

Affix label with Candidate Code
Number here.
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Number if known

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No. 9195



Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2013

CERTIFYING PLUMBER

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 2013 were provided with the following documents:

- AS/NZS 3500 Part 1: Water services
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
- AS/NZS 3500 Part 4: Heated water services

SECTION A

QUESTION 1

- (a) State the length of time within which a plumber is required to notify the Plumbers, Gasfitters and Drainlayers Board of a change of address.
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(1 mark)

- (b) State the penalty that may be imposed if the requirement in (a) is not met.
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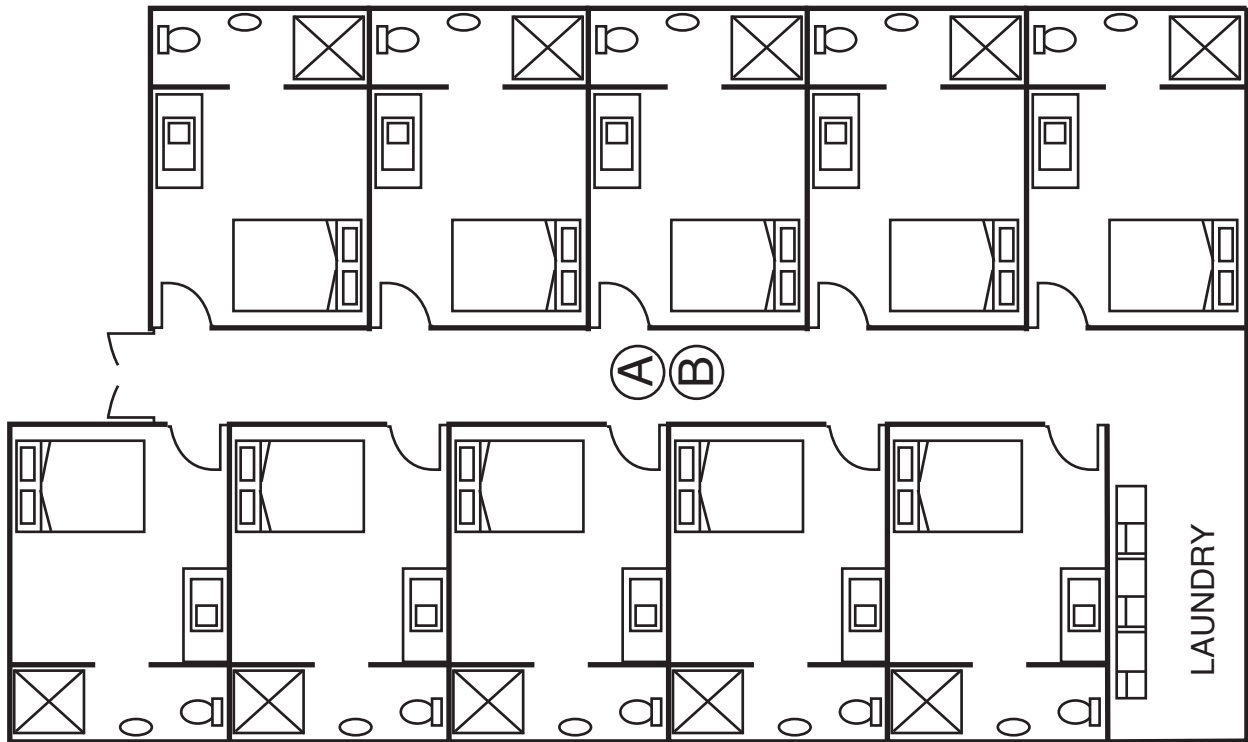
(1 mark)

Total 2 marks

QUESTION 2

The diagram below shows a plan view of a proposed dormitory with 10 single occupancy rooms. The diagram includes the sanitary fixtures layout and laundry facilities.

Hot water for fixtures is to be supplied via a ring main fed from two identical storage water heaters installed in the ceiling space, shown as A and B on the plan.



- (a) Complete the drawing to show the pipework and components required to convey hot water from the cylinders to the fixtures.

(4 marks)

QUESTION 2 (cont'd)

(b) It is expected there will be one peak load period per day, where 80% of the showers will be in use.

The incoming cold water temperature is 15°C.

The average shower temperature is expected to be 40°C.

The estimated average shower time is 9.5 minutes.

The thermostat on the cylinder is set to maintain a temperature of 70°C.

Using the typical flow rates for hot water demand stated in AS/NZS 3500 Part 4 Heated water services, calculate the required capacity for each of the hot water cylinders.

Formula:

Total
storage
required =
$$\frac{\text{Time (seconds)} \times \text{Flow rate (l/s)} \times \text{Number of showers} \times T_1}{T_2 \times \text{Peak load}}$$

where

T₁ = Temperature increase from cold to average shower temperature.

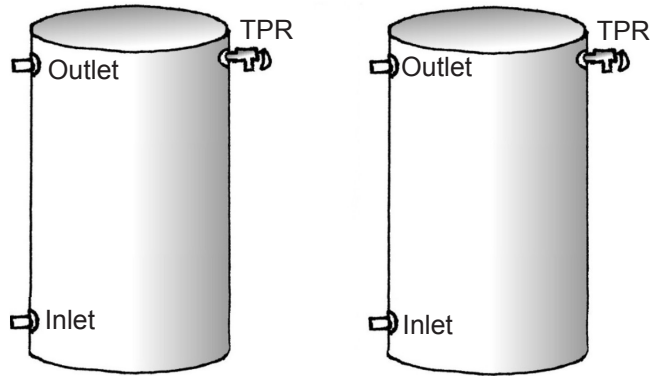
T₂ = Temperature increase from cold to hot stored temperature.


(5 marks)

QUESTION 2 (cont'd)

(c) The hot water storage cylinders A and B are to be connected in parallel.

(i) Complete the starter drawing below to show the pipework and valves required for the installation of the hot water cylinders.



 Cold supply

(2 marks)

(ii) Give THREE advantages of installing the cylinders in parallel.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(iii) Give THREE requirements that must be met relating to the support of the cylinders in the ceiling space.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

QUESTION 2 (cont'd)

(d) Describe a method that can be used to prevent legionella bacteria growing within the ring main.

(1 mark)

Total 18 marks

QUESTION 3

A hot water storage system with a capacity of 750 litres has been installed.

The 1 hour peak load of the system is 600 litres, at the end of this time the cylinder temperature has dropped to 40°C.

The cylinder is fitted with a 3.0 kW element that has an efficiency rating of 94%.

The thermostat is set to 70°C.

3.6 MJ = 1 kWh

Calculate the recovery time required for the hot water cylinder to reach the thermostat setting.

Formula:

$$\text{Time} = \frac{\text{mass of water (kg)} \times 4.2 \times (T2 - T1)}{\text{Heat energy input per hour (kJ)} \times (\text{efficiency \%} \div 100)}$$

Total 4 marks

QUESTION 4

- (a) The Health and Safety in Employment Act defines classes of injuries that constitute serious harm.

Give THREE of these classes.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

- (b) Name the government agency that must be notified when a serious harm accident occurs on a work site.

(1 mark)

- (c) State the maximum amount of time within which written notification for a serious harm accident must be provided to the agency named in (b).

(1 mark)

- (d) Give THREE instances in which it is acceptable to disturb the scene of a serious harm accident.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

Total 8 marks

QUESTION 5

The drawing opposite shows a range of sanitary fixtures, connected to an offset discharge stack. The fixtures include showers, urinals, hand basins and cistern – flushing WC pans.

Each floor level has a height of 2.7 metres.

The stack is to be a fully vented modified system installed to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

- (a) Complete the drawing to show the ventilation requirements for a fully vented modified stack, show the diameter of each section of vent pipework.

(7 marks)

- (b) Complete the table below to show the measurements listed for the installation of the stack.

Total discharge loading for the stack	
The maximum discharge loading allowable for any one floor level	
Minimum diameter at point A	
Minimum diameter at point B	
Minimum diameter at point C	
Minimum height of section D	
Minimum length of section E	
Minimum length of section F	
Minimum height of section G	
Minimum diameter at point H	
Minimum diameter at point I	
Minimum diameter at point J	

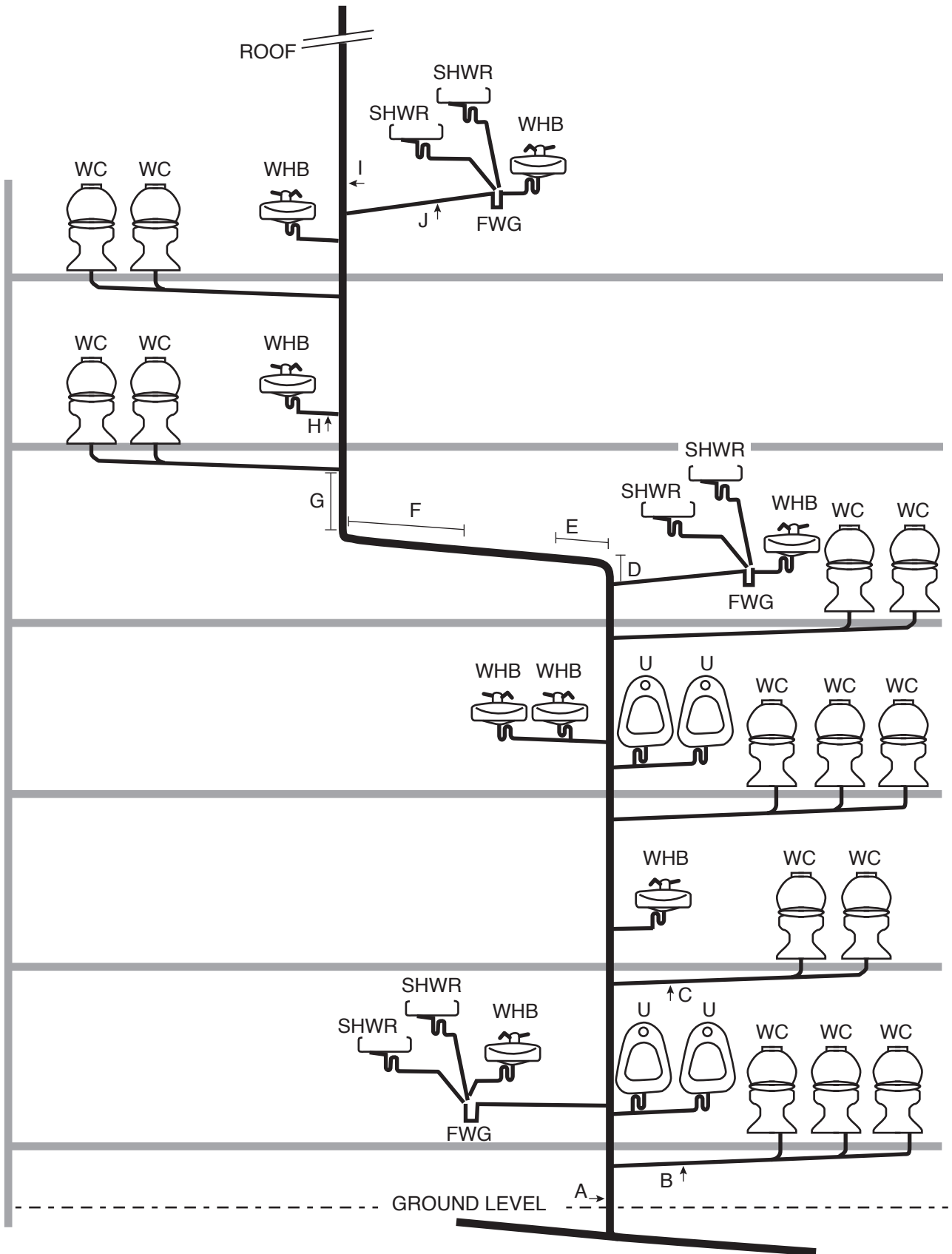
(12 marks)

- (c) An air admittance valve is to be installed at the top of the discharge stack vent. State the minimum determined airflow capacity allowable for the air admittance valve.

(1 mark)

Total 20 marks

QUESTION 5 (cont'd)



QUESTION 6

- (a) Give THREE characteristics of a work site that determine that the site will be considered to be a confined space.

1 _____

2 _____

3 _____

(3 marks)

- (b) State who is responsible for ensuring that all workers entering a confined space are suitably trained.

(1 mark)

Total 4 marks

QUESTION 7

Draw and label a cross-sectional view of a pipe penetration through a hollow construction wall fitted with fire collars.

Total 4 marks

QUESTION 8

A reduced pressure zone backflow prevention device is to be installed to protect a potable water supply from contamination.

(a) Give THREE specific installation requirements that must be met for this device.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(b) Name THREE backflow prevention devices that must have isolating valves installed on the inlet and the outlet of the device.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

Total 6 marks

QUESTION 9

Give THREE locations where a thrust block would need to be placed when installing water services underground and that include elastomeric (rubber) ring joints to comply with AS/NZS 3500 Part 1: Water services.

- 1 _____
- 2 _____
- 3 _____

Total 3 marks

QUESTION 10

The schematic diagram opposite shows a series of fixtures fitted with flushing valves supplied by a break tank. The available head to the upper level is 4 metres.

Answer the following so that the system complies with the minimum requirements of AS/NZS 3500 Part 1: Water services.

- (a) Complete the following table to show the diameter of the pipe supplying the flushing valves in each labelled section of the diagram.

Section	Diameter
A – B	
B – C	
C – D	
E – F	
G – H	

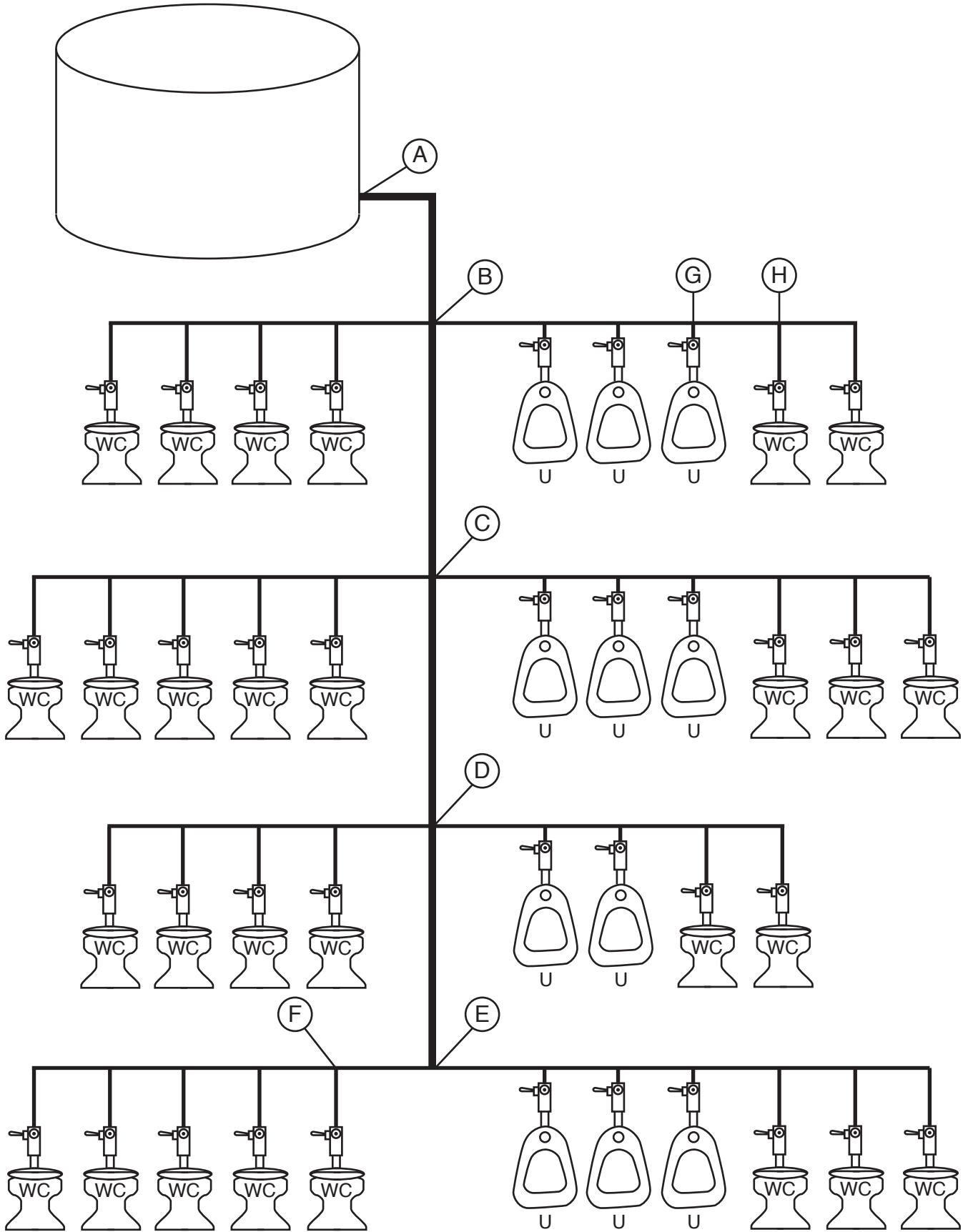
(6 marks)

- (b) Calculate the minimum capacity permitted for the break tank supplying water to the flushing valves.

(4 marks)

Total 10 marks

QUESTION 10 (cont'd)



QUESTION 11

An underslab pipe-out has been completed for a dwelling, including discharge pipes and hot and cold water feeds to an island bench, to comply with AS/NZS 3500.

- (a) Give the requirements that must be met for hydrostatically testing the discharge pipework before backfilling.

(2 marks)

- (b) State the minimum clearance that must be provided between the water supply pipes and the concrete slab.

(1 mark)

- (c) State three actions that should be taken regarding the pipe work before the concrete slab is poured.

1

2

3

(3 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 in this section of the examination no marks will be awarded for that question.

1. At which pipe diameter does fitting a soaker flashing under a flexible boot flashing become required to comply New Zealand Code Clause E2/AS1 External moisture?

- A 41 mm
- B 52 mm
- C 66 mm
- D 86 mm
- E 105 mm

2. Which of the following determines the overhang required each side of a penetration when a soaker flashing is being designed?

- A The expected rainfall in the area.
- B The diameter of the penetration.
- C The expected wind speed in the area.
- D The pitch of the roof.
- E The roof sheet length.

3. When flashing a square penetration through a roof, what is the minimum height required for the upstand on the flashing?

- A 75 mm.
- B 90 mm.
- C 100 mm.
- D 110 mm.
- E 150 mm.

4. What is the minimum allowable distance between 20 mm holes drilled through a 100 mm timber stud?
- A 75 mm.
 - B 100 mm.
 - C 250 mm.
 - D 300 mm.
 - E 500 mm.

5. What is the maximum allowable diameter hole permitted to be drilled down through the bottom plate of a timber frame wall?
- A 20 mm.
 - B 25 mm.
 - C 35 mm.
 - D 45 mm.
 - E 50 mm.

6. Which of the following can be discharged into a copper waste pipe without risk of affecting the system?
- A Undiluted urinal waste.
 - B Photographic equipment.
 - C Cooling towers.
 - D Grease arrestors.
 - E Slop hoppers.

7. Which of the following components would you NOT expect to find in a thermo-siphon solar water heating system?
- A A non-return valve.
 - B An element.
 - C A pump.
 - D A thermostat.
 - E An air eliminator/vent.
-

8. Which of the following statements best describes convection heat transfer?
- A Heat that is transferred molecule to molecule by direct contact.
 - B Heat that is obtained from a non-potable liquid and transferred to potable water.
 - C Heat that transferred with the assistance of a fan.
 - D Heat that can travel through a vacuum.
 - E Heat that is circulated through air or liquid due to differing densities.
-

9. Which of the following statements best describes radiation heat transfer?
- A Heat that is transferred molecule to molecule by direct contact.
 - B Heat that is obtained from a non-potable liquid and transferred to potable water.
 - C Heat that transferred with the assistance of a fan.
 - D Heat that can travel through a vacuum.
 - E Heat that is circulated through air or liquid due to differing densities.
-

10. Which of the following statements best describes conduction heat transfer?
- A Heat that is transferred molecule to molecule by direct contact.
 - B Heat that is obtained from a non-potable liquid and transferred to potable water.
 - C Heat that transferred with the assistance of a fan.
 - D Heat that can travel through a vacuum.
 - E Heat that is circulated through air or liquid due to differing densities.

11. A water service carrying non-potable water is to be installed.
Which colour pipe or marking should be used to enable future identification of the pipe?

- A Purple.
- B Red.
- C Yellow.
- D Orange.
- E Pink.

12. When installed underground what is the minimum separation distance between parallel potable and non-potable water supplies?

- A 200 mm.
- B 300 mm.
- C 500 mm.
- D 600 mm.
- E 1000 mm.

13. What is the minimum height above a lawn sprinkler head at which an atmospheric vacuum breaker must be installed?
- A 150 mm.
 - B 200 mm.
 - C 250 mm.
 - D 300 mm.
 - E 350 mm.
-

14. What is the minimum diameter for the overflow pipe fitted to a safe tray under a water supply tank?
- A 25 mm.
 - B 32 mm.
 - C 40 mm.
 - D 50 mm.
 - E 65 mm.
-

15. An access ladder must be installed to permit entry into a water storage tank exceeding what depth?
- A 1000 mm.
 - B 1200 mm.
 - C 1500 mm.
 - D 1800 mm.
 - E 2000 mm.
-

Total 15 marks

For Examiner's use only

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