 marks

QUESTION 7

(a) State EIGHT factors to be considered when installing a 190 litre gas-fired water storage heater in a roof-space.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

(4 marks)

(b) Calculate the heat input requirement for a room 5.000 m x 3.200 m with a ceiling height of 2.700 m.
Assume a minimum heat input of 0.36 mJ/h/m^3.
Show all working in calculations.

_____

_____

_____

(2 marks)

(c) Calculate the minimum floor area of a hallway where a 12 mJ flueless panel heater is to be installed. The ceiling height is 2.400 m. NZS 5261 sets a limit of 0.4 mJ/h/m^3 for flueless space heaters in hallways.
Show all working in calculations.

_____

_____

_____

(2 marks)

QUESTION 7 (cont'd)

(d) State THREE conditions that must be met for the installation of a gas space heater in a bedroom.

1 _____

2 _____

3 _____

(3 marks)

(e) State TWO advantages of using radiant tube heaters in a commercial warehouse.

1 _____

_____

2 _____

_____

(1 marks)

(f) State FOUR factors to be considered for the positioning of a radiant gas heater in relation to a workbench in a commercial warehouse.

1 _____

_____

2 _____

_____

3 _____

_____

4 _____

_____

(4 marks)

Total 16 marks

QUESTION 8

(a) Identify FOUR design requirements for a direct-fired make up air heater system suitable for a commercial building.

1 _____

_____

2 _____

_____

3 _____

_____

4 _____

_____

(4 marks) ☐

(b) Some commercial appliances such as pottery kilns are normally installed without down-draught diverters. As a consequence, special conditions apply to the flues of these appliances.

(i) Give the reason for the special conditions.

_____

_____

(1 mark) ☐

(ii) State FOUR of the special conditions.

1 _____

_____

2 _____

_____

3 _____

_____

4 _____

_____

(2 marks) ☐

QUESTION 8 (cont'd)

(c) Commercial catering appliances must be fitted with special isolation requirements.

State THREE requirements.

1 _____

2 _____

3 _____

(3 marks)

(d) A natural draught boiler is to be installed in the basement of an office block.

Give THREE advantages of installing a power flue.

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

(3 marks)

Total 13 marks

QUESTION 9

(a) Briefly describe each of the following types of burner control systems.

(i) Automatic _____

_____

_____

(ii) Semi-automatic _____

_____

_____

(iii) Manual _____

_____

_____

(3 marks)

(b) (i) State TWO requirements relating to the appliance that must be met before taking samples of flue gas from a gas appliance.

1 _____

2 _____

(2 marks)

(ii) State TWO positions from which the samples should be taken.

1 _____

_____

2 _____

_____

(2 marks)

QUESTION 9 (cont'd)

(c) Give TWO reasons for flue gas analysis.

1 _____

2 _____

(2 marks)

(d) For an industrial installation supplied from a bulk LPG installation state the reason for installing each of the following:

(i) Vaporiser _____

_____

_____

_____

(ii) Two stage pressure regulation _____

_____

_____

_____

(4 marks)

Total 13 marks

QUESTION 10

Complete the following table for an automatic gas burner fitted with a separate pilot system and a programmable control unit (PCU).

The equipment in operation during each period must be chosen from the following:
fan
igniter
flame failure device (FFD).

Period	All equipment in operation during period	Pilot gas valve (open/shut?)	Main gas valve (open/shut?)
Pre-purge			
Start flame Ignition			
Start flame proving			
Main flame establishment			

Total 6 marks ☐

QUESTION 11

(a) List SIX factors that should be considered when designing a natural draught flue for a gas appliance.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

(3 marks)

(b) With the aid of a ruler, draw a cross-section of a flue box of a wall-hung gas appliance as it passes through the wall of a timber-framed weatherboard house. Show the minimum clearances, ventilation and other requirements.

(5 marks)

Total 8 marks

For Candidate's use

Number of EXTRA sheets used (write NIL if none have been used).	

For Examiner's use only

Questions Answered	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
Total		