SULIT

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2015

DCB 2062 : ELECTRICAL SERVICES 1

TARIKH : 11 APRIL 2016
MASA : 2.30 PM – 4.30 PM (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.
Bahagian A: Esei Struktur (2 soalan)
Bahagian B: Esei Struktur (4 soalan)
Dokumen sokongan yang disertakan : Jadual

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)** structure questions. Answer **ALL** questions.

ARAHAN:

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

QUESTION 1

SOALAN 1

CLO1
C1

a) List **FIVE (5)** methods of electrical power transmission

*Senaraikan **LIMA (5)** kaedah penghantaran kuasa elektrik*

[5 marks]

[5 markah]

CLO1
C2

b) Explain the function of the following components :

i. kWh meter

ii. main switch

iii. electrical circuit breaker

iv. fuse box

Terangkan fungsi komponen-komponen berikut :

i. Meter kWj

ii. Suis utama

iii. Pemutus litar

iv. Kotak fius

[8 marks]

[8 markah]

CLO2
C3

c) i) An industry used 250 units and the Maximum Demand in that month is 5 kW. Calculate how much a consumer should pay if the scale Tariff C1 is RM 23.93 for each kW of maximum demand and 28.8 cents for each additional unit used.

Sebuah industri menggunakan 250 unit dan permintaan maksima dalam bulan tersebut adalah sebanyak 5 kW. Kirakan jumlah yang perlu dibayar oleh pengguna jika skala bayaran mengikut Tariff C1 di mana kadar permintaan maksimum untuk setiap kW adalah RM23.93 dan 28.8 sen untuk setiap unit tambahan.

[4 marks]
[4 markah]

ii) Table 1 shows the list of load in a house and the period of time used.

LOAD	TIME (Hour per day)
1 x 1HP air conditioner	8 hours
20 lamps x 60 watts	8 hours
1 x 3kW cooker	1 hour
1 x 700 watts refrigerator	24 hours

Table 1

Calculate the payment needed in a month using equal rate tariff which is 23 cents per unit for lamp and 15 cents per unit of power.

Jadual 1 menunjukkan senarai beban yang digunakan oleh pengguna rumah kediaman dan masa yang digunakan dalam sehari.

BEBAN	*MASA (JAM SEHARI)*
1 x 1HP penghawa dingin	*8 jam*
20 biji lampu x 36 watt	*8 jam*
1 x 3kW pemasak	*1 jam*
1 x 700 watt peti sejuk	*24 jam*

Jadual 1

Kirakan jumlah bayaran dalam sebulan menggunakan tariff kadar samarata di mana kadarnya adalah 23 sen seunit untuk lampu dan 15 sen seunit untuk kuasa.

[8 marks]
[8 markah]

QUESTION 2

SOALAN 2

CLO1
C1

a) Define over current protection.
Definisikan perlindungan arus lebihan.

[5 marks]
[5 markah]

CLO2
C2

b) Differentiate the following devices:
i) Fuse
ii) Circuit breaker
Bezakan di antara peralatan di bawah;
i) Fius
ii) Pemutus litar

[8 marks]
[8 markah]

CLO2
C3

c) List **THREE (3)** principles of operation for each device below:
*Senaraikan **TIGA (3)** prinsip setiap operasi peralatan di bawah:*
i) Fuse
Fius
ii) Circuit breaker
Pemutus litar

[12 marks]
[12 markah]

SECTION B: 50 MARKS

BAHAGIAN B: 50 MARKAH

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1

SOALAN 1

CLO1 C1

(a) List **FIVE (5)** categories of a final circuit.

*Senaraikan **LIMA (5)** kategori litar akhir.*

[5 marks]

[5 markah]

CLO1 C2

(b) Sketch the following:

Lakarkan perkara berikut:

i. Circuit diagram for one lamp controlled by 2 switches used in shared toilets.

Diagram bagi litar satu lampu yang dikawal oleh dua suis yang digunakan untuk 2 bilik yang berkongsi bilik air.

ii. Circuit diagram for one lamp controlled by one switch used in bedrooms.

Diagram bagi litar satu lampu dikawal oleh satu suis seperti yang digunakan untuk bilik-bilik tidur.

[8 marks]

[8 markah]

CLO2 C3

(c) En. Maslan plans to build a bungalow house. He wants his bungalow to be equipped with the following electrical appliance:

En Maslan merancang untuk membina sebuah rumah banglo. Dia ingin rumah tersebut dilengkapi dengan kelengkapan berikut:

i. Lamp: 15 units of 60 W fluorescent lamp

Lampu: 15 unit 60W lampu kalimantang

ii. Socket outlet: 10 units 13A switch socket outlet

Soket keluaran: 10 unit 13A soket keluaran

iii. Air conditioner: 3 units split type 2 HP air conditioner

Pendingin hawa: 3 unit 2 kuasa kuda pendingin hawa jenis unit terpisah

iv. Cooker: 1 unit 2 kW oven

Pemasak: 1 unit 2kW oven

Calculate the current demand of En. Maslan's bungalow taking into consideration the diversity factor. (Refer to Table 4.1)

Kirakan jumlah arus yang diperlukan untuk banglo tersebut dengan mengambil kira faktor kepelbagaian. (Rujuk Jadual 4.1)

[12 marks]

[12 markah]

QUESTION 2

SOALAN 2

CLO1 C1

(a) i) Define wiring cable.

Definisikan kabel pendawaian.

[2 marks]

[2 markah]

CLO2 C2

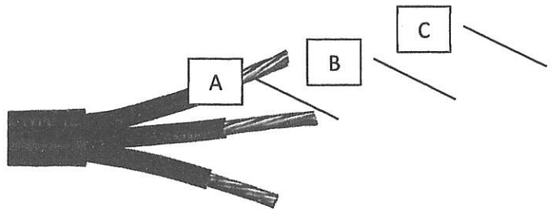

Figure 1

ii) Name the parts of a cable shown in Figure 1.

Namakan bahagian kabel yang ditunjukkan pada Rajah 1.

[3 marks]

[3 markah]

CLO2 C3

(b) i) Identify **FOUR (4)** colour codes for cable.

*Kenalpasti **EMPAT (4)** kod warna bagi kabel.*

[4 marks]

[4 markah]

ii) Identify **FOUR (4)** types of cable.

*Kenalpasti **EMPAT (4)** jenis kabel.*

[4 marks]

[4 markah]

CLO 1 C3

(c) i) The Level of voltage for a cable is 600/1000. Interpret the meaning of 600 and 1000.

Kadaran voltan kabel adalah 600/1000. Tafsirkan maksud 600 dan 1000.

[4 marks]

[4 markah]

ii) Calculate the size of cable in mm^2 unit if the number of cable and diameter is 7/1.35.

Kirakan saiz kabel dalam unit mm^2 sekiranya bilangan kabel dan diameter ialah 7/1.35.

[8 marks]

[8 markah]

QUESTION 3

SOALAN 3

CLO1 C2

(a) Name **FIVE (5)** types of building wiring.

*Namakan **LIMA (5)** jenis pendawaian bangunan.*

[5 marks]

[5markah]

CLO1 C3

(b) Discuss **FOUR (4)** factors to be considered before the selection of building wiring type can be made.

*Bincangkan **EMPAT (4)** faktor yang diambilkira sebelum pemilihan jenis pendawai bagi sesebuah bangunan dibuat.*

[8 marks]

[8 markah]

(c) Show **THREE (3)** IEE Regulations for the following:

i. Switch
ii. Lamp holder
iii. Socket outlet
iv. Ceiling Rose

*Tunjukkan **TIGA (3)** Peraturan IEE bagi perkara berikut:*

i. *Suis*
ii. *Pemegang lampu*
iii. *Soket keluaran*
iv. *Ros siling*

[12 marks]

[12 markah]

QUESTION 4

SOALAN 4

CLO1 C1

(a) List **FIVE (5)** things that can be excluded from earthing.

*Senaraikan **LIMA (5)** perkara yang boleh dikecualikan dari dibumikan.*

[5 marks]

[5 markah]

CLO 2 C2

(b) A ring final circuit using PVC insulated cable and copper is protected by a 30A for rewireable fuses. The supply voltage is 240V. Determine the minimum conductor circuit size protection if the operating time is 0.4 seconds, given that the maximum impedance (Zs) is 1.1 ohm and value for k pvk cable is 115.

Suatu litar akhir gelang menggunakan kabel berpenebat PVK bersalut kuprum yang dilindungi oleh 30 A fius yang boleh didawaikan. Voltan bekalan ialah 240V. Tentukan saiz minimum pengalir perlindungan litar sekiranya masa kendalian ialah 0.4 saat. Diberi galangan maksima (Zs) iailah 1.1 ohm dan nilai k nagi kabel pvk ialah 115.

[8 marks]

[8 markah]

CLO 2 C3

(c) En. Muhammad received the key for his new house. He would like to check whether the connection of conductor phase, neutral and earth in switch socket outlet are connected to the right terminal points. With the aid of diagram, choose an appropriate testing method to help En. Muhammad check his switch socket outlet.

En Muhammad baru mendapat kunci rumah baharunya. Beliau ingin memeriksa samada sambungan pada pengalir fasa, neutral dan bumi pada soket alur keluar disambungkan pada punca yang betul. Terangkan beserta gambarajah ujian yang bersesuaian untuk membantu En Muhammad melakukan pemeriksaan terhadap soket alur keluar tersebut.

[12 marks]

[12 markah]

SOALAN TAMAT

Table 4.1 *Table of typical allowances for diversity (IEE On-site guide, Table 1B)*

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 10 A +50% of any current demand in excess of 10 A	100% f.l. of largest appliance +75% of remaining appliances	100% f.l. of largest appliance +80% f.l. of second largest appliance +60% of remaining appliances
3 Cooking appliances	10 A +30% f.l. of connected cooking appliances in excess of 10 A +5 A if socket-outlet incorporated in unit	100% f.l. of largest appliance +80% f.l. of second largest appliance +60% f.l. of remaining appliances	100% of largest appliance +80% f.l. of second largest appliance +60% f.l. of remaining appliances
4 Motors (other than lift motors which are subject to special consideration)		100% f.l. of largest motor +80% f.l. of second largest motor +60% f.l. of remaining motors	100% f.l. of largest motor +50% f.l. of remaining motors
5 Water heaters (instantaneous type)*	100% f.l. of largest appliance +100% of second largest appliance +25% f.l. of remaining appliance	100% f.l. of largest appliance +100% of second largest appliance +25% f.l. of remaining appliances	+100% f.l. of largest appliance +100% of second largest appliance +25% f.l. of remaining appliances
6 Water heaters (thermostatically controlled)	NO DIVERSITY ALLOWABLE†		
7 Floor warming installations	NO DIVERSITY ALLOWABLE†		
8 Thermal storage space heating installations	NO DIVERSITY ALLOWABLE†		
9 Standard arrangements of final circuits in accordance with IEE Appendix 5	100% of current demand of largest circuit +40% of current demand of every other circuit	100% of current demand of largest circuit +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 +40% of current demand of every other point of utilisation	100% of current demand of largest point of utilisation +75% of current demand of every other point of utilisation	100% of current demand of largest point of utilisation +75% of current demand of every point in main rooms (dining rooms, etc.) +40% of current demand of every other 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.