

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENGAJIAN TINGGI**

JABATAN KEJURUTERAAN AWAM

**PENILAIAN ALTERNATIF BERIKUTAN
PELAKSANAAN PERINTAH KAWALAN BERSYARAT**

SESI JUN 2020

DCB5152 : LIGHTING

NAMA PENYELARAS KURSUS : AZIZI MURSIDY BIN ZAINOL ABIDIN

KAEDAH PENILAIAN : PEPERIKSAAN ONLINE

JENIS PENILAIAN : SOALAN ESEI (2 SOALAN)

TARIKH PENILAIAN : 29 JANUARI 2021

TEMPOH PENILAIAN : 1 JAM

LARANGAN TERHADAP PLAGIARISM (AKTA 174)

**PELAJAR TIDAK BOLEH MEMPLAGIAT APA-APA IDEA, PENULISAN, DATA
ATAU CIPTAAN ORANG LAIN. PLAGIAT ADALAH SALAH SATU
PENYELEWENGAN AKADEMIK. SEKIRANYA PELAJAR DIBUKTIKAN
MELAKUKAN PLAGIARISM, PENILAIAN BAGI KURSUS BERKENAAN AKAN
DIMANSUHKAN DAN DIBERI GRED F DENGAN NILAI MATA 0.**

**(RUJUK BUKU ARAHAN-ARAHAN PEPERIKSAAN DAN KAEDAH PENILAIAN (Diploma) EDISI 6, JUN 2019,
KLAUSA 17.3)**

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

CLO2
C3

(a) A point light source has an intensity of 3,151 cd in all directions and is mounted 4 meters above the work surface as shown in figure 1.

- (i) Calculate the illuminance on the surface directly underneath (Ea), at a distance of 1.8 meters to the side (Eb) and at a distance of 3.0 meters to the side (Ec).

[9 marks]

- (ii) Restate the rule or laws of illumination for points Ea, Eb and Ec

[3 marks]

Satu sumber cahaya titik menghasilkan keamatan lar 3151 cd dalam semua arah dan dipasang 4 meter dari aras permukaan kerja seperti yang ditunjuk dalam rajah 1.

- (i) *Kira penyinaran pada permukaan yang berada dibawah sumber cahaya (Ea), pada jarak 1.8 meter ke sisi (Eb) dan pada jarak 3.0 meter ke sisi (Ec).*

[9 markah]

- (ii) *Sila nyatakan semula apakah peraturan atau undang-undang penyinaran yang terpakai di titik Ea, Eb dan Ec tersebut.*

[3 markah]

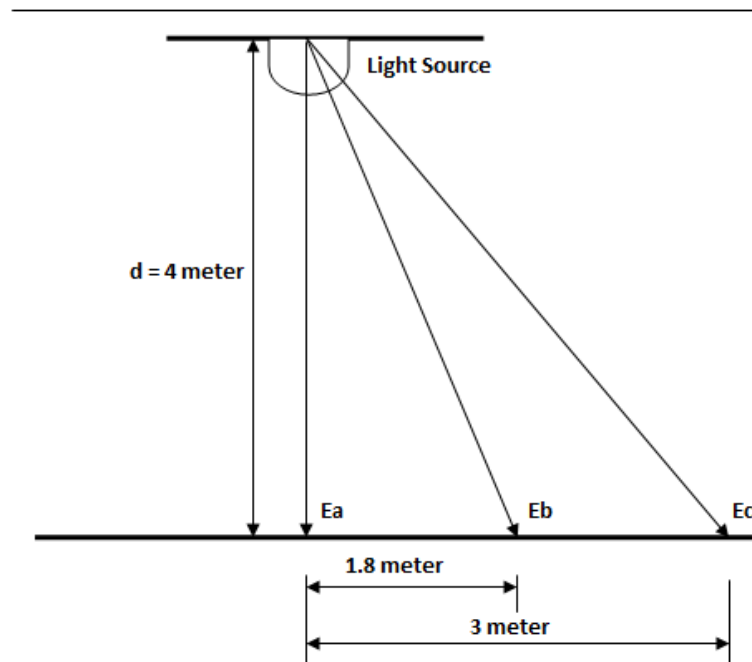


Figure 1 / Rajah 1

CLO2
C3

(b) A master bedroom measuring of 6m x 5m x 4m (Height) has a horizontal window with a dimension of 2.5m x 2m. The reflection factor for the surface of ceiling, wall, floor and glass are 70%, 70%, 35% and 25% respectively. The glass transmission value is 75% and the angle of visible sky is 65° .

- (i) Calculate the average daylight factor for the room by assuming the correction factor for dirt is 1.0.

[9 marks]

- (ii) Sketch the no-sky line area if the room is blocked by an 8m high building located 5m away. Assuming the window sill is 0.8m from the floor

[4 marks]

Sebuah bilik tidur utama berukuran 6m x 5m x 4m (tinggi) mempunyai tingkap melintang berukuran 2.5m x 2m. Faktor pemantulan bagi permukaan siling,

dinding, lantai dan kaca adalah 70%, 70%, 35% dan 25%. Manakala nilai pemancaran kaca adalah 75% dan sudut langit yang kelihatan pada 65° .

- (i) Kira purata faktor cahaya siang bagi bilik tidur dengan andaian faktor pembedahan bagi habuk adalah 1.0.

[9 markah]

- (ii) Lakarkan garisan kawasan tiada langit apabila pandangan bilik dihalang oleh sebuah bangunan setinggi 8m yang terletak sejauh 5m. Andaikan ambang tingkap setinggi 0.8m dari aras lantai.

[4 markah]

QUESTION 2

SOALAN 2

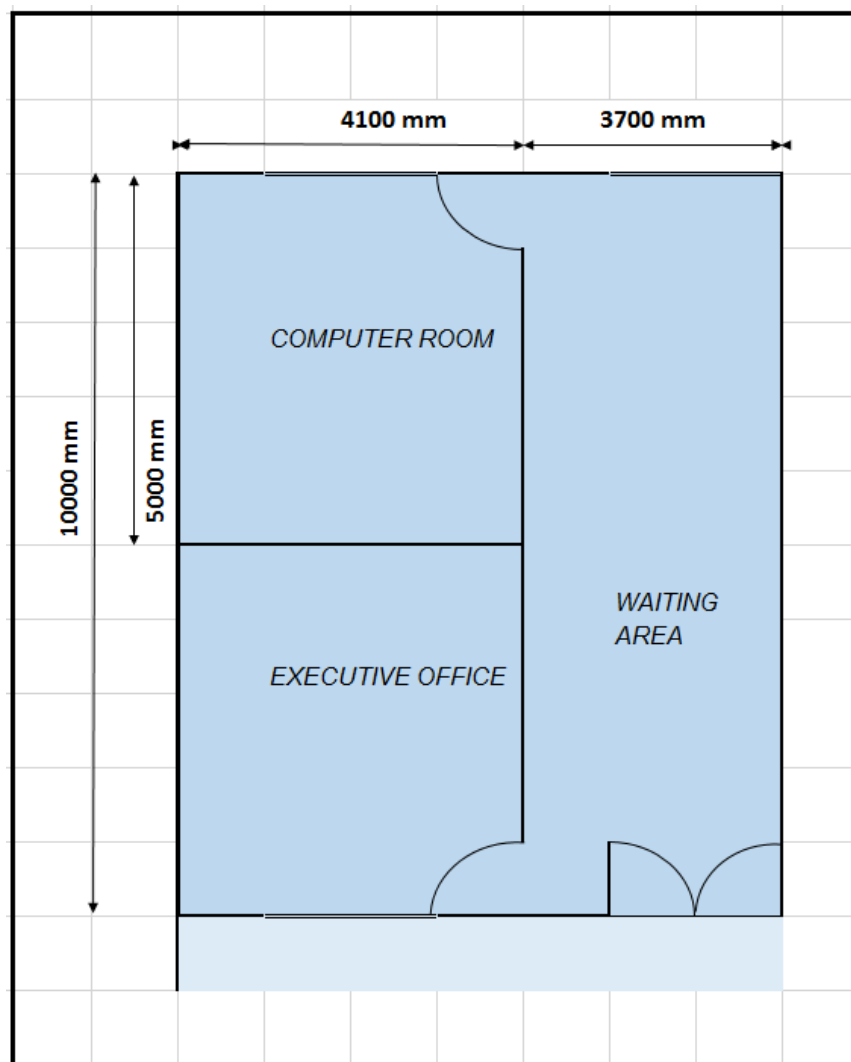


Figure 1/Rajah 1

CLO3
C5

- (a) An office area measures 10m x 7.8m which include in the Executive Office, Computer Room and Waiting Area as shown in Figure 1. The measurement for ceiling to desk height is 3 meters. The area is to be illuminated to a general level of 300 lux for the Executive Office, 500 lux for the Computer Room and 200 lux for the Waiting Area using the same twin lamp 32 watt VDT Ceiling Recessed luminaires. Each lamp has an initial output of 2,720 lumens. The lamps are operated for 6000 hours before being replaced. Lamps and luminaires are cleaned annually and the room is cleaned every 3 years. Each rooms has a bright interior with room reflectance 70% ceiling, 50% walls and 20% floor.
- i) Find the Room Index for each rooms inside the office. [6 marks]
 - ii) Find the utilization factor. [6 marks]
 - iii) Find the maintenance factor. [4 marks]
 - iv) Calculate the number of luminaires required at each rooms inside the office [9 marks]

Sebuah pejabat berukuran 10m x 7.8m didalamnya mengandungi Pejabat Eksekutif, Bilik Komputer dan Ruang Menunggu seperti yang ditunjuk pada Rajah 1. Nilai pengukuran diantara siling hingga permukaan meja adalah 3m. Kawasan ini akan dilengkapi pencahayaan umum dengan nilai penyinaran 300 lux bagi Pejabat Eksekutif, 500 lux bagi Bilik Komputer dan 200 lux bagi Ruang Menunggu. Setiap bilik-bilik tersebut akan menggunakan pemasangan lampu jenis terbenam dalam siling yang mana setiap satunya akan dilengkapi dua biji lampu 32 watt. Setiap lampu akan menghasilkan fluks lar sebanyak 2,720 lumen. Lampu akan mempunyai kadar hayat operasi selama 6000 jam sebelum ianya ditukar baharu. Lampu dan pemasangan lampu akan dibersihkan sekali dalam setahun dan bilik pula akan dibersihkan sekali dalam masa tiga tahun. Faktor pemantulan permukaan bilik adalah 70% untuk siling , 50% untuk dinding dan 20% untuk lantai.

- i) *Cari nilai indeks bilik bagi setiap bilik didalam pejabat tersebut. [6 markah]*
- ii) *Cari nilai faktor penggunaan. [6 markah]*
- iii) *Cari nilai faktor penyenggaraan [4 markah]*

- iv) *Kira bilangan pemasangan lampu yang diperlukan untuk setiap bilik didalam pejabat tersebut.* [9 markah]

SOALAN TAMAT

APPENDIX 1: TABLES & FIGURES

Table 1 Utilization Factor

Room reflectances			Room index								
C	W	F	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00
0.7	0.5	0.2	0.53	0.57	0.60	0.62	0.64	0.66	0.67	0.69	0.69
	0.3		0.50	0.54	0.57	0.59	0.62	0.64	0.65	0.67	0.68
	0.1		0.48	0.52	0.55	0.57	0.61	0.63	0.64	0.66	0.67

Table 2 Lamp Lumen Maintenance Factor

Typical lumen maintenance and lamp survival data

		Typical values of LLMF and LSF										
		Operation time (1000h)										
		0.1	0.5	1.0	1.5	2.0	4.0	6.0	8.0	10.0	12.0	14.0
Fluorescent multi- and tri-phosphor	LLMF	1	0.98	0.96	0.95	0.94	0.91	0.87	0.86	0.85	0.84	0.83
	LSF	1	1	1	1	1	1	0.99	0.95	0.85	0.75	0.64
Fluorescent halophosphor	LLMF	1	0.97	0.94	0.91	0.89	0.83	0.80	0.78	0.76	0.74	0.72
	LSF	1	1	1	1	1	1	0.99	0.95	0.85	0.75	0.64
Mercury	LLMF	1	0.99	0.97	0.95	0.93	0.87	0.80	0.76	0.72	0.68	0.64
	LSF	1	1	1	1	0.99	0.98	0.97	0.95	0.92	0.88	0.84
High-pressure sodium	LLMF	1	1	0.98	0.97	0.96	0.93	0.91	0.89	0.88	0.87	0.86
	LSF	1	1	1	1	0.99	0.98	0.96	0.94	0.92	0.89	0.85
High-pressure sodium, improved colour	LLMF	1	0.99	0.97	0.95	0.94	0.89	0.84	0.81	0.79	0.78	
	LSF	1	1	1	0.99	0.98	0.96	0.90	0.79	0.65	0.50	

Table 3 Luminaire category

Luminaire/activity/location categories

Activity	Location	Bare lamp batten	Open ventilated reflector	Dust tight, dust proof or reflector lamp	Open non-ventilated reflector, enclosed diffuser/ controller	Open base diffuser or louver	Recessed diffuser or louver, diffusing or louvered luminous ceiling	Indirect cornice
Offices, shops & stores, hospitals, laboratories, schools etc	All air-conditioned buildings	A	A	A	A/B	A/B	A	B
	Clean country area	A/B	A/B	A/B	B	B	A/B	C/D
	City or town outskirts	B	B	B	C	B/C	B	E
	City or town center	B/C	B/C	B/C	C/D	C	B/C	F/G
	Dirty industrial area	C	C	B/C	D	C/D	C	G
Manufacturing areas, machine shops, etc	All air-conditioned buildings	A/B	A	A	C	B/C	B	B/C
	Clean country area	B	A/B	B	C/D	C	B/C	D/E
	City or town outskirts	B/C	B	B	D	C/D	C	F/G
	City or town center	C	B/C	B/C	D/E	D	C/D	G
	Dirty industrial area	C/D	C	C	E	D/E	D	H
Steelworks, foundries, welding shops, etc	Clean country area	C	B/C	B	D/E	D	C/D	
	City or town outskirts	C/D	C	B/C	E	D/E	D	
	City or town center	D	C/D	B/C	E/F	E	D/E	
	Dirty industrial area	D/E	D	C	F	E/F	E	

Figure 2 Luminaire Maintenance factor

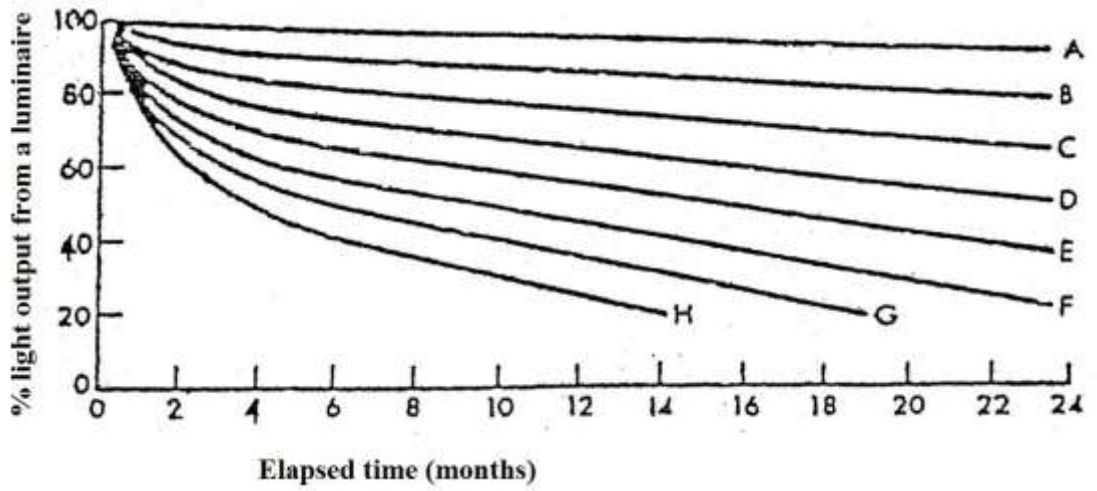
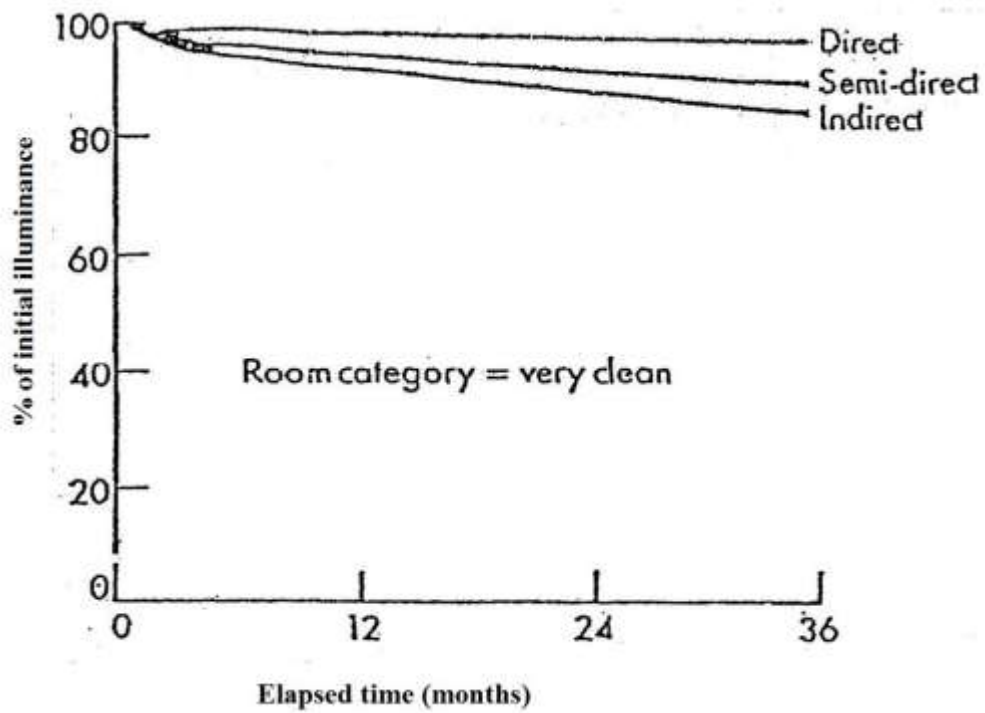


Figure 3 Room Surface Maintenance factor



APPENDIX 2: FORMULAConversion Lumen to Candela

$$I = \frac{F}{2\pi [1 - \cos(60^\circ)]^2}$$

Inverse Square Law

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

Cosine Lambert Law

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

OR

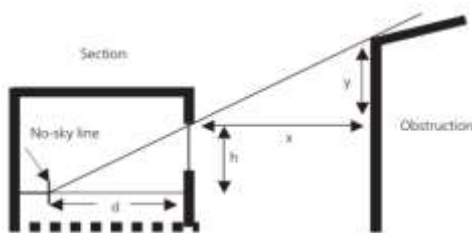
$$E = \frac{I (\cos^3 \theta)}{d^2}$$

Average Daylight Factor

$$DF_{avg} = \frac{T(W)(\theta)}{A (1-R^2)} \%$$

No-Sky Line Boundary

$$d = \frac{x(h)}{y}$$

Lighting Design

$$\text{Room Index, } K = \frac{A}{H_m (\text{Length} + \text{Width})}$$

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