SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2018

DCC3113 : HIGHWAY AND TRAFFIC ENGINEERING

TARIKH : 14 APRIL 2019
MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak.

Bahagian A: Struktur (2 soalan)
Bahagian B: Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A: 50 MARKS

BAHAGIAN A : 50 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** structured questions. Answer **ALL** questions.

ARAHAN :

*Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Sila jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO2
C3

(a) As an Assistant Engineer, you are requested to perform tests on aggregates to be used for a road construction. List and discuss **THREE (3)** tests which can be carried out on the aggregates.

*Sebagai seorang pembantu jurutera, anda di kehendaki untuk menjalankan ujian ke atas batu baur yang akan di gunakan dalam pembinaan jalan raya. Senarai dan bincangkan **TIGA (3)** daripada ujikaji yang akan dijalankan ke atas batu baur*

[10 marks]

[*10 markah*]

CLO2
C5

(b) Design the thickness of flexible pavement according to the PWD manual for this R05 class road, based on the following data :

Rekabentuk ketebalan turapan anjal bagi jalan raya kelas R 05 berikut dengan menggunakan kaedah JKR, berdasarkan data berikut :

i. Width of road = 7.5 m, Width of road shoulder = 2.0 m
Lebar jalan raya = 7.5 m, Lebar bahu jalan = 2.0 m

ii. Initial Average daily traffic (1way) = 5750
Purata lalulintas harian (1 hala) = 5750

iii. Percentage of commercial vehicle = 17 %
Peratus kenderaan perdagangan = 17 %

iv. Annual growth rate = 9 % , Subgrade CBR = 5 %
Kadar pertumbuhan tahunan = 9 % , CBR subgred = 5 %

v. Type of terrain = Flat
Bentuk rupa bumi = Mendatar.

vi. Surface pavement material = Asphaltic concrete
Bahan lapisan Lapisan permukaan = Konkrit asphalt

vii. Road base material = Wet-mix Macadam
Bahan Tapak Jalan = Macadam campuran basah.

Any other assumptions made should be mentioned in your answer
Andaian lain yang dibuat perlu dinyatakan dalam jawapan anda.

[15 marks]
[*15 markah*]

QUESTION 2
SOALAN 2

CLO2
C3

(a) i Interpret the following terms in traffic light circulation phase design as follow:
effective green time, red time, cycle length and lost time.
Tafsirkan terma-terma fasa rekabentuk peredaran lampu isyarat seperti : masa hijau berkesan.,masa merah, masa pusingan dan masa hilang.

[10 marks]
[*10 markah*]

CLO2
C3

ii. A two phase signal is to be installed at four arms intersection. The actual flow rate ,Q and saturation flow, S are shown in **Table 3.**
Given Interval = 4s , Lost time =2s , and Amber = 3s .
Calculate :
*Lampu isyarat dua fasa akan dipasang di satu simpang empat. Kadar aliran sebenar ,Q dan aliran tepu,S diberikan seperti dalam **Jadual 3.***
Diberi masa antara hijau =4s, masa hilang =2s, masa kuning = 3s.
Kirakan:

i. Maximum saturation flow. Ymax / *Aliran tepu maksima , Y max*

ii. Optimum cycle time, Co / *Masa pusingan optima, Co*

iii. Length of cycle time, L / *Jumlah masa kitaran, L*

Table 3 / Jadual 3

Arm/*Lengan*	North *Utara*	South *Selatan*	East *Timur*	West *Barat*
Flow/Aliran(pcu/h)	450	300	800	850
Saturated Flow/*Aliran Tepu(pcu/h)*	2400	2200	2500	3000

[10 marks]

[*10 markah*]

CLO2 C5

(b) There are **TWO (2)** types of junction. Compare between at-grade junction and interchange.

*Terdapat **DUA (2)** jenis persimpangan .Bandingkan antara persimpangan searas dan persimpangan berlainan aras.*

[5 marks]

[*5 markah*]

SECTION B: 50 MARKS

BAHAGIAN B: 50 MARKAH

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **TWO (2)** questions only.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **DUA (2)** soalan sahaja. .*

QUESTION 1

SOALAN 1

CLO1
C2

(a) There are five categories of road in Malaysia. Describe **TWO (2)** primary characteristics for each road category.

*Terdapat lima kategori jalan di Malaysia. Terangkan **DUA(2)** ciri utama bagi setiap kategori jalan tersebut .*

[10 marks]

[*10 markah*]

CLO1
C3

(b) Among the six accident factors, driver condition is the most important factor because when he/she is driving in a good physical, mental and emotional condition, he/she can avoid accidents by adjusting his/her in self during emergencies and also able to avoid the negligence of other drivers. Choose **FIVE (5)** important precaution measures pertaining to driver's condition.

*Di antara enam faktor kemalangan, keadaan pemandulah yang paling penting kerana memandu dalam keadaan fizikal, fikiran dan emosi yang baik boleh mengelakkan kemalangan dengan menyesuaikan diri dengan keadaan kecemasan dan juga mengelakkan diri daripada kelalaian pemandu-pemandu yang lain. Pilih **LIMA (5)** perkara penting yang harus diambil perhatian tentang keadaan pemandu.*

[15 marks]

[*15 markah*]

QUESTION 2

SOALAN 2

CLO1
C2

(a) You are involved in construction of a road section between Pekan Keramat and Ulu Kelang towns. In of construction of a flexible pavement, there are many layers in the road structure. Explain the construction processes of the following layers of flexible pavement

Anda terlibat dalam pembinaan jalan yang menghubungkan Pekan Keramat dan Ulu Kelang. Dalam amalan pembinaan jalan raya boleh lentur, terdapat beberapa lapisan yang bertindak sebagai lapisan struktur jalan. Terangkan proses pembinaan bagi lapisan turapan boleh lentur berikut:

i) Sub gred / *Sub gred*
ii) Sub base / *Sub tapak*
iii) Road base / *Tapak jalan*
iv) Road surface / *Permukaan Jalan*

[10 marks]
[*10 markah*]

CLO 1
C3

(b) The Public Works Department considers several factors in the process of determining the thickness of flexible pavement. Interpret **FIVE (5)** factors based on the design method

*Jabatan Kerja Raya mempertimbangkan beberapa faktor dalam proses merekabentuk ketebalan turapan lentur.Tafsirkan **LIMA(5)** faktor berdasarkan kaedah rekabentuk tersebut.*

[15 marks]
[*15 markah*]

QUESTION 3

SOALAN 3

CLO1 C2

(a) Pavement maintenance includes all the methods and techniques used to restore or maintain the specified level of service and to prolong pavement life by slowing its deterioration rate. Describe **TWO (2)** categories of maintenance and give examples for each category.

*Penyelenggaraan turapan melibatkan semua kaedah dan teknik digunakan untuk memulihkan atau mengekalkan aras perkhidmatan dan memanjangkan jangka hayat turapan dengan memperlahankan kadar kerosakan. Terangkan **DUA (2)** kategori penyelenggaraan beserta contoh bagi setiap kategori.*

[10 marks]

[*10 markah*]

CLO1 C3

(b) Road maintenance management is very important to ensure road safety. List and discuss in sequence the duties carried out by road maintenance management

Pengurusan penyenggaraan jalan adalah sangat penting untuk memastikan keselamatan jalan raya. Tafsirkan dalam turutan, tugas yang dijalankan oleh pihak pengurusan penyenggaraan jalan.

[15 marks]

[*15 markah*]

QUESTION 4

SOALAN 4

CLO1 C2

(a) Explain the following transportation studies conducted in the planning process.
Terangkan kajian pengangkutan yang dijalankan semasa proses perancangan

i. Origin-destination/direction (OD) / *Kajian asalan –tujuan (OD)*

ii. Volume study / *Kajian isipadu trafik*

iii. Spot speed study / *Kajian laju setempat*

iv. Delay speed study / *Kajian kelengahan*

v. Vehicle parking study / *Kajian tempat letak kenderaan*

[10 marks]
[*10 markah*]

CLO1 C3

(b) Signs on road surface are the markings painted on the road surface to assist road users on actions or movements to be taken in the specific areas. With the aid of a diagram, list **FIVE (5)** road markings on the road surface.
*Penanda jalan merupakan tanda yang dicat pada permukaan jalan dan berfungsi untuk membantu pengguna jalan raya bertindak atau memilih arah di kawasan tertentu. Dengan bantuan lakaran, senaraikan **LIMA (5)** jenis penanda jalan pada permukaan jalan*

[15 marks]
[*15 markah*]

SOALAN TAMAT

PAVEMENT DESIGN FORMULA

Table 3.1 Guide for Equivalence Factor

Percentage of selected heavy goods vehicles*	0-15%		16-50%	51-100%
Type of road	local	trunk		
Equivalence Factor	1.2	2.0	3.0	3.7

Table 3.2 Maximum Hourly Capacity under ideal conditions

Road Type	Passenger Vehicle Units per hour
Multi lane	2000 per lane
Two lanes (bothways)	2000 total for bothways
Three lanes (bothways)	4000 total for bothways

Table 3.3 Carriageway Roadway Reduction Factor

Carriageway Width	Shoulder Width			
	2.00m	1.50m	1.25m	1.00m
7.5m	1.00	0.97	0.94	0.90
7.0m	0.88	0.86	0.83	0.79
6.0m	0.81	0.78	0.76	0.73
5.0m	0.72	0.70	0.67	0.64

Table 3.4 Traffic Reduction Factor

Type of Terrain	Factor*
Flat	T = 100/(100+Pc)
Rolling	T = 100/(100+2Pc)
Mountainous	T = 100/(100+5Pc)

Table 3.5 Structural Layer Coefficients

Component	Type of Layer	Property	Coefficient
Wearing and Binder Course	Asphalt Concrete		1.00
Base Course	Dense Bituminous Macadam	Type 1:Stability > 400 kg	0.80
		Type 2:Stability > 300 kg	0.55
	Cement Stabilized	Unconfined Compressive strength(7 days) 30-40 kg/cm2	0.45
	Mechanically Stabilized crushed aggregate	CBR ⩾ 80%	0.32
Subbase	Sand,Laterite etc.	CBR ⩾ 20%	0.23
	Crushed aggregate	CBR ⩾ 30%	0.25
	Cement Stabilized	CBR ⩾ 60%	0.28

Table 3.6 Minimum Layer Thickness

Type of layer		Minimum thickness
Wearing Course		4 cm
Binder Course		5 cm
Base Course	Bituminous	5 cm
	Wet Mix	10 cm
	Cement treated*	10 cm
Subbase Course	Granular	10 cm
	Cement treated	15 cm

Table 3.7 Standard & Construction Layer Thickness

Type of layer		Standardard thickness	One layer lift
Wearing course		4-5 cm	4-5 cm
Binder course		5-10 cm	5-10 cm
Base Course	Bituminous	5-20 cm	5-15 cm
	Wet mix	10-20 cm	10-15 cm
	Cement treated	10-20 cm	10-20 cm
Subbase Course	Granular	10-30 cm	10-20 cm
	Cement treated	15-20 cm	10-20 cm

Table 3.8 Minimum thickness of Bituminous Layer

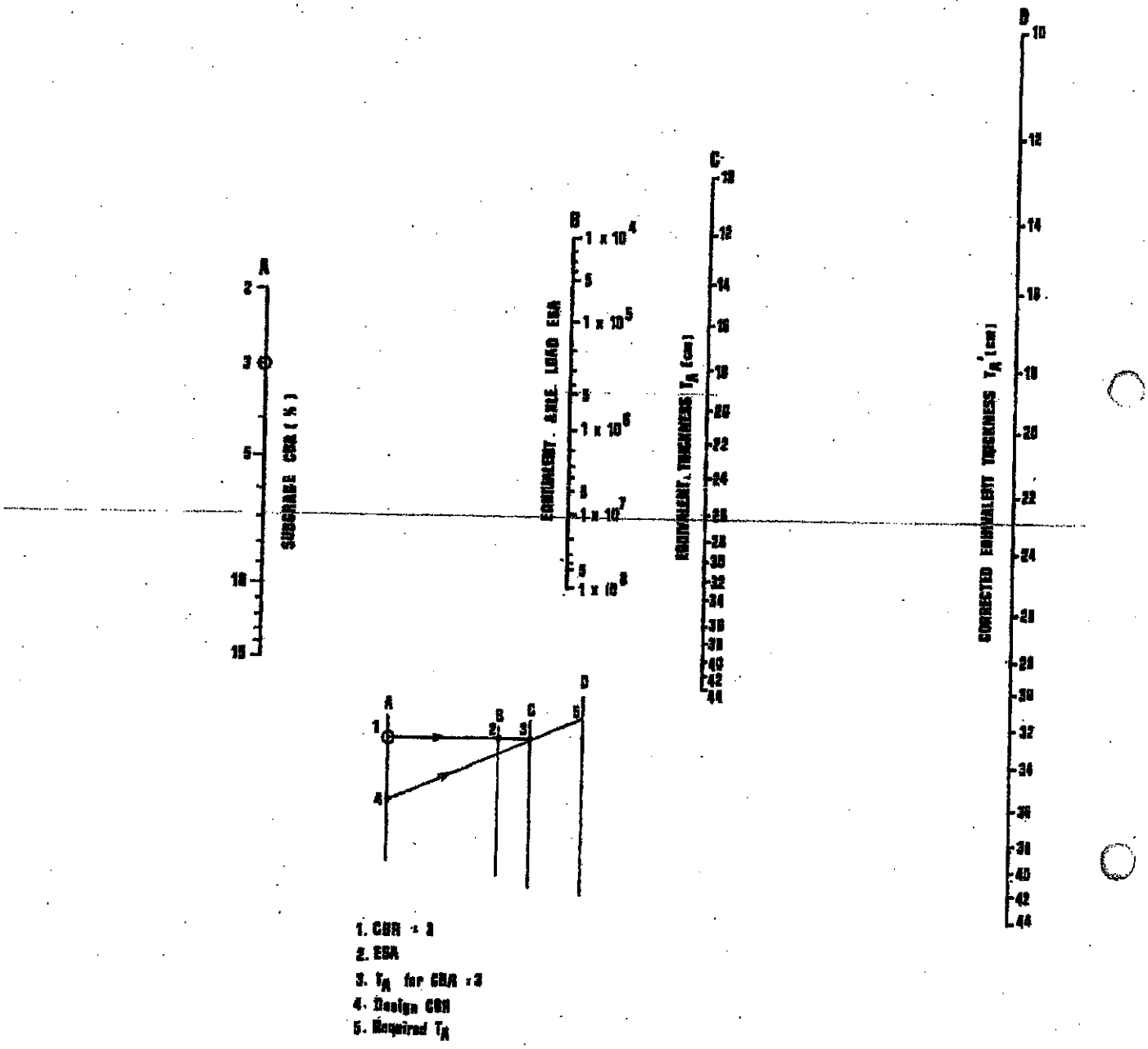
T_A	Total thickness of bituminous layer
< 17.5 cm	5.0 cm
17.5 - 22.5 cm	10.0 cm
23.0 - 29.5 cm	15.0 cm
> 30.0 cm	17.5 cm

Table 4.1: Conversion Factors to P.C.U's
(Source Arahan Teknik (Jalan) 8/86)

Type of Vehicle	Equivalent Value in P.C.U's			
	Urban Standards	Rural Standards	Round About	Traffic Signal
Passenger Car	1.00	1.00	1.00	1.00
Heavy vehicles	2.00	3.00	2.80	1.75
Buses	3.00	3.00	2.80	2.25
Motorcycle	0.75	1.00	0.75	0.33
Bicycle	0.33	0.50	0.50	0.20

Table 4.2 : Saturated flow Determination

Broad access road (m)	3.00	3.50	4.00	4.50	5.00	5.50
Saturated flow (u.k.p/hour)	1850	1875	1975	2175	2550	2900



THICKNESS DESIGN NOMOGRAPH

LAMPIRAN DAN FORMULA

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INTERSECTION DESIGN

a. $S = 525W$ OR $S = 160W$

b. $y = \frac{Q}{S}$

c. $L = \sum l + \sum (I - k)$

d. $C_0 = \frac{1.5L+5}{1-Y}$

e. $g_{phase} = (C_0 - L)\left(\frac{yphase}{Y}\right)$

f. $G_{phase} = g_{phase} + I - k$

FLEXIBLE PAVEMENT DESIGN

a. Vo = ADT X 365X(Pc/100) x Directional

b. $Vc = Vo[1+r]^n-1]/r$

c. ESA @ JBGP = V_C x e

d. $V_x = V_I (1+r)x$

e. c = I x R x T

f. C = 10 x c

g. $TA' = SN = a_1D_1 + a_2D_2 + ...a_nD_n$