

SULIT



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

JABATAN KEJURUTERAAN AWAM

PENILAIAN ALTERNATIF

SESI 1 : 2021/2022

DCB20042 : BUILDING ELECTRICAL SERVICES

NAMA PENYELARAS KURSUS: NAZRIZAM BINTI AB. WAHAB

KAEDAH PENILAIAN : PEPERIKSAAN ONLINE

**JENIS PENILAIAN : SOALAN ESEI BERSTRUKTUR
(2 SOALAN) & ESEI (1 SOALAN)**

TARIKH PENILAIAN : 3 FEBRUARI 2022

TEMPOH PENILAIAN : 1 JAM 30 MINIT

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)** structured essay questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **DUA (2)** soalan esei berstruktur. Jawab semua soalan.*

QUESTION 1

SOALAN 1

CLO1
C2

- a) Hydroelectric power is electricity produced from hydropower. Identify **FIVE (5)** components consist in hydroelectric power plant.

*Kuasa hidroelektrik adalah pengeluaran arus elektrik dari kuasa air. Kenalpasti **LIMA (5)** komponen yang terdapat pada loji kuasa hidroelektrik.*

[5 marks]

[5 markah]

CLO1
C3

- b) Consumer control sequence is a sequence of control devices and circuit protection such as fuse service, kWh meter, main switch, circuit breaker and distribution board. By using all the devices mentioned, sketch the following circuit:

- i. Distribution for storey building
- ii. Distribution of circuit power and lighting

Urutan litar pengguna adalah urutan peranti kawalan dan pengawal litar seperti fius perkhidmatan, meter kilowatt, suis utama, pemutus litar dan papan agihan.

Dengan menggunakan semua peranti yang disebutkan, lakar litar berikut:

- i. Pengagihan untuk bangunan bertingkat
- ii. Pengagihan bagi litar kuasa dan lampu

[10 marks]

[10 markah]

CLO1
C2

- c) Switch socket outlet is a device for opening or closing a circuit or for diverting a current from one part of a circuit to another. Explain **FIVE (5)** IEE regulations for switch socket outlet.

*Soket alur keluaran adalah peranti untuk membuka atau menutup litar atau untuk mengalihkan arus dari satu bahagian litar ke bahagian yang lain. Jelaskan **LIMA (5)** peraturan IEE untuk soket alur keluaran.*

[10 marks]

[10 markah]

QUESTION 2

SOALAN 2

CLO1
C2

- a) The process of transferring the immediate discharge of the electrical energy to the earth by the help of the low resistance wire is known as electrical earthing. Explain **FIVE (5)** importances of electrical installation to be earthed.

*Proses pemindahan tenaga elektrik dengan cepat ke bumi dengan bantuan wayar berintang rendah dikenali sebagai pbumian elektrik. Jelaskan **LIMA (5)** kepentingan pemasangan elektrik perlu dibumikan.*

[5 marks]

[5 markah]

CLO1
C2

- b) The resistance of earth is the resistance between the earth and earth electrode. Identify **TEN (10)** factors affecting earth resistance.

*Rintangan bumi adalah rintangan di antara bumi dan elektrod bumi. Kenalpasti **SEPULUH (10)** factor yang memperngaruhi rintangan bumi.*

[10 marks]

[10 markah]

CLO1
C3

- c) New electrical installations and extensions to the existing installations must be inspected and tested. Three units of 13A switch socket outlets need to be installed in an extension living area for a house. The electrical contractor decides to install all the switch socket outlets in ring circuit. With the aid of a diagram, explain the method of the test to be used to ensure that each conductor in the circuit has continuity.

Pemasangan baharu dan penambahan terhadap pemasangan sediaada mesti disemak dan diuji. Tiga unit soket alur keluaran 13A perlu dipasang pada ruang tamu tambahan bagi sebuah rumah. Kontraktor elektrik memutuskan untuk memasang semua soket alur keluar tersebut secara litar gelang. Dengan bantuan gambarajah, jelaskan kaedah perlaksanaan ujian yang akan digunakan bagi memastikan setiap pengalir pada litar mempunyai keterusan.

[10 marks]

[10 markah]

SECTION B : 25 MARKS
BAHAGIAN B : 25 MARKAH

INSTRUCTION:

This section consists of **ONE (1)** essay question. Answer the question.

ARAHAN:

*Bahagian ini mengandungi **SATU (1)** soalan esei. Jawab soalan tersebut.*

QUESTION 1

SOALAN 1

a) Sketch the following electrical symbols:

Lakarkan simbol-simbol elektrik berikut:

- i. Ceiling fan / *kipas siling*
- ii. 1 x 36W fluorescent lamp / *lampu kalimantang*
- iii. 1 gang 13A switch socket outlet / *soket alur keluar*
- iv. 1 x 8W emergency lamp / *lampu kecemasan*
- v. Distribution board / *papan agihan*

[5 marks]

[5 markah]

b) Given data for a classroom in Table 1, calculate Total Connected Load (TCL) and Total Maximum Demand (TMD) for the classroom. Assume Diversity Factor (DF) for lamp and fan as 0.8; and 13A switch socket outlet as 0.1. Refer Appendix 1 for Connected Load.

Diberi data untuk sebuah kelas pada Jadual 1, kirakan Jumlah Beban Sambungan (JBS) dan Jumlah Permintaan Maksimum (JPM) untuk kelas tersebut. Anggarkan Faktor Diversiti (FD) untuk lampu dan kipas sebagai 0.8; dan soket alur keluaran 13A sebagai 0.1.

CLO2
C3

CLO2
C3

CIRCUIT	LOADS	NUMBER
Circuit 1/ <i>Litar 1</i>	1 X 36W Fluorescent lamp/ <i>Lampu kalimantang</i>	6
	1500mm Ceiling fan/ <i>kipas siling</i>	2
Circuit 2/ <i>Litar 2</i>	1 X 18W Fluorescent lamp/ <i>lampu kalimantang</i>	8
	1200mm Ceiling fan/ <i>kipas siling</i>	2
Circuit 3/ <i>Litar 3</i>	13A Switch socket outlet/ <i>Soket Alur Keluar</i>	2
Circuit 4/ <i>Litar 4</i>	13A Switch socket outlet/ <i>Soket Alur Keluar</i>	2

Table 1 : Final circuit load for classroom

[10 marks]

[10 markah]

- c) Referring to Appendix 2, calculate the acceptable cable size for the following installation.

CLO2
C3

Merujuk Appendix 2, kirakan saiz kabel yang boleh diterima untuk pemasangan berikut.

Loads/ <i>Beban</i>	=	2.5kW
Supply voltage/ <i>Voltan bekalan</i>	=	Single phase, 230V
Wiring type/ <i>Jenis pendawaian</i>	=	Surface
Cable length/ <i>Panjang kabel</i>	=	8m

[10 marks]

[10 markah]

- SOALAN TAMAT -

APPENDIX 1

Appendix 1: TCL Guide (updated: 15.5.2006)

NO	DESCRIPTION	ESTIMATED LOAD
1	18W Fluorescent	24W
2	36W Fluorescent	42W
3	60W Tungsten	60W
4	100W Tungsten	100W
5	1 × 8W (F) EL	10W
6	2 × 8W (F) LAMPU 'K' SIGN	20W
7	9W PLC	15W
8	11W PLC	17W
9	13W PLC	19W
10	18W PLC	24W
11	9W PLCE	10W
12	11W PLCE	12W
13	13W PLCE	14W
14	18W PLCE	20W
15	50W Halogen Bulb	50W
16	70W Metal Halide/SON	80W
17	150W Metal Halide/SON	170W
18	250W Metal Halide/SON	280W
19	400W Metal Halide/SON	440W
20	Obstruction Light	100W
21	Electric Bell	Ignore
22	2 × 8W (F) Insect Killer	20W
23	1500mm Ceiling Fan	80W
24	1200mm Ceiling Fan	60W
25	400mm Wall Fan	60W
26	500mm Wall Fan	80W
27	400mm Automatic Fan	80W
28	200mm Exhaust Fan	15W
29	250mm Exhaust Fan	25W
30	300mm Exhaust Fan	40W
31	13A 3P Switched Socket Outlet	250W
32	15A Switched Socket Outlet	500W
33	15A SPN Isolator	Motor H.P. rating
34	20A SPN Isolator	Motor H.P. rating
35	30A SPN Isolator	Motor H.P. rating
36	15A TPN Isolator	Motor H.P. rating
37	20A TPN Isolator	Motor H.P. rating

APPENDIX 2

TABLE 4D1A
Single-core pvc-insulated cables, non-armoured, with or without sheath
(COPPER CONDUCTORS)

BS 6004

BS 6231

Ambient temperature : 30 °C

CURRENT-CARRYING CAPACITY (amperes):

Conductor operating temperature : 70 °C

Conductor cross-sectional area	Reference Method 4 (Enclosed in conduit in thermally insulating wall etc.)		Reference Method 3 (enclosed in conduit on a wall or in trunking etc.)		Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray horizontal or vertical)		Reference Method 12 (free air)		
	2 cables, single-phase a.c or d.c	3 or 4 cables, three-phase a.c	2 cables, single-phase a.c or d.c	3 or 4 cables, three-phase a.c	2 cables, single-phase a.c and d.c flat and touching	3 or 4 cables, three-phase a.c flat and touching or trefoil	2 cables, single-phase a.c or d.c flat and touching	3 or 4 cables, three-phase a.c flat and touching or trefoil	Horizontal flat spaced	Vertical flat spaced	Trefoil
1	(A) 11	(A) 10.5	(A) 13.5	(A) 12	(A) 15.5	(A) 14	(A) -	(A) -	(A) -	(A) -	(A) -
1.5	14.5	13.5	17.5	15.5	20	18	-	-	-	-	-
2.5	19.5	18	24	21	27	25	-	-	-	-	-
4	26	24	32	28	37	33	-	-	-	-	-
6	34	31	41	36	47	43	-	-	-	-	-
10	46	42	57	50	65	59	-	-	-	-	-
16	61	56	76	68	87	79	-	-	-	-	-
25	80	73	101	89	114	104	126	112	146	130	110
35	99	89	125	110	141	129	156	141	181	162	137
50	119	108	151	134	182	167	191	172	219	197	167
70	151	136	192	171	234	214	246	223	281	254	216
95	182	164	232	207	284	261	300	273	341	311	264

TABLE 4D1B
VOLTAGE DROP (per ampere per metre): Conductor operating temperature : 70°C

Conductor cross-sectional area	2 cables d.c		2 cables, single-phase a.c				3 or 4 cables, three-phase a.c			
	1	2	Reference Method 3 & 4 (Enclosed in conduit etc. in or on a wall)	Reference Method 11 (clipped direct or on trays, touching)	Reference Method 1 & 4 (Enclosed in conduit etc. in or on a wall)	Reference Method 12 (spaced*)	Reference Method 3 & 4 (Enclosed in conduit etc. in or on a wall)	Reference Method 1, 11 & 12 (in trefoil)	Reference Method 1 & 11 (flat and touching)	Reference Method 12 (spaced*)
(mm ²)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)
1	44	44	44	44	44	38	38	38	38	38
1.5	29	29	29	29	29	25	25	25	25	25
2.5	18	18	18	18	18	15	15	15	15	15
4	11	11	11	11	11	9.5	9.5	9.5	9.5	9.5
6	7.3	7.3	7.3	7.3	7.3	6.4	6.4	6.4	6.4	6.4
10	4.4	4.4	4.4	4.4	4.4	3.8	3.8	3.8	3.8	3.8
16	2.8	2.8	2.8	2.8	2.8	2.4	2.4	2.4	2.4	2.4
25	1.75	1.80	1.80	1.75	1.75	1.50	1.50	1.50	1.50	1.50
35	1.25	1.30	1.30	1.25	1.25	1.10	1.10	1.10	1.10	1.10
50	0.93	0.95	0.95	0.93	0.93	0.81	0.81	0.80	0.80	0.80
70	0.63	0.65	0.65	0.63	0.63	0.56	0.56	0.55	0.55	0.55
95	0.46	0.49	0.49	0.47	0.47	0.42	0.42	0.41	0.41	0.41

Note : * Spacings larger than those specified in Method 12 (see Table 4A1) will result in larger voltage drop