**SULIT**

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

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

**SESI JUN 2019**

# DCB2062: ELECTRICAL SERVICES 1

**TARIKH : 06 NOVEMBER 2019**
**MASA : 2.30 PETANG - 4.30 PETANG (2 JAM)**

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Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.
Bahagian A: Esei Berstruktur (2 soalan)
Bahagian B: Esei Berstruktur (4 soalan)
Dokumen sokongan yang disertakan : LAMPIRAN 1

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**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 structured questions. Answer **ALL** questions.

***ARAHAN :***

*Seksyen ini mengandungi **DUA (2)** soalan esei berstruktur. Jawab **SEMUA** soalan.*

**QUESTION 1**

***SOALAN 1***

CLO1 C1

a) State **FIVE (5)** methods of electrical transmission.
*Nyatakan **LIMA (5)** kaedah penghantaran kuasa.*

[5 marks]
[*5 markah*]

CLO1 C2

b) The electrical supply is distributed to consumer through distribution line by single-phase system or three-phase system. Describe the single-phase system.
*Bekalan elektrik diagihkan kepada pengguna melalui talian agihan secara sistem satu-fasa dan sistem tiga-fasa. Huraikan sistem satu-fasa.*

[8 marks]
[*8 markah*]

CLO2 C3

c) Calculate the maximum current and number of final circuit required by the following situations. The supply voltage is 240 V and 5 Amp fuse is used.
*Kirakan arus maksima dan bilangan litar akhir yang diperlukan dalam situasi berikut. Voltan bekalan adalah 240 V dan fius 5 Amp digunakan.*

i. Installation of 10 units of 40 watt filament lamps and 10 units of 100 watt ceiling fans.
*Pemasangan bagi 10 unit lampu filamen 40 watt dan 10 unit kipas siling 100 watt.*

[4 marks]
[*4 markah*]

ii. Installation of 20 units of 80 watt filament lamp and 20 units of 36 watt pendaflour lamp.

*Pemasangan bagi 20 unit lampu filament 80 watt dan 20 unit lampu kalimantang 36 watt.*

[4 marks]

[*4 markah*]

iii. Installation of 15 units of 40 watt filament lamp and 15 units of 36 watt pendaflour lamp.

*Pemasangan bagi 15 unit lampu filament 40 watt dan 15 unit lampu kalimantang 36 watt.*

[4 marks]

[*4 markah*]

**QUESTION 2**

***SOALAN 2***

CLO1
C1

a) List **FIVE (5)** factors in the selection of over current protection devices.
*Senaraikan **LIMA (5)** faktor dalam pemilihan perkakas pelindung lebihan arus.*

[5 marks]

[*5 markah*]

CLO1
C2

b) Explain the operation of miniature circuit breaker (MCB).
*Jelaskan operasi bagi pemutus litar mini (PLM).*

[8 marks]

[8 *markah*]

CLO1
C3

c) List the factors that affect the soil resistivity.
*Senaraikan faktor-faktor yang mempengaruhi rintangan tanah.*

[12 marks]

[12 *markah*]

**SECTION B : 50 MARKS**

***BAHAGIAN B : 50 MARKAH***

**INSTRUCTION:**

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

***ARAHAN:***

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

**QUESTION 1**

***SOALAN 1***

CLO1
C1

a) Label the Figure 1.

*Labelkan Rajah 1 berikut.*

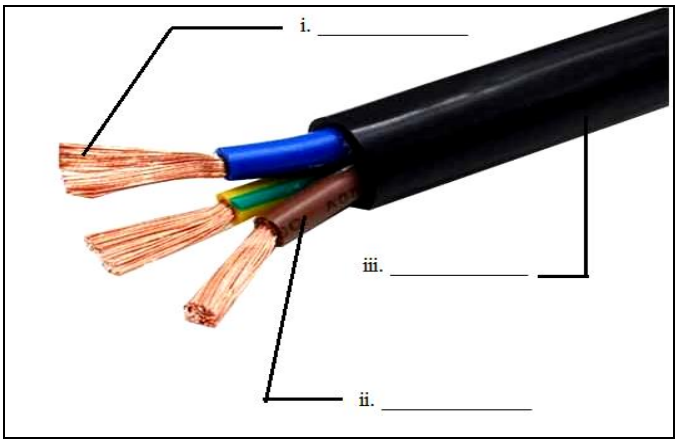


Figure 1
*Rajah 1*

[3 marks]

*[3markah]*

CLO1
C2

b) i. Identify **FOUR (4)** characteristics of conductors
*Kenalpasti **EMPAT (4)** ciri pengalir*

[4 marks]
*[4markah]*

ii. Identify**THREE (3)** characteristics of insulators.
*Kenalpasti **TIGA (3)** ciri penebat.*

[3 marks]
*[3markah]*

CLO1
C3

c) New electrical installations and extensions to the existing installations must be inspected and tested.
*Pemasangan baharu dan penambahan terhadap pemasangan sediada mesti disemak dan diuji.*

i. Illustrate the procedure to conduct insulator resistance test.
*Ilustrasikan prosedur untuk melakukan ujian rintangan penebatan.*

[12 marks]
*[12markah]*

ii. List the equipment used in conducting insulator resistance test.
*Senaraikan peralatan yang digunakan untuk melakukan ujian rintangan penebatan.*

[3 marks]
*[3markah]*

**QUESTION 2**

***SOALAN 2***

CLO1 C1 (a) State **THREE (3)** components which are included in main circuit.

*Nyatakan **TIGA (3)** komponen yang terdapat dalam litar utama.*

[3 marks]

[*3 markah*]

CLO1 C2 (b) There are two types of circuit connection for socket outlet which are radial and ring.

*Terdapat dua jenis sambungan litar untuk soket alur keluar iaitu sambungan jejari dan gelang.*

i. Explain ring circuit.

*Terangkan litar gelang*

[3 marks]

[*3 markah*]

ii. Describe **TWO (2)** advantages of ring circuit.

*Huraikan **DUA (2)** kebaikan litar gelang.*

[4 marks]

[*4 markah*]

CLO1 C3 (c) i) List **THREE (3)** procedures required to carry out the insulation resistance test for a single phase wiring installation.

*Senaraikan **TIGA (3)** prosedur untuk melaksanakan ujian rintangan penebatan bagi pemasangan pendawaian satu-fasa.*

[6 marks]

[*6 markah*]

ii) Sketch a diagram of insulation resistance test on single phase wiring installation.

*Lakarkan gambarajah bagi ujian rintangan penebatan pada pemasangan pendawaian satu fasa.*

[9 marks]

[*9 markah*]

**QUESTION 3**

***SOALAN 3***

CLO1 C1

(a) List **THREE (3)** factors that affect the selection of wiring system.
*Senaraikan **TIGA (3)** faktor-faktor yang mempengaruhi pemilihan sistem pendawaian.*

[3 marks]
[*3 markah*]

CLO1 C2

(b) Explain the installation of the following wiring systems:
*Terangkan cara pemasangan sistem pendawaian berikut*:

i. Surface wiring
*Pendawaian permukaan*
ii. Concealed wiring
*Pendawaian tersembunyi*

[7 marks]
[*7 markah*]

CLO1 C3

(c) Illustrate with the aid of a diagram the procedures to conduct insulation resistance test between conductor and earth cable in a three-phase system.
*Ilustrasikan langkah-langkah menjalankan ujian rintangan penebat antara kabel pengalir dan bumi dalam sistem tiga fasa dengan bantuan gambarajah yang sesuai.*

[15 marks]
[15 *markah*]

**QUESTION 4**

***SOALAN 4***

CLO 1
C1

a) Define the followings:
*Definisikan perkara berikut :*

i. Lightning protection
*Pelindung kilat*

*i.* Earthing.
*Pembumian*

[3 marks]
*[3markah]*

CLO 1
C2

b) Identify **THREE (3)** parts that are required to be earthed and **FOUR (4)** parts that are not required to be earthed.
*Kenal pasti **TIGA (3)** bahagian yang perlu dibumikan dan **EMPAT (4)** bahagian yang tidak perlu dibumikan.*

[7 marks]
*[7markah]*

CLO 2
C3

c) An installation in a small shop requires a 415V, three-phase supply to supply the following load at each phase to be balanced.
*Pemasangan di kedai kecil memerlukan bekalan 415V, tiga-fasa bagi membekalkan beban yang berikut pada setiap fasa agar seimbang.*

1 x 4.5kW, 240V and 6 x 3kW, 240 heaters (thermostatically type)
*1 x 4.5kW, 240V dan 6 x 3kW, 240 pemanas (jenis laras suhu)*

1 x 6kW, 240V and 1 x 4kW, 240V cookers
*1 x 6kW, 240V dan 1 x 4kW, 240V alat pemasak*

2 x 3kW, 240V water heater (instantaneous type)
*2 x 3kW, 240V alat pemanas (jenis segera)*

4kW total of discharge lamp 240V
*4kW jumlah keseluruhan lampu nyahcas 240V*

3 x 30A switch socket outlet, ring circuit (13A socket)
*3 x 30A soket alur keluar, litar gelang (soket 13A)*

Calculate the estimated current demand by using the Table of Diversity Factor (Appendix 1)
*Kirakan anggaran arus permintaan menggunakan Jadual Faktor Diversiti (Appendix 1)*

[15 marks]
*[15markah]*

**SOALAN TAMAT**

**LAMPIRAN 1**

## TABLE OF TYPIAL ALLOWANCES FOR DIVERSITY

| Purpose of final circuit fed from conductors or switchgear to which diversity applies | Individual household installations, including individual dwellings of a block | Type of premises | |
|---|---|---|---|
| | | Small shops, stores, offices and business premises | Small hotels, boarding houses, guest houses, etc. |
| **1. Lighting** | 66% of total demand | 90% of total current demand | 75% of total current demand |
| **2. Heating and power (but see 3-8 below)** | 100% of total current demand up to 10A<br>+ 50% of any current demand in excess of 10A | 100 % f.l of largest appliance<br>+ 75% of remaining appliances | 100 % f.l of largest appliance<br>+ 80% f.l of second largest appliances<br>+ 60% of remaining appliances |
| **3. Cooking appliances** | 10A<br>+ 30% f.l of connected cooking appliances in excess of 10A<br>+ 5A if socket-outlet incorporated in unit | 100% f.l of largest appliance<br>+ 80% f.l of second largest appliance<br>+ 60% f.l of remaining appliances | 100% of largest appliance<br>+ 80% f.l of second largest appliance<br>+ 60% f.l of remaining appliances |
| **4. Motors (other than lift motors which are subject to special consideration)** | | 100% f.l of largest motor<br>+ 80% f.l of second largest motor<br>+ 60% f.l of remaining motors | 100% f.l of largest motor<br>+ 50% f.l of remaining motors |
| **5. Water heaters (instantaneous type)*** | 100% f.l of largest appliance<br>+ 100% of second largest appliance<br>+ 25% f.l of remaining appliance | 100% f.l of largest appliance<br>+ 100% of second largest appliance<br>+ 25% f.l of remaining appliance | 100% f.l of largest appliance<br>+ 100% of second largest appliance<br>+ 25% f.l of remaining appliance |
| **6. Water heaters (thermostatically controlled)** | NO DIVERSITY ALLOWABLE** | | |
| **7. Floor warming installations** | NO DIVERSITY ALLOWABLE** | | |
| **8. Thermal storage space heating installation** | NO DIVERSITY ALLOWABLE** | | |
| **9. Standard arrangements of final circuits in accordance with IEE Appendix 5** | 100% of current demand of largest circuit<br>+ 40% of current demand of every other circuit | 100% of current demand of largest circuit<br>+ 50% of current demand of every other circuit | |
| **10. Socket outlets other than those included in 9 above and stationary equipment other than those listed above** | 100% of current demand of largest point of utilisation<br>+ 40% of current demand of every point of utilisation | 100% of current demand of largest point of utilisation<br>+ 75% of current demand of every point of utilisation | 100% of current demand of largest point of utilisation<br>+ 75% of current demand of every point in main rooms (dining rooms, etc)<br>+ 40% of current demand of every point of utilisation |

*For the purpose of this table an instantaneous water heater is deemed to be a water heater of any loading which heats water only while the tap is turned on and therefore uses electricity intermittently.

**It is important to ensure that the distribution boards are of sufficient rating to take the total load connected to them without the application of any diversity