SULIT

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2015

DCB2072 : PLUMBING SERVICES

TARIKH : 07 APRIL 2016
MASA : 2.30 PM -4.30 PM (2 JAM)

Kertas ini mengandungi **TIGA BELAS (13)** halaman bercetak.
Bahagian A: Esei (2 soalan)
Bahagian B: Esei (4 soalan)
Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A: 50 MARKS
BAHAGIAN A: 50 MARKAH

INSTRUCTION:
This section consists of **TWO (2)** essay questions. Answer **ALL** questions.

ARAHAN:
*Bahagian ini mengandungi **DUA (2)** soalan esei. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO1
C1

(a) State the process of aeration in water treatment.
Nyatakan proses pengudaraan dalam rawatan air.

[5 marks]
[*5 markah*]

CLO1
C2

(b) With the help of diagram, describe the piping system from water meter to the storage tank.
Dengan bantuan gambarajah, huraikan sistem perpaipan dari meter air ke tangki simpanan.

[8 marks]
[*8 markah*]

CLO2
C3

(c) A galvanized steel cold water distributing pipe has an equivalent length of 20 m, with four elbows in the run and under a constant head of water of 5 m. Assuming the galvanized steel pipe diameter is 40 mm with frictional resistant for elbows is 1.2. Calculate the loss of head per meter run of the pipe.

Satu paip agihan air sejuk jenis besi bergalvani mempunyai panjang sebenar 20 m, dengan 4 sesiku larian bawah dengan kepala air stabil ialah 5 m. Dengan menganggarkan diameter paip besi bergalvani ialah 40 mm dan rintangan geseran sesiku adalah 1.2. Kirakan kehilangan turus pada paip larian per meter.

[12 marks]
[*12 markah*]

QUESTION 2
SOALAN 2

CLO1 C1

(a) Give **FIVE (5)** common code of practices used during the installation of sanitary appliances.
*Berikan **LIMA (5)** amalan kod yang selalu digunakan untuk pemasangan perkakas sanitari.*

[5 marks]
[*5 markah*]

CLO1 C2

(b) Explain the induced siphonage and capillary attraction that causes loss of water seal in trap.
Terangkan pensifonan teraruh dan tindakan kapilari yang boleh menyebabkan kehilangan kedap air dalam perangkap.

[8 marks]
[*8 markah*]

CLO2 C3

(c) Calculate the diameter of discharge and ventilating stack required to carry the discharge from 18 unit of flats. Each flat has 2 water closets, 2 wash basins, 1 bath tub, 1 sink and 1 washing machine.
Kirakan diameter paip pelupusan dan paip pengudaraan yang diperlukan untuk menjalankan pelupusan dari 18 unit rumah pangsa. Setiap rumah pangsa mempunyai 2 tandas, 2 sinki, 1 tab mandi, 1 sinki dan 1 mesin basuh.

[12 marks]
[*12 markah*]

SECTION B: 50 MARKS
BAHAGIAN B: 50 MARKAH

INSTRUCTION:
This section consists of **FOUR (4)** essay questions. Answer **TWO** questions only.

ARAHAN:
*Bahagian ini mengandungi **EMPAT (4)** soalan esei. Jawab **DUA** soalan sahaja.*

QUESTION 1
SOALAN 1

CLO1 C1

(a) Give **TWO (2)** types of underground water resources that could be used for the water supply.
*Berikan **DUA (2)** jenis sumber air bawah tanah yang boleh digunakan untuk tujuan bekalan air.*

[5 marks]
[*5 markah*]

CLO1 C2

(b) Explain the processes of water treatment below:
Terangkan proses-proses rawatan air mentah di bawah:

i) Filtering
Penyaringan

ii) Aeration
Pengudaraan

iii) Flocculation
Penggentalan

iv) Sedimentation
Penyerapan

[8 marks]
[*8 markah*]

CLO2 C3

(c) Sketch and label the hydrological cycle (Rain Cycle).
Lakar dan labelkan kitaran hidrologi (Kitaran Hujan)

[12 marks]
[*12 markah*]

QUESTION 2
SOALAN 2

CLO1 C1

(a) List **FIVE (5)** precautions needed when installing electric water heaters in order to minimize the heat losses.
*Senaraikan **LIMA (5)** langkah-langkah keselamatan yang perlu diambil semasa memasang pemanas air elektrik untuk meminimumkan kehilangan haba.*

[5 marks]
[*5 markah*]

CLO1 C2

(b) Sketch the indirect system of hot water supply.
Lakarkan sistem secara tidak langsung bagi sistem bekalan air panas.

[8 marks]
[*8 markah*]

CLO2 C3

(c) Based on the following data, calculate the size of the hot water storage tank and boiler power.
Kirakan saiz tangki air panas dan kuasa dandang berdasarkan data berikut:

i. 10 units Bath tab – 60 litre (use 2 times a day)
10 unit Tab mandi – 60 liter(digunapakai 2 kali sehari)

ii. 20 units Wash hand basin - 3 litres (use 4 times a day)
20 unit Basin basuh tangan – 3 liter (digunapakai 4 kali sehari)

iii. 20 units Sink - 12 litre (use 3 times a day)
20 unit Sinki – 12 liter(digunapakai 3 kali sehari)

iv. Temperature rise - 50°c
Kenaikan suhu - 50°c

v. Boiler efficiency - 70 watt
Kecekapan dandang – 70 watt

vi. Specific heat capacity of water – 4.2kj/kg
Muatan haba tentu air - 4.2kj/kg

vii. Time in seconds - 2 hours
Masa dalam saat – 2 jam

[12 marks]
[*12 markah*]

QUESTION 3
SOALAN 3

CLO1 C1

(a) Give **Five (5)** criteria in locating manhole.
*Berikan **LIMA (5)** kriteria kedudukan lurang.*

[5 marks]
[*5 markah*]

CLO1 C2

(b) Explain the following drainage system test.
Terangkan ujian sistem perparitan berikut.

i. Smoke test
Ujian Asap

ii. Mirror test.
Ujian Cermin

[8 marks]
[*8 markah*]

CLO2 C3

(c) Explain the comparison between combine and separate drainage system.
Terangkan perbezaan di antara sistem perparitan gabung dan pisah.

[12 marks]
[*12 markah*]

QUESTION 4

SOALAN 4

CLO1 C1 (a) State **FIVE (5)** ergonomic considerations in designing sanitary appliances.

*Nyatakan **LIMA (5)** pertimbangan ergonomik di dalam mereka-bentuk peralatan kebersihan.*

[5 marks]

[*5 markah*]

CLO1 C3 (b) Explain **FOUR (4)** general requirements for sanitary pipework in buildings.

*Terangkan **EMPAT (4)** keperluan umum untuk paip kebersihan dalam bangunan.*

[8 marks]

[*8 markah*]

CLO1 C3 *(c)* Sketch and label a diagram for the following:

Lakarkan dan labelkan gambarajah berikut:

i. Septic Tank

Tangki Septik

i. Sewage Treatment Process

Proses Rawatan Kumbahan

[6 marks]

[*6 markah*]

CLO2 C3 (d) Calculate the internal dimensions of the septic tank for an apartment to serve a population of 100 persons based on the following data:

Kirakan dimensi dalam tangki septik sebuah pangsapuri yang mempunyai populasi penduduk seramai 100 orang berdasarkan data berikut:

i. Depth of septic tank 1.5m

Kedalaman tangki septik adalah 1.5m

ii. Depth of filter 1.8m

Kedalaman penapis adalah 1.8m

[6 marks]

[*6 markah*]

SOALAN TAMAT

Lampiran

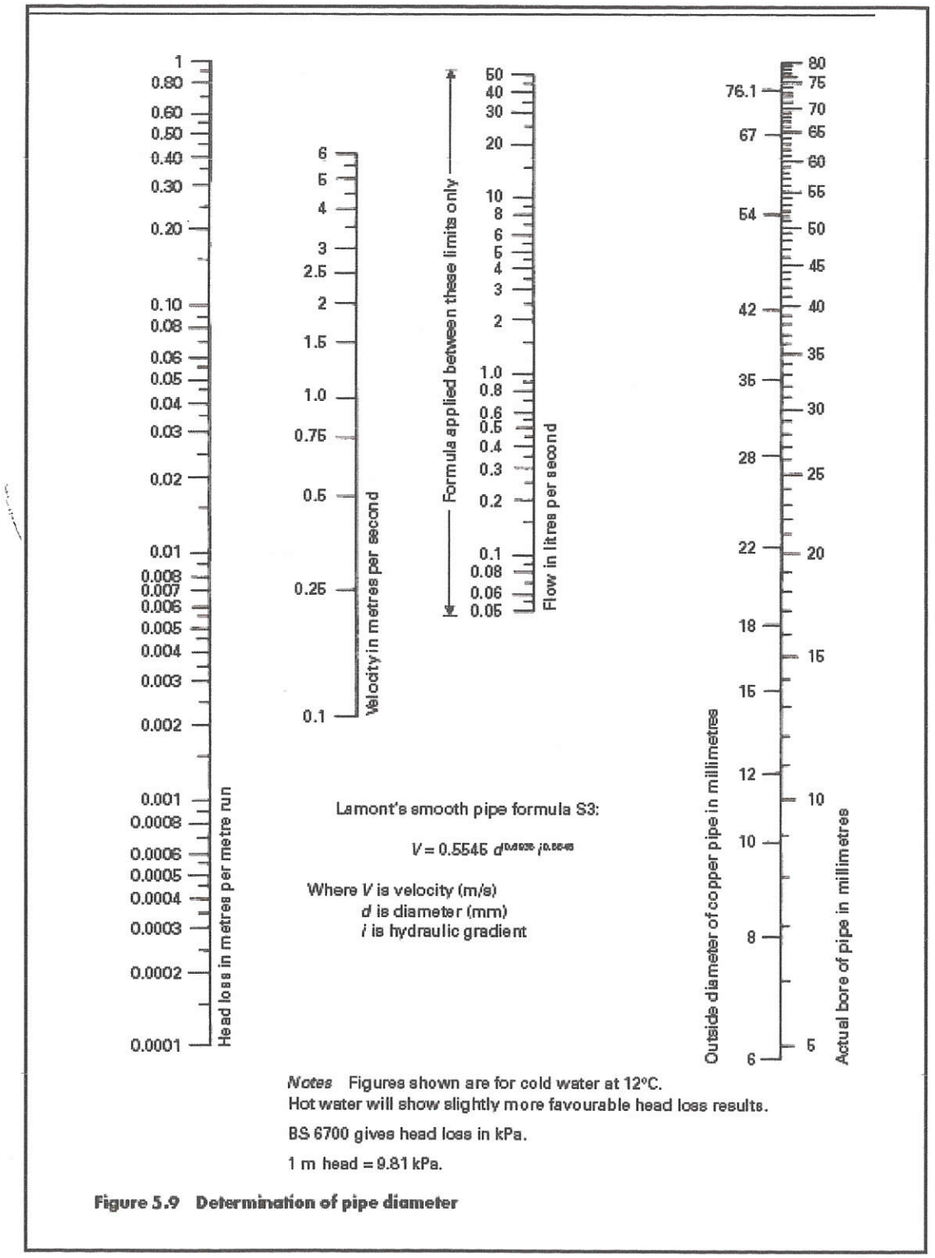
Table 5.1 Design flow rates and loading units

Outlet fitting	Design flow rate l/s	Minimum flow rate l/s	Loading units
WC flushing cistern single or dual flush – to fill in 2 minutes	0.13	0.05	2
WC trough cistern	0.15 per WC	0.10	2
Wash basin tap size $\frac{1}{2}$ – DN 15	0.15 per tap	0.10	1.5 to 3
Spray tap or spray mixer	0.05 per tap	0.03	–
Bidet	0.20 per tap	0.10	1
Bath tap, nominal size $\frac{3}{4}$ – DN 20	0.30	0.20	10
Bath tap, nominal size 1 – DN 25	0.60	0.40	22
Shower head (will vary with type of head)	0.20 hot or cold	0.10	3
Sink tap, nominal size $\frac{1}{2}$ – DN 15	0.20	0.10	3
Sink tap, nominal size $\frac{3}{4}$ – DN 20	0.30	0.20	5
Sink tap, nominal size 1 – DN 20	0.60	0.40	–
Washing machine size – DN 15	0.20 hot or cold	0.15	
Dishwasher size – DN 15	0.15	0.10	3
Urinal flushing cistern	0.004 per position served	0.002	–
Pressure flushing valve for WC or urinal	1.5	1.2	–

Table 5.2 Equivalent pipe lengths (copper, stainless steel and plastics)

Bore of pipe mm	Equivalent pipe length			
	Elbow m	Tee m	Stopvalve m	Check valve m
12	0.5	0.6	4.0	2.5
20	0.8	1.0	7.0	4.3
25	1.0	1.5	10.0	5.6
32	1.4	2.0	13.0	6.0
40	1.7	2.5	16.0	7.9
50	2.3	3.5	22.0	11.5
65	3.0	4.5	–	–
73	3.4	5.8	34.0	–

Lampiran



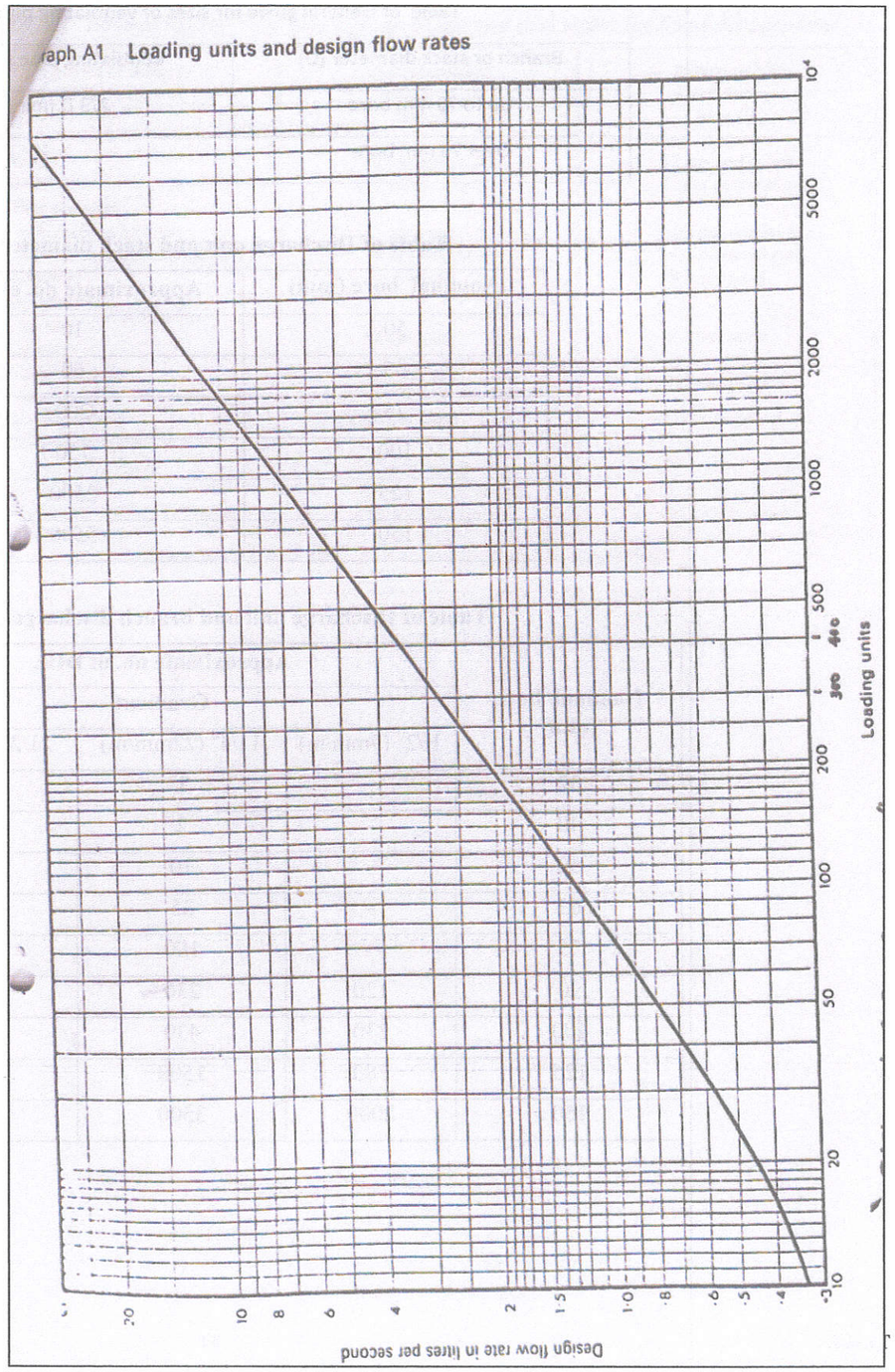
Notes Figures shown are for cold water at 12°C.
Hot water will show slightly more favourable head loss results.

BS 6700 gives head loss in kPa.

1 m head = 9.81 kPa.

Figure 5.9 Determination of pipe diameter

Lampiran



Lampiran

Table of General guide for sizes of ventilating pipes

Branch or stack diameter (D)	Ventilating pipe min. diameter
Up to 75 mm bore	2/3 D (min. 25mm)
Over 75 mm bore	½ D

Table of Discharge unit and stack diameter

Nominal bore (mm)	Approximate no. of DUs.
50	10
65	60
75	200
100	750
125	2500
150	5500

Table of Discharge unit and branch discharge pipe

Nominal bore (mm)	Approximate no. of DUs.		
	Gradient		
	$1//2^0$ (9mm/m)	$11/4^0$ (22mm/m)	$21/2^0$ (45mm/m)
32	-	1	1
40	-	2	8
50	-	10	26
65	-	35	95
75	-	100	230
90	120	230	460
100	230	430	1050
125	780	1500	3000
150	2000	3500	7500

Lampiran

Table 5.5 Recommended minimum storage of hot and cold water for domestic purposes

Type of building	Minimum cold water storage litres (l)	Minimum hot water storage litres (l)
Hostel	90 per bed space	32 per bed space
Hotel	200 per bec space	45 per bed space
Office premises:		
with canteen fccilities	45 per employee	4.5 per employee
without canteen facilities	40 per employee	4.0 per employee
Restaurant	7 per meal	3.5 per meal
Day school:		
nursery, primary	15 per pupil	4.5 per pupil
secondary, technical	20 per pupil	5.0 per pupil
Boarding school	90 per pupil	23 per pupil
Children's home or residential nursery	135 per bec space	25 per bed space
Nurses' home	120 per bec space	45 per bed space
Nursing or convalescent home	135 per bec space	45 per bed space

Note Minimum cold water storage shown includes that used to supply hot water outlets.

LAMPIRAN

Table of Discharge unit values (DU)

Appliance	Application	Discharge unit value
WC	Domestic	7
	Commercial	14
	Congested/public	28
Basin	Domestic	1
	Commercial	3
	Congested/public	6
Bath	Domestic	7
	Commercial	8
Sink	Domestic	6
	Commercial	14
	Congested/public	27
Shower	Domestic	1
	Commercial	2
Urinal	-	0.3
Washing machine	-	4
1 group of WC,bath and basin	-	14