No. 9195

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2011

CERTIFYING PLUMBER

ANSWER SCHEDULE

ANSWER 1

(a) Any TWO:

- Back siphonage.
- Back pressure with faulty 2nd check valve. OR split diaphragm OR faulty 1st check vavlve.
- Static (no flow) with faulty 1st check valve. (2 marks)

(b) (i) Copper. (1 mark)

(ii) The carbon dioxide in the machine reacts with the copper, making the water toxic. (1 mark)

Total 4 marks

ANSWER 2

(a) (i) Circumstance:

Any ONE:

- If one or more floors separate the highest and lowest branch discharge pipe connected to the stack.
- Every discharge stack serving fixtures or appliances from 3 floors within a building shall include a relief vent pipe.
- Where any stack is offset less than 45º to the horizontal.

(ii) Circumstance:

Required on a stack of 20 or more levels measured from the highest connected discharge pipe to the connection point of any relief vent.

(2 marks)

(b) Relief vent for section of stack below offset connected at correct levels. (1 mark)
Relief vent for section of stack above offset connected at correct levels. (1 mark)
Branch vent pipes fitted where required and connected at correct places. (3 marks)
Vents sized correctly. (4 marks)
NOTE:
System does operate: 0 marks
System operates but is not fully vented modified: maximum 2 marks

Total 11 marks

ANSWER 3

(a)

A	150 mm
B	150 mm
C	100 mm
D	80 mm

(4 marks)

(b) 300 mm. (1 mark)

Total 5 marks

ANSWER 4

(a) Any FOUR (½:mark each):

- The stack loading shall not exceed 30 fixture units.
- No more than one of each of the following types of fixtures at each level, basin, bath, DW, kitchen sink, shower, WC pan.
- If fully vented the stack can carry discharge from 2 WC pans or slop hoppers for each discharge branch connected.
- Laundry troughs cannot discharge into the stack.
- Clothes washing machine cannot discharge into the stack.
- Each fixture must enter the stack with an individual discharge pipe.
- The stack must be straight between the discharge pipe of the highest fixture connected and the drain.
- The stack must be connected to a 100 mm drain.
- Can only be offset above the highest discharge branch connection and any offset must be 45° or greater.

(2 marks)

(b) The offset section must be sized as a graded pipe. (1 mark)

Total 3 marks

ANSWER 5

(a) 1 Supply the ring main with un-tempered water from the cylinder and temper the water for each fixture.

2 Supply the ring main with tempered water and install a UV steriliser on the return pipe to the cylinder.

(2 marks)

(b) Ensure that some facilities within the building are permanently fed from the tank so that the water is constantly changed.

(1 mark)

Total 3 marks

ANSWER 6

(a) Any THREE:

- Spouting and roof free from rust.
- Spouting and roof free from flaking paint.
- No trees over hanging roof and spouting.
- Move TV aerial if located on roof to help prevent birds perching.
- Location of chimneys/flues that may discharge soot.
- Lead flashings or lead based paint on the roof.
- Bitumen based roofing materials.
- Friable asbestos roofing products.
- Any exposed treated timber that may leech into the rainwater.
- Any possible pollution. (3 marks)

(b) Leaf guard of leaf diverter used to prevent leaves etc entering downpipes.
First flush diverter included to discharge the first amount of water during rainfall to waste.

(2 marks)

Total 5 marks

ANSWER 7

Index length of installation	Pressure drop
90 metres (1 mark)	23 metres (2 marks)

Pipe Section	Probable simultaneous demand (L/s)	Nominal pipe size (DN)
A-B	1.17	32 mm
B-C	0.70	32 mm
C-D	0.48	25 mm
B-E	0.88	32 mm
E-F	0.70	32 mm
F-G	0.48	25 mm

(1 mark each)

Total 15 marks

ANSWER 8

(a) Finding correct section of AS3500 (1 mark)

Section	Diameter
A	65
B	65
C	50
D	50
E	40

(5 marks)

(b) Finding correct values in AS3500 part 1 Water services. (1 mark)

21 × WC @ 45 litres each = 945 (1 mark)

9 × Urinals @ 30 litres each = 270 (1 mark)

270 + 945 = 1215 litres (1 mark)

Total 10 marks

ANSWER 9

Diameter of pipe A	25 mm (½ mark)
Diameter of pipe B	20 mm (½ mark)
Diameter of pipe C	20 mm (½ mark)
Diameter of pipe D	15 mm (½ mark)
Maximum length of pipe A	2 metres (½ mark)
Minimum length of pipe A	1 metre (1 mark)
Diameter of Tempering Valve E	25 mm (½ mark)

Total 4 marks

ANSWER 10

(a) Drawing to include:

- Flow and return pipes (at gradient and to correct connections).
- Storage unit with heat exchanger (heat exchanger ½ mark; above the panel ½ mark).
- Solar panel.

NOTE: Not thermosyphone system: 0 marks
Not indirect system: 0 marks
System does not work: 0 marks
Unsafe system: 0 marks (3 marks)

(b) Non-potable heat transfer fluids can be incorporated into the system to prevent freezing and corrosion.

(1 mark)

Total 4 marks

ANSWER 11

Name: Thermosiphon
Requirements:
Any TWO:

- Base of solar store must be above the top of the collector – to prevent back siphoning.
- Circulator pipes must be sized correctly.
- Circulator pipes must be on correct gradient.
- Vented with expansion (top up) tank.
- Pipes must be insulated.

Name: Pump
Requirements:
Any TWO:

- Have a non-return valve fitted – to prevent back siphoning.
- Have a suitable collector for forced circulation systems.
- Have the correct pump type fitted (to return line).
- Have control devices (temperature sensors)fitted to turn pump on and off as required.

Total 6 marks

ANSWER 12

Any TWO:

- Cause: Pressure reducing valve washer is worn letting the pressure within the system increase over the rating of the relief valve.
  Check: Isolate the water supply and see if valve stops dripping.

- Cause: Thermal expansion of water within the cylinder increasing pressure over the rating of the relief valve.
  Check: Turn power off to element to stop water heating and expanding. Check to see if valve stops dripping.

- Cause: Cross connection between high pressure cold water and low pressure hot water.
  Check: If any mixing valves are installed on the system that could allow high pressure cold water into the hot water system.

- #4 Cause: Pressure relief valve faulty.
- #4 Check: Can only be checked by replacing washers etc within valve or replacing valve, therefore does not answer question correctly.

(1 mark each cause, 2 marks each check except #4)

Total 6 marks

ANSWER 13

(a) 120 mm (2 marks)

(b) 1:40 (2 marks)

Total 4 marks

SECTION B

1. D 2 × the inlet diameter or 25 mm whichever is greater.
2. A Both check valves shut and relief valve shut.
3. D At a location that protects the water supply in one area of a building from another area within the building.
4. B Pressure vacuum breaker.
5. E The bypass must provide the same protection as the main.
6. B 150 mm.
7. E 12 hours.
8. A It must be ventilated to the atmosphere at all times.
9. B Reduced pressure zone device.
10. C 45°C.
11. A To allow air to escape a water pipe system when filling it with water.
12. D When the riser main is installed in an area susceptible to freezing.
13. C 40 mm.
14. D 1500 kPa.
15. B To prevent trap seal loss.
16. C 3.500 metres.
17. D The sum of the unit ratings of the fixtures discharging into the floor waste gully.
18. A When the discharge from connected fixtures is expected to be foamy.

    OR

    B When the stack services a building with more than 5 storeys.
19. C 27.
20 D 125.

Total 20 marks