SULIT

KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

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

JABATAN KEJURUTERAAN ELEKTRIK

PEPERIKSAAN AKHIR

SESI I : 2024/2025

DET10013 : ELECTRICAL TECHNOLOGY

TARIKH : 08 DISEMBER 2024
MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas ini mengandungi **TUJUH (7)** halaman bercetak.
Bahagian A: Struktur (4 soalan)
Bahagian B: Esei (1 soalan)
Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A : 80 MARKS

BAHAGIAN A : 80 MARKAH

INSTRUCTION:

This section consists of **FOUR (4)** subjective questions. Answer **ALL** questions.

ARAHAN :

*Bahagian ini mengandungi **EMPAT (4)** soalan subjektif. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO 1 (a) With the aid of suitable diagram, state the definition of parallel circuit.
Dengan bantuan rajah yang sesuai, nyatakan definisi litar selari.

[4 marks]
[4 *markah*]

CLO 1 (b) Explain the Ohm's Law with the aid of a diagram and relevant formula.
Terangkan Hukum Ohm dengan bantuan rajah dan formula yang berkaitan.

[6 marks]
[6 *markah*]

CLO 1 (c) The circuit shown in Figure A1(c) is a series-parallel circuit. Calculate the current flowing through the 600Ω resistor by using Current Divider Rule method.
Litar yang ditunjukkan dalam Rajah A1(c) ialah litar siri selari. Kirakan arus yang mengalir melalui perintang 600Ω dengan menggunakan kaedah Peraturan Pembahagi Arus.

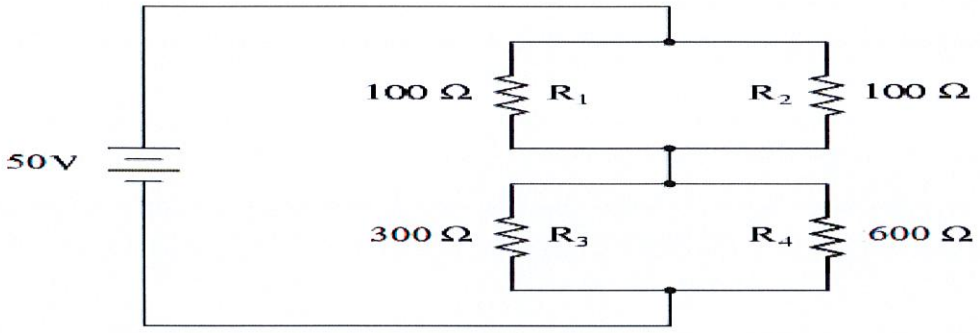

Figure A1(c) /*Rajah A1(c)*

[10 marks]

[10 *markah*]

QUESTION 2

SOALAN 2

CLO 1 (a) Define a capacitor and list **THREE (3)** types of capacitors.
*Takrifkan pemuat dan senaraikan **TIGA (3)** jenis pemuat.*

[4 marks]

[4 *markah*]

CLO 1 (b) Based on Figure A2(b), simplify the circuit to get the total capacitance.
Merujuk kepada Rajah A2(b), permudahkan litar untuk mendapatkan jumlah kemuatan.

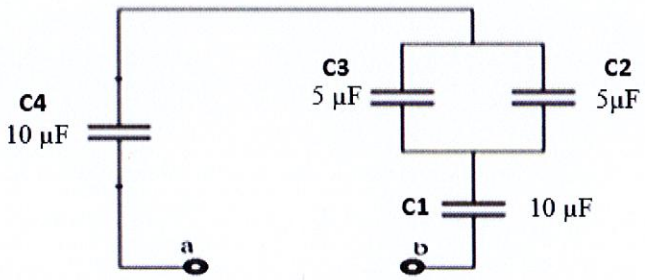

Figure A2(b) /*Rajah A2(b)*

[6 marks]

[6 *markah*]

CLO 1 (c) Based on Figure A2(c), if the switch (SW) is switched to node a at t = 0s, calculate the instantaneous value of current when t = 9ms.
Merujuk kepada Rajah A2(c), *suis dialihkan kepada titik a pada t=0s. Kirakan nilai serta-merta arus apabila t = 9ms.*

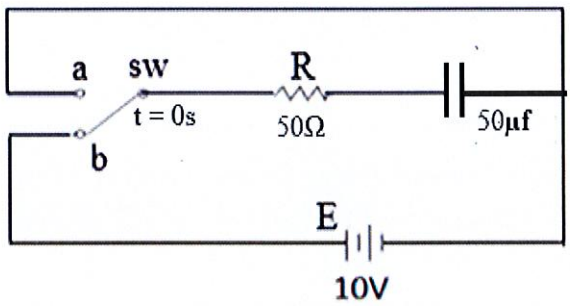

Figure A2(c) /*Rajah A2(c)*

[10 marks]

[10 *markah*]

QUESTION 3

SOALAN 3

CLO 1 (a) With the aid of circuit diagram, state the formula for total inductance in series and parallel connections.

Dengan bantuan gambar rajah litar, nyatakan formula bagi jumlah kearuhan dalam sambungan bersiri dan selari.

[4 marks]

[4 *markah*]

CLO 1 (b) Based on Figure A3(b), simplify the circuit to obtain the total inductance.

Berdasarkan Rajah A3(b), permudahkan litar tersebut untuk mendapatkan jumlah kearuhan.

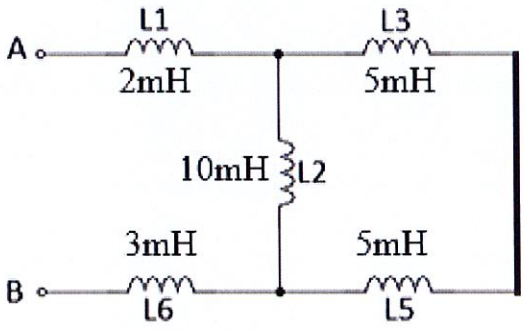

Figure A3(b) / *Rajah A3(b)*

[6 marks]

[6 *markah*]

CLO 1

(c) Based on Figure A3(c), calculate the instantaneous value of current when t = 10ms and the maximum energy stored by the inductor when the switch is closed.

Berdasarkan Rajah A3(c), kirakan nilai arus seketika apabila t = 10ms dan tenaga maksimum yang disimpan oleh induktor apabila suis ditutup.

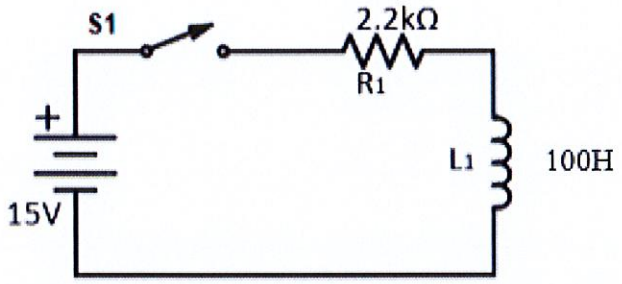

Figure A3(c) / *Rajah A3(c)*

[10 marks]

[10 *markah*]

QUESTION 4

SOALAN 4

CLO 1

(a) Describe **TWO (2)** methods to determine the direction of a magnetic field.

*Nyatakan **DUA (2)** kaedah untuk menentukan arah medan magnet.*

[4 marks]

[4 *markah*]

CLO 1

(b) Explain the direction of magnetic field formed when the current flowing through the conductor as shown in Figure A4(b).

Terangkan arah medan magnet yang terbentuk apabila arus mengalir melalui konduktor seperti yang ditunjukkan dalam Rajah A4(b).

Inflow direction

Arah arus masuk

Outflow direction

Arah arus keluar

Figure A4(b) / *Rajah A4(b)*

[6 marks]

[6 *markah*]

CLO 1

(c) Based on Figure A4(c), calculate the current flowing through the 6Ω and 8Ω resistor by using Current Divider Rule method.

Berdasarkan Rajah A4(c), kirakan arus yang mengalir melalui perintang 6Ω dan 8Ω dengan menggunakan kaedah Peraturan Pembahagi Arus.

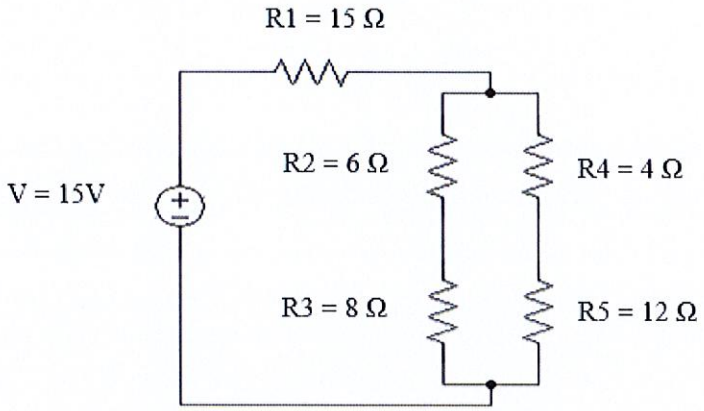

Figure A4(c) / *Rajah A4(c)*

[10 marks]

[10 *markah*]

SECTION B : 20 MARKS

BAHAGIAN B : 20 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

CLO 1

Referring to the circuit shown in Figure B1, calculate the current flows through the 9Ω resistor by using Kirchoff's Law and the power dissipated in the 8Ω resistor.

Merujuk kepada litar yang ditunjukkan dalam Rajah B1, kirakan arus yang mengalir melalui perintang 9Ω menggunakan Hukum Kirchoff dan kuasa yang hilang dalam perintang 8Ω.

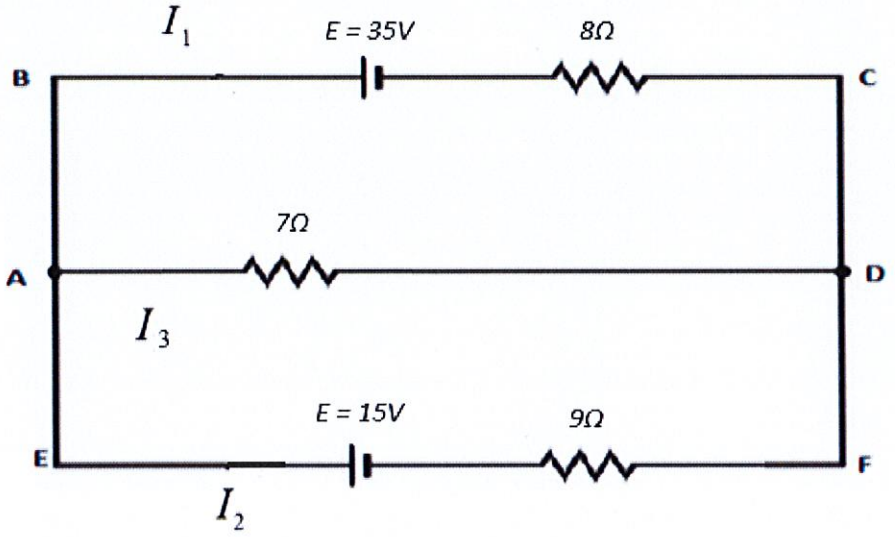

Figure B1/*Rajah B1*

[20 marks]

[*20 markah*]

SOALAN TAMAT

APPENDIX – Related Formulas

$$Q = It$$

$$R = \frac{\rho l}{A}$$

$$V = IR$$

$$P = IV$$

$$R_T = R_1 + R_2 + \cdots + R_n$$

$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}}$$

$$W = Pt$$

$$C = \frac{Q}{V}$$

$$E = \frac{V}{d}$$

$$D = \frac{Q}{A}$$

$$C = \frac{\varepsilon_r \varepsilon_0 A}{d}$$

$$\varepsilon = \varepsilon_0 \varepsilon_r = \frac{D}{E}$$

$$\varepsilon_0 = 8.854 \times 10^{-12}$$

$$\tau = RC$$

$$E_C = \frac{1}{2} CV^2$$

$$v_C(t) = V_{max}(1 - e^{-t/\tau})$$

$$i_C(t) = I_{max}\,(e^{-t/\tau})$$

$$v_C(t) = V_{max}(e^{-t/\tau})$$

$$i_C(t) = -I_{max}\,(e^{-t/\tau})$$

$$E = -L\frac{dI}{dt}$$

$$E = -N\frac{d\phi}{dt}$$

$$L = \frac{N\phi}{I}$$

$$\tau = \frac{L}{R}$$

$$L = \frac{N^2 \mu_r \mu_0 A}{l}$$

$$\mu = \mu_0 \mu_r$$

$$\mu_0 = 4\pi \times 10^{-7}$$

$$i_L(t) = I_{max}(1 - e^{-t/\tau})$$

$$E_L = \frac{1}{2} LI^2$$

$$i_L(t) = I_{max}(e^{-t/\tau})$$

$$F_m = IN$$

$$H = \frac{F_m}{l}$$

$$B = \frac{\phi}{A}$$

$$S = \frac{F_m}{\phi}$$

$$\mu = \frac{B}{H}$$

$$S = \frac{l}{\mu_0 \mu_r A}$$