

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI JUN 2015

CB504: ELECTRICAL SERVICES 3

TARIKH : 20 OKTOBER 2015

TEMPOH : 2.30 PM – 4.30PM (2 JAM)

Kertas ini mengandungi **EMPAT BELAS (11)** halaman bercetak.
Dokumen sokongan yang disertakan : Jadual dan Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

INSTRUCTION:

This section consists of **SIX (6)** essay questions. Answer **FOUR (4)** questions only.

ARAHAN:

Bahagian ini mengandungi ENAM (6) soalan esei. Jawab EMPAT (4) soalan sahaja.

QUESTION 1**SOALAN 1**CLO1
C1

(a) Define the terms below :

Definisi istilah di bawah :

i. Illuminance

Pencahayaan[2 marks]
[2 markah]

ii. Luminous Flux

Fluks Lar[2 marks]
[2 markah]CLO1
C2

(b) A point light source has an intensity of 1050 candela and the light fall perpendicularly on a surface. Determine the illuminance on the surface if the distance from the surface is:

Satu sumber titik mempunyai keamatan 1050 candela dan kejatuhan cahaya adalah serenjang pada permukaan. Tentukan pencahayaan pada permukaan itu jika jaraknya dari permukaan adalah:

i. three metres

tiga meter[3 marks]
[3 markah]

ii. nine metres

sembilan meter[3 marks]
[3 markah]

- CLO1
C3 (a) A uniform point source of light emits a total flux of 2500 lm. It is suspended 2000 mm above the centre of a round table with diameter of 1700 mm. Calculate the maximum and minimum illuminance produced on the table.

Satu sumber titik seragam cahaya mengeluarkan sejumlah fluks 2500 lm. Ia digantung 2000 mm di atas pusat sebuah meja bulat yang diameter 1700 mm. Kira pencahayaan maksimum dan minimum yang dihasilkan di atas meja tersebut.

[15 marks]
[15 markah]

QUESTION 2
SOALAN 2

- CLO1
C1 (a) Describe colour rendering.
Jelaskan tentang penonjolan warna.

[5 marks]
[5 markah]

- CLO1
C2 (b) Describe a polar curve luminaire with the help of a diagram.
Jelaskan dengan bantuan gambarajah lengkung kutub sistem lampu.

[7 marks]
[7 markah]

- CLO1
C3 (c) Explain the artificial light below with the aid of a diagram:
Dengan bantuan gambarajah, terangkan cahaya cipta jadi dibawah:

- a. Incandescent lamp
Lampu pijar

[6 marks]
[6 markah]

- b. Discharge lamp.
Lampu nyahcas

[7 marks]
[7 markah]

QUESTION 3
SOALAN 3

- CLO2
C1 (a) Define localized lighting.
Takrifkan pencahayaan setempat.

[3 marks]
[3 markah]

- CLO2
C2 (b) Describe the lighting design flowchart in **Figure Q3**.
Jelaskan carta alir rekabentuk pencahayaan pada Rajah S3.

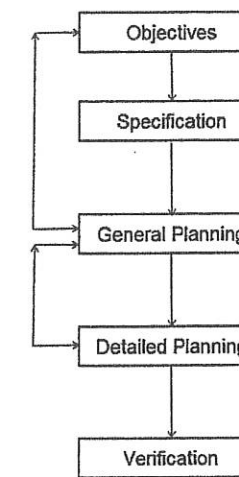


Figure Q3
Rajah Q3

[10 marks]
[10 markah]

CLO2
C4

- (c) A classroom with an area of 10m by 6m. The height of the classroom is 4m and the desk is measured 1m from the floor. The 40W tubular fluorescent lamps chosen have a luminous efficacy of 60lm/W with the illuminance of 500 lux. DLOR for this lamps is 60%. The room reflectance is 0.5 for the ceiling and 0.3 for walls. The initial light loss factor is 0.8.

Calculate the number of luminaire required. (Refer Appendix 1)

Sebuah kelas berkeluasan 10m x 6m. Kelas tersebut mempunyai ketinggian 4m dan ketinggian dari meja ke lantai adalah 1m. Lampu florescent tubular 40W mempunyai keberkesanan sebanyak 60lm/W dengan nilai pencahayaan sebanyak 500 lux. DLOR adalah 60%. Pantulan bilik adalah 0.5 untuk siling dan 0.3 untuk dinding. Jumlah faktor kehilangan lampu adalah 0.8.

Kirakan bilangan sistem lampu yang diperlukan. (Rujuk Lampiran 1)

[12 marks]

[12 markah]

QUESTION 4

SOALAN 4

CLO1
C1

- (a) Describe briefly TWO (2) objectives of emergency lighting.

Jelaskan DUA (2) objektif pencahayaan kecemasan .

[4 marks]

[4 markah]

CLO1
C2

- (b) Explain the emergency lighting below:

Terangkan pencahayaan kecemasan di bawah:

- i. Escape lighting

Pencahayaan lepas diri

[5 marks]

[5 markah]

- ii. Standby lighting

Pencahayaan sedia tunggu

[4 marks]

[4 markah]

CLO 1
C2

- (c) Describe the important aspects in emergency lighting according to BS5266 below:

Jelaskan aspek penting dalam pencahayaan kecemasan berdasarkan BS5266 di bawah:

- i. Toilet

Tandas

[2 marks]

[2 markah]

- ii. Fire equipment

Peralatan kebakaran

[2 marks]

[2 markah]

- iii. Illuminating the route

Pencahayaan laluan

[4 marks]

[4 markah]

- iv. Marking the route

Penandaan laluan

[4 marks]

[4 markah]

QUESTION 5
SOALAN 5

CLO3
C1

- (a) Determine the value of resistor below and tolerance value in **Figure Q5** based on color code table (**Refer Appendix 2**).

Tentukan nilai perintang dan nilai toleransi di Rajah Q5 berdasarkan jadual kod warna (Rujuk Lampiran 2).

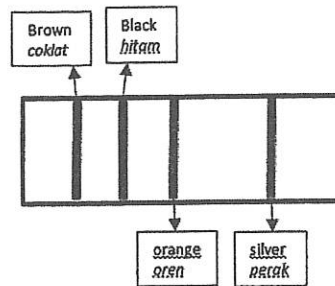


Figure Q5
Rajah Q5

[5 marks]
[5 markah]

CLO3
C2

- (b) Describe the meaning of electronic components below:

Jelaskan definisi bagi komponen-komponen elektronik dibawah:

- i. Resistor
Resistor
- ii. Capacitor
Kapasitor
- iii. Inductor
Induktor

[9 marks]
[9 markah]

CLO3
C3

- (c) Explain the characteristic of N type semiconductor with the help of a diagram.
Terangkan dengan bantuan gambarajah ciri-ciri semikonduktor jenis N.

[11 marks]
[11 markah]

QUESTION 6
SOALAN 6

CLO3
C1

- (a) Draw a schematic symbols of NPN and PNP transistors.
Lukiskan simbol skematik bagi transistor NPN dan PNP.

[4 marks]
[4 markah]

CLO3
C2

- (b) Describe briefly the characteristics of transistors.
Terangkan ciri-ciri transistor.

[8 marks]
[8 markah]

CLO3
C3


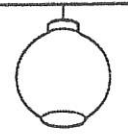
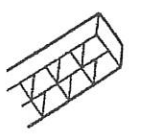
- (c) Explain the V-I characteristic curve for a silicon diode with the aid of illustration.
Jelaskan dengan gambarajah lengkung ciri V-I diod silikon.

[13 marks]
[13 markah]

SOALAN TAMAT

Appendix 1
Lampiran 1

Table 1: Utilization factor for some luminaires

Description of fitting	Typical outline LOR	Basic downward LOR %	Reflectances									
			Ceiling			Walls			Room index			
			0.7	0.5	0.3	0.5	0.3	0.1	0.5	0.3	0.1	
Aluminium industrial reflector, Aluminium or enamel high-bay reflector		70	0.6	0.39	0.36	0.33	0.39	0.36	0.33	0.39	0.35	0.33
			0.8	0.48	0.43	0.40	0.46	0.43	0.40	0.46	0.43	0.40
			1.0	0.52	0.49	0.45	0.52	0.48	0.45	0.52	0.48	0.45
			1.25	0.56	0.53	0.50	0.56	0.53	0.49	0.56	0.52	0.42
			1.5	0.60	0.57	0.54	0.59	0.57	0.53	0.59	0.55	0.53
			2.0	0.65	0.62	0.59	0.63	0.60	0.58	0.63	0.59	0.57
			2.5	0.67	0.64	0.62	0.65	0.62	0.61	0.65	0.62	0.60
			3.0	0.69	0.66	0.64	0.67	0.64	0.63	0.67	0.64	0.62
			4.0	0.71	0.68	0.67	0.69	0.67	0.65	0.69	0.66	0.64
			5.0	0.72	0.70	0.69	0.71	0.69	0.67	0.71	0.67	0.66
Near-spherical diffuser, open beneath		50	0.6	0.28	0.22	0.18	0.25	0.20	0.17	0.22	0.18	0.16
			0.8	0.39	0.30	0.26	0.33	0.28	0.23	0.27	0.25	0.22
			1.0	0.43	0.36	0.32	0.38	0.34	0.29	0.31	0.29	0.26
			1.25	0.48	0.41	0.37	0.42	0.38	0.33	0.34	0.32	0.29
			1.5	0.52	0.46	0.41	0.46	0.41	0.37	0.37	0.35	0.32
			2.0	0.58	0.52	0.47	0.50	0.48	0.43	0.42	0.39	0.36
			2.5	0.62	0.56	0.52	0.54	0.50	0.47	0.45	0.42	0.40
			3.0	0.65	0.60	0.56	0.57	0.53	0.50	0.48	0.45	0.43
			4.0	0.68	0.64	0.61	0.60	0.56	0.54	0.51	0.48	0.46
			5.0	0.71	0.60	0.65	0.62	0.59	0.57	0.53	0.50	0.48
Recessed louvre trough with optically designed reflecting surfaces		50	0.6	0.28	0.25	0.23	0.28	0.25	0.23	0.28	0.25	0.23
			0.8	0.34	0.31	0.28	0.33	0.30	0.28	0.33	0.30	0.28
			1.0	0.37	0.36	0.32	0.37	0.34	0.32	0.37	0.34	0.32
			1.25	0.40	0.38	0.35	0.40	0.37	0.35	0.40	0.37	0.35
			1.5	0.43	0.41	0.38	0.42	0.40	0.38	0.42	0.39	0.38
			2.0	0.46	0.44	0.42	0.45	0.43	0.41	0.44	0.42	0.41
			2.5	0.48	0.46	0.44	0.47	0.45	0.43	0.46	0.44	0.43
			3.0	0.49	0.47	0.46	0.48	0.46	0.45	0.47	0.45	0.44
			4.0	0.50	0.49	0.48	0.49	0.48	0.47	0.48	0.47	0.46
			5.0	0.51	0.50	0.49	0.50	0.49	0.48	0.49	0.48	0.47

Appendix 2
Lampiran 2

Table 2: Color Code Table

Color	1 st band	2 nd band	Multiplier	Tolerance
Black	0	0	1	
Brown	1	1	10	
Red	2	2	100	
Orange	3	3	1000	
Yellow	4	4	10 000	
Green	5	5	100 000	
Blue	6	6	1 000 000	
Violet	7	7	10 000 000	
Grey	8	8	100 000 000	
White	9	9	1 000 000 000	
Gold				± 5%
Silver				± 10%
No color				±20%

FORMULA

$$E = \frac{I}{d^2}$$

$$E = \frac{I}{d^2} \cos \theta$$

$$E = \frac{I \cos^2 \theta \sin \theta}{h^2}$$

$$E(\alpha) = \frac{I \cos^2 \theta \cos \alpha}{h^2}$$

$$E = \pi L \left[\frac{R^2}{(R^2 + H^2)} \right]$$

$$E = \frac{I_0}{2H} (\alpha + \sin \alpha \cos \alpha)$$

$$RI = \frac{P \times L}{Hm (P + L)}$$

$$N = \frac{E \times A}{n \times F \times UF \times MF}$$