No. 9197

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2007

DRAINLAYING

ANSWER SCHEDULE

ANSWER 1

(a) Any FIVE:

(i) Be laid to an even grade.

(ii) Be straight.

(ii) Have a minimum number of changes of direction.

(iv) Be sized in accordance with the fixture loading table.

(v) Be continuously supported under the barrel other than cast iron and ductile Iron pipes and fittings.

(vi) Be protected against damage.

(vii) Be watertight.

(viii) Have the interior of each pipe cleared of any foreign matter before it is laid and prior to commissioning.

(5 marks)

(b) To entrap silt, sand, or any material that will not float in a catchment pit and to prevent it from entering the storm water drain.

(2 marks)

(c) Any THREE:

Poisons.

Infectious waste.

Flammable substances.

High temperature (waste above 50 degrees).

(1 mark each), (3 marks)

Total 10 marks

ANSWER 2

(a) To prevent sewer gases entering private drains

(1 mark)

(b) Hot water cools down allowing fats to solidify.

Fats and grease float to top.

Liquid free of fats and grease pass through to drain.

(1 mark each) (3 marks)

(c) (i) Three metres.

(ii) Five minutes.

(iii) If no make up water is required.

(1 mark each), (3 marks)

(d) (i) DN 50mm

(ii) DN 40 mm

(iii) DN 65mm

(1 mark each), (3 marks)

Total 10 marks

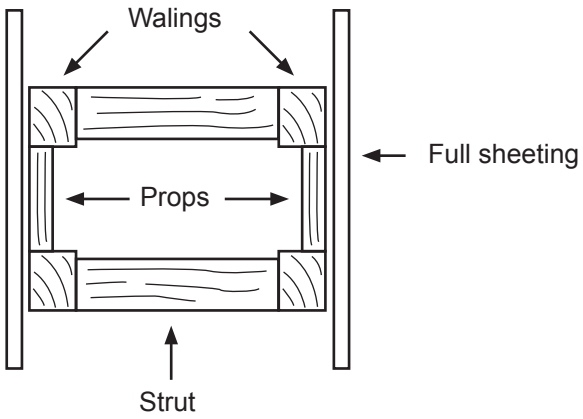
ANSWER 3

(a)

Strut	A timber or steel member usually horizontal in compression, resisting thrust or pressure from face or faces of an excavation.
Waling	A horizontal beam supporting vertical runners or sheeting.
Sheeting	Vertical timber boards placed against the face of an excavation to give it support and held in place by struts and walings as required.
Prop	A vertical timber member used to support a higher waling or strut from the one below.

(4 marks)

(b)



(2 marks)

Total 6 marks

ANSWER 4

Any THREE:

Test air in the manhole for toxic or other harmful gases. (2 marks)

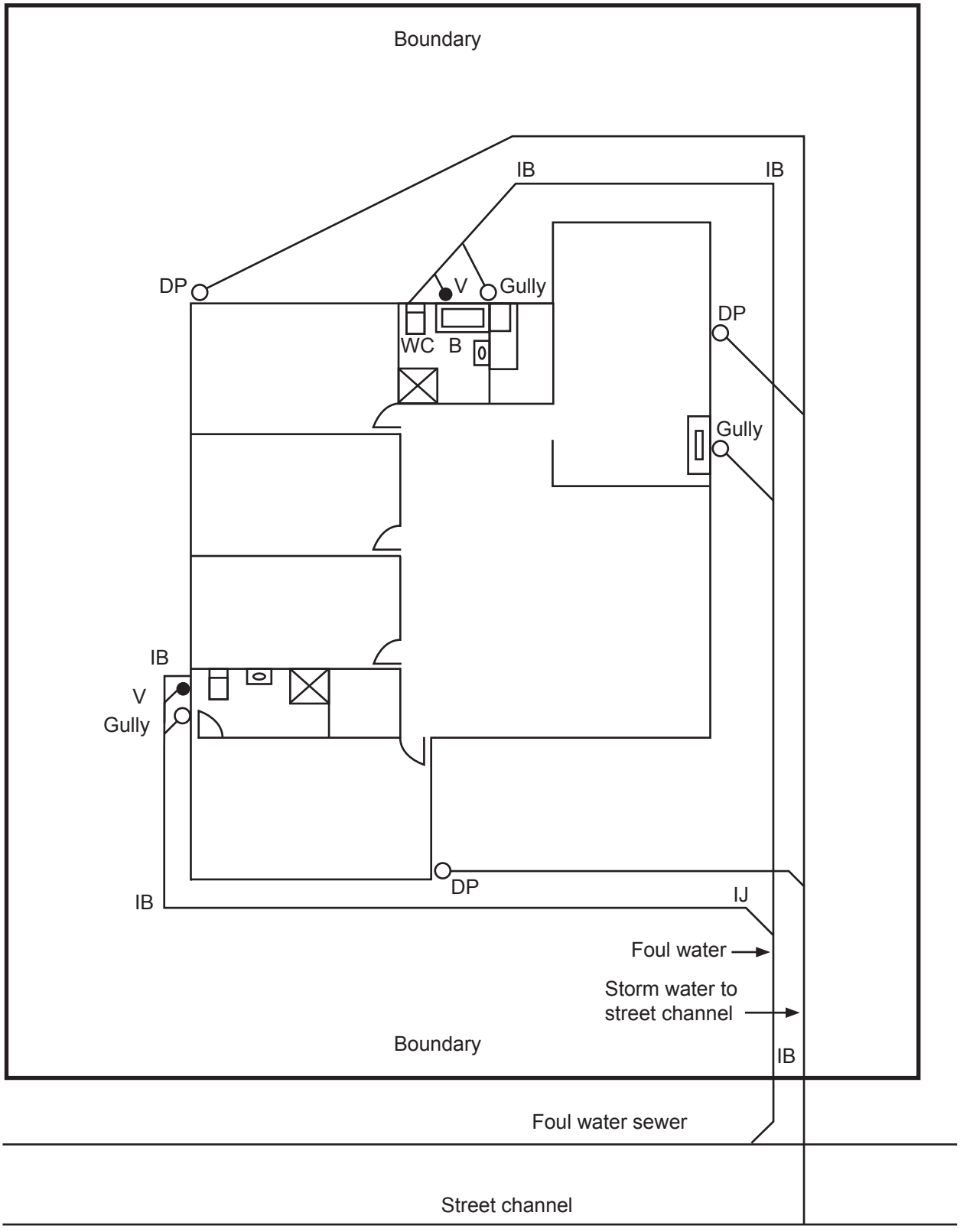
Arrange a buddy to supervise the descent from above (½ mark)

Wear protective clothing (½ mark)

Wear a harness with a retrieval rope. (½ mark)

Total 3 marks

ANSWER 5



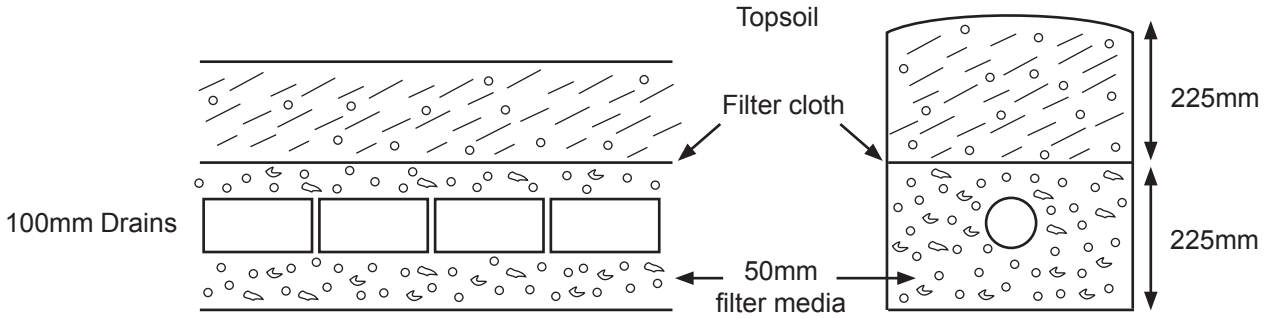
(Foul water drainage: 1 mark for inspection at boundary, 1 mark for inspection junction where branch line joins, 2 marks for inspections – ½ mark each)
(1 mark for gully on en-suite, 1 mark for vent on en-suite, 1 mark for gully, 1 mark for vent

(Storm water: 1 mark for combining 3 down pipes, 1 mark for discharging to street channel)

Total 10 Marks

ANSWER 6

(a)



Absorption Trench Detail

(1 mark for tiles with gap, 1 mark for filter media around tiles, 1 mark for filter cloth, 1 mark for measurements)
(4 marks)

(b) Any FIVE:

(i) At the top of a jump-up at point of connection.

(ii) At the connection of an inspection shaft to a graded drain.

(iii) At the connection of a drain to a boundary trap riser.

(iv) Where a vent is connected to a boundary trap riser.

(v) As the inlet riser of a gully.

(vi) As an inspection opening.

(vii) As the inlet riser of a floor waste gully.

(viii) At the top of a jump-up in a drain in lieu of a bend and inspection opening.

(ix) Inlet to septic tank.

(Any FIVE, 1 mark each), (5 marks)

(c)

The maximum length of an unvented branch drain	10m
The minimum grade as a percentage for a DN 100mm drain	1.65%
The minimum grade as a percentage for a DN 80mm drain	1.65%
The minimum separation between any underground drain and a communication cable	100mm
The minimum cover for a uPVC drain subject to light vehicular traffic	450mm

(1 mark for each), (5 marks)

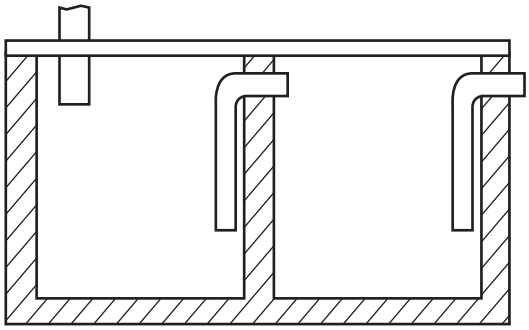
Total 14 marks

ANSWER 7

(a) (i) It must be large enough to hold the hot water discharge until cooled below 50ºC before it is displaced by incoming water.

(1 mark for holding water until cooled below 50ºC,
1 mark for holding before displaced by incoming water), (2 marks)

(ii)



Cooling Pit (Cooling Tank in ground)

(Cooling tank: 1 mark for two or more chambers,
1 mark for outlets between chambers), (2 marks)

Total 4 marks

(b) Eliminating possible explosive mixture.

Prevents petrol vaporising and creating a dangerous build up of petrol vapour in the drain.

(1 mark for explosive mixture,
1 mark for petrol vapour build up), (2 marks)

(c) When gravity for the drainage can not be used to an approved outfall.

(1 mark for gravity), (1 mark)

(d) Between pump and isolating valve.

(1 mark)

Total 8 Marks

ANSWER 8

(a) (i) Length in mm x by grade divide by 100 = fall in mm

26m = 26000mm x 1.65% = 42900

42900 ÷ 100 = 429mm or (26 ÷ 60 = 0.433m)

Ans 0.429m (½ mark)

(ii) 31m = 31000mm x 2.5% = 77500

77500 ÷ 100 = 775mm or (31 ÷ 40 = 0.775m)

Ans = 0.775m

(iii) Total fall = 0.429m + 0.775m

1.204m accept 1.200 or (0.433 + 0.775 = 1.208m)

(1 marks for each, ½ mark if grade used), (3 marks)

(b) Formulae Length x width x times depth

Length 185m, width 350mm, average depth [depth 620mm to 1.800m]

$185m \times 0.350m \times \frac{(0.620m \text{ plus } 1.800m)}{2}$ $\frac{2.420}{2} = 1.210m$

(i) 185m x 0.350m x 1.210m = 78.347 cubic metres (1 mark)

(ii) $78.3473m^3 \div 4$ = Number of truck loads

= 19.586 (20 loads)

20 loads at \$185 load = \$3700

Ans = \$3700 (½ mark truck loads, ½ mark cost), (1 mark)

(iii) Scoria = 185m long by 350mm width by 350mm depth

185m x 0.35 m x 0.35 m = $22.662m^3$

Scoria $22.662m^3$ ($23m^3$ acceptable) (1 mark)

(iv) 22.662 x $21 = $475.912

Ans = $475.912 (1 mark)

(v) Total cost = excavation plus base material.

$3700 + $475.912 = $4175. 912

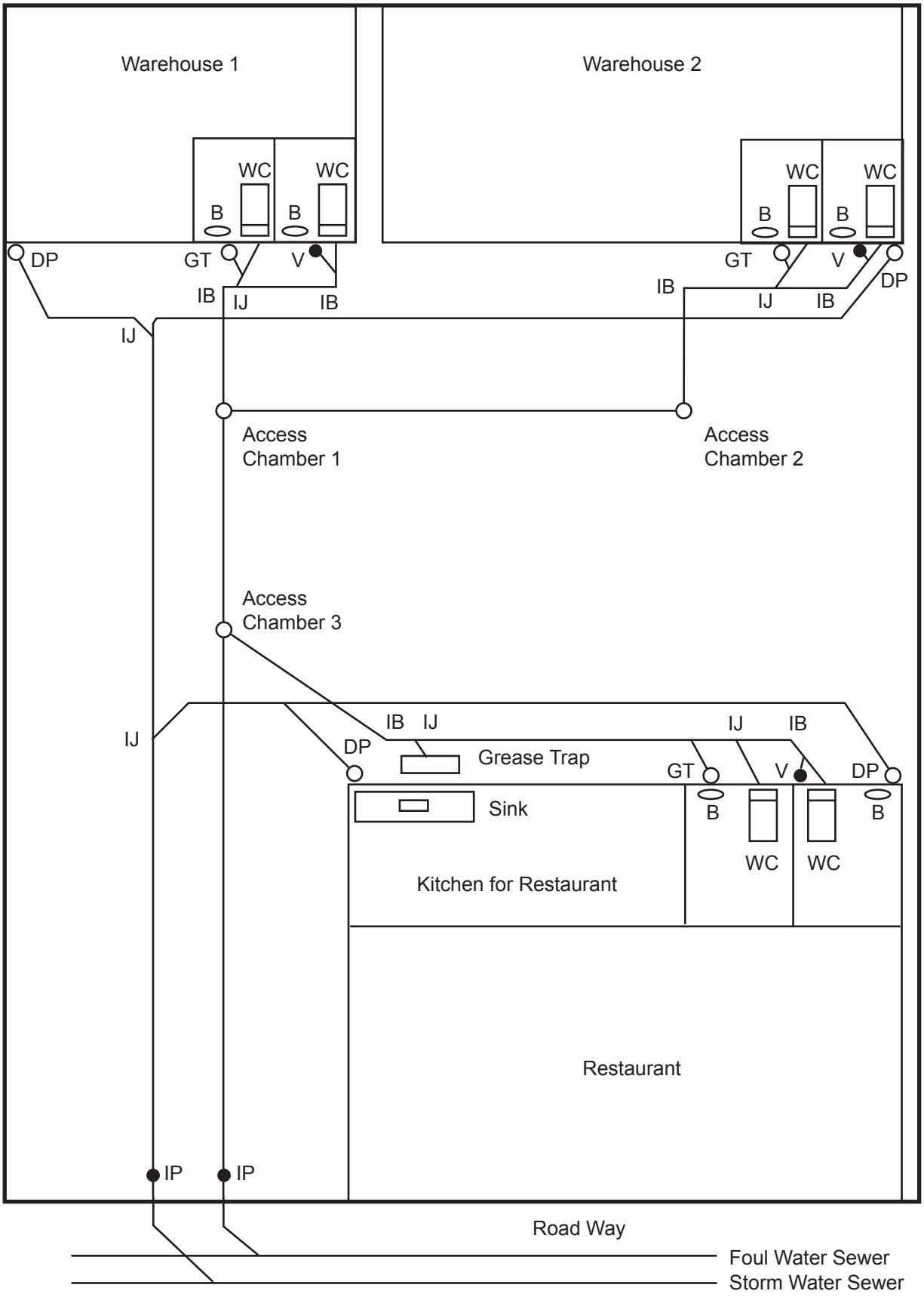
Ans = $4175.912

Accept $4176 (1 mark)

(Total 5 marks)

Total 8 marks

ANSWER 9


Warehouse 1
Warehouse 2
WC
WC
B
B
WC
WC
B
B
DP
GT
V
IB
IJ
IB
GT
V
IB
IJ
IB
DP
IJ
Access
Chamber 1
Access
Chamber 2
Access
Chamber 3
IJ
IB
IJ
DP
Grease Trap
IJ
IB
GT
V
DP
Sink
B
B
WC
WC
Kitchen for Restaurant
Restaurant
IP
IP
Road Way
Foul Water Sewer
Storm Water Sewer

Foul water:	Warehouse 1	(½ mark for vent, ½ mark for gully, ½ mark for inspections – Total 1 mark)
	Warehouse 2	(½ mark for vent, ½ mark for gully, ½ mark for inspections – Total 1 mark)
	Restaurant.	(½ mark for vent, ½ mark for gully, ½ mark for inspections – Total 2 marks) (2 marks for grease trap) (1 mark for drains to correct chambers) (1 mark for inspection at boundary)
	Stormwater.	(1 mark for inspection at boundary) (1 mark for all joined in direction of flow)

Total 13 marks

ANSWER 10

(a) (i) Minimum 600mm

(ii) Contact the relevant regulatory authority to get a ruling.
(1 mark each), (2 marks)

(b) (i) 100mm minimum separation 1 mark

(ii) Not less than 45º. 1 mark

(iii) 1 To protect the drain from physical damage (1 mark)

2 Space to permit repairs. (1 mark)

(iv) Position: Along the centre line of service (1 mark)

Location & distance: For one metre either side of centre line of the service. (1 mark)

(Total 6 marks)

Total 8 marks

ANSWER 11

(a) Provide and maintain a safe working environment.

Provide and maintain facilities for the safety and health of employees at work.

Ensure that machinery and equipment is safe for employees.

Ensure that working arrangements are not hazardous to employees.

Provide procedures to deal with emergencies that may arise while employees are at work.

(Any 4, 1 mark each), (4 marks)

(b) Holder of a current limited certificate to work at drainlaying under the supervision of a licensed drainlayer.

(1 mark)

(c) (i) Directly supervise the trainee for a period of not less than 2 years

(½ mark for supervise the trainee and ½ mark for 2 years), (1 mark)

(ii) Completed application form.

(1 mark)

(1 mark for (i), 1 mark for (ii)), (Total 2 marks)

(d) The trainee must notify the Plumbers, Gasfitters and Drainlayers Board should he or she change physical address.

Must have the limited certificate on their person when working at drainlaying.

Must hold a current limited certificate.

(1 mark each), (3 marks)

Total 10 marks