

**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 : 2025/2026**

**BEU10373: ELECTRICAL TECHNOLOGY**

**TARIKH : 30 JANUARI 2026**

**MASA : 9.00 PAGI – 12.00 TENGAH HARI  
(3 JAM)**

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Kertas soalan ini mengandungi **SEPULUH(10)** halaman bercetak.

Bahagian A: Subjektif (4 soalan)

Bahagian B: Esei (1 soalan)

Dokumen sokongan yang disertakan : ~~Kertas Graf~~, Formula dsb / ~~Tiada~~

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**

**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**

CLO1

- (a) Define Ohm's Law with the aid of a suitable formula.

*Takrifkan Hukum Ohm dengan bantuan formula yang sesuai*

[4 marks]

[4 markah]

CLO1

- (b) Based on the Figure A1(b), simplify the circuit to obtain the total resistance ( $R_t$ ) and total current ( $I_t$ ) flowing in this circuit.

*Berdasarkan Rajah A1(b), ringkaskan litar untuk mendapatkan rintangan keseluruhan ( $R_t$ ) dan arus keseluruhan ( $I_t$ ) yang mengalir dalam litar ini.*

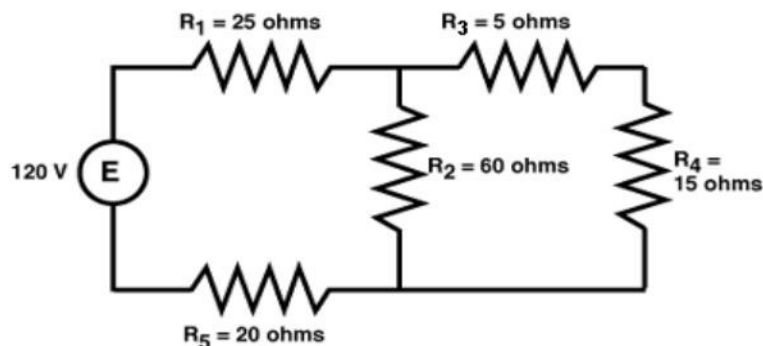


Figure A1(b)/ Rajah A1(b)

[6 marks]

[6 markah]

CLO1

- (c) A prime application for  $\Delta$ -Y conversion is in the solution of unbalanced bridge circuits such as the one below. Based on Figure A1, calculate the total resistance.

*Aplikasi utama untuk penukaran  $\Delta$ -Y adalah dalam penyelesaian litar jambatan tidak seimbang seperti litar di bawah. Berdasarkan Rajah A1, hitung jumlah rintangan.*

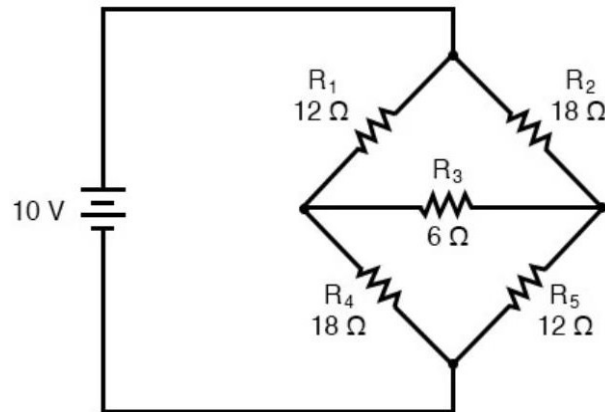


Figure A1(c)/ Rajah A1(c)

[10 marks]

[10 markah]

## QUESTION 2

## SOALAN 2

CLO1

- (a) State the fundamental principle of Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL).

*Nyatakan prinsip asas bagi Hukum Arus Kirchhoff (KCL) dan Hukum Voltan Kirchhoff (KVL).*

[ 4 marks]

[4 markah]

CLO1

- (b) Based on Figure A2(b), simplify the circuit to obtain the voltage across, the electric charge on, and the energy stored by each capacitor.

*Berdasarkan Rajah A2(b), ringkaskan litar untuk mendapatkan voltan merentasi, cas elektrik pada, dan tenaga yang disimpan oleh setiap kapasitor.*

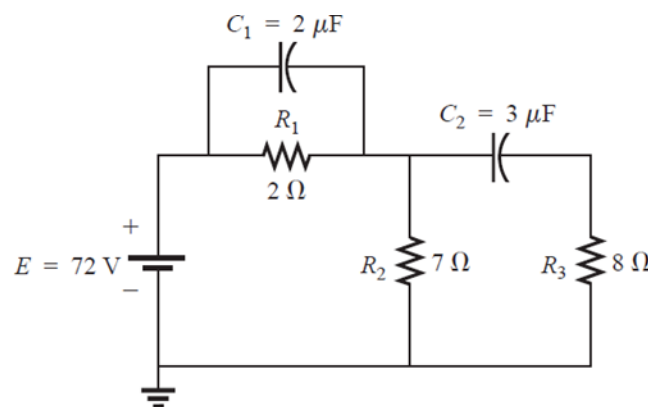


Figure A2(b)/ Rajah A2(b)

[6 marks]

[6 markah]

CLO1

- (c) Figure A2(c) shows a circuit that has two voltage sources, 8V and 1V, connected with a number of resistors. Calculate the values of voltage V1 and V2 using Node Analysis and current I1, I2 and I3 using Mesh Analysis.

Rajah A2(c) menunjukkan litar yang mempunyai sumber voltan penarik  $8V$  dan  $1V$ , dihubungkan dengan sejumlah perintang. Hitung nilai voltan  $V_1$  dan  $V_2$  menggunakan Node Analysis dan arus  $I_1$ ,  $I_2$  dan  $I_3$  menggunakan Mesh Analysis.

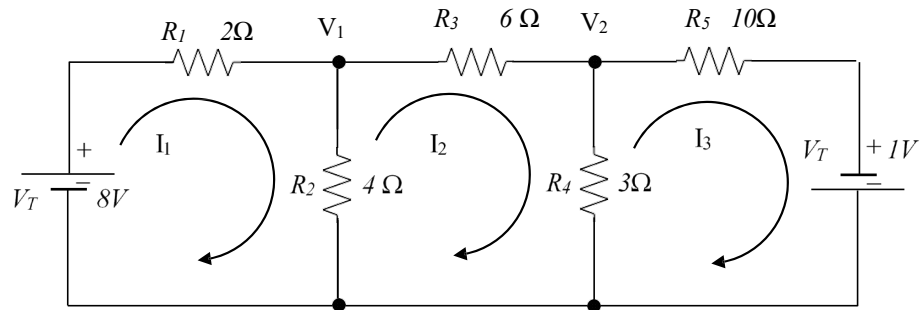


Figure A2(c)/ Rajah A2(c)

[10 marks]

[10 markah]

**QUESTION 3****SOALAN 3**

CLO1

- (a) List **TWO (2)** types of polarity capacitors and **TWO (2)** types of non-polarity capacitors.

*Senaraikan **DUA (2)** jenis pemuat berkutub dan **DUA (2)** jenis pemuat tidak berkutub.*

[4 marks]

[4 markah]

CLO1

- (b) Explain **THREE (3)** factors affecting capacitance.

*Terangkan **TIGA (3)** faktor yang mempengaruhi kemuatan.*

[6 marks]

[6 markah]

CLO1

- (c) Based on Figure A3(c), when the switch is closed, calculate the time constant, current and potential difference through the capacitor after 6 seconds and the energy stored in capacitor C1.

*Berdasarkan Rajah A3(c), apabila suis ditutup, kirakan pemalar masa, arus dan beza keupayaan melalui pemuat selepas 6 saat dan tenaga disimpan dalam pemuat C1.*

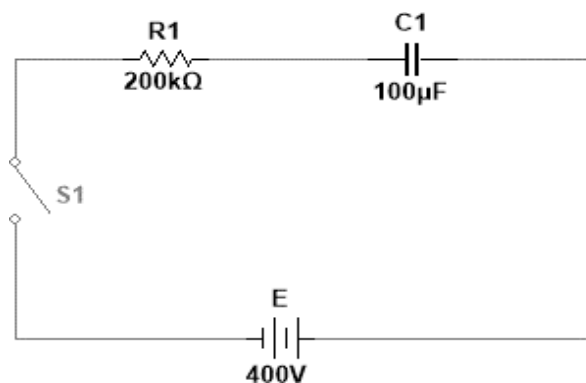


Figure A3(c)/ Rajah A3(c)

[10 marks]

[10 markah]

## QUESTION 4

## SOALAN 4

CLO1

- (a) State **FOUR (4)** factors that influence inductance.

*Nyatakan EMPAT (4) faktor yang mempengaruhi kearuhan.*

[4 marks]

[4 markah]

CLO1

- (b) Based on the Figure A4(b), simplify the total equivalent inductance for the a-b terminal.

*Berdasarkan Rajah A4(b), ringkaskan jumlah induktans setara bagi terminal a-b.*

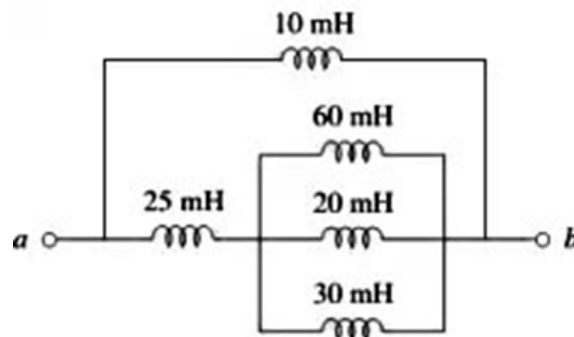


Figure A4(b)/ Rajah A4(b)

[6 marks]

[6 markah]

CLO1

- (c) Figure A4(c) shows a schematic diagram that consists of a resistive and inductive load. If the switch SW is initially connected and then switched to node b, calculate the value of R, given the time constant,  $\tau = 0.35\text{ms}$ , the maximum current rises in the inductor, the instantaneous value of current at  $t = 2.5\text{ms}$  and the maximum energy inside the inductor after decay.

*Rajah A4(c) menunjukkan satu rajah skematik yang terdiri daripada beban rintangan dan induktif. Jika suis SW pada mulanya disambungkan dan kemudian ditukar ke nod b, kira nilai R dengan diberikan pemalar masa,  $\tau = 0.35\text{ ms}$ , arus*

maksimum yang meningkat dalam induktor, nilai arus serta-merta pada  $t = 2.5$  ms, dan tenaga maksimum di dalam induktor selepas peluruhan.

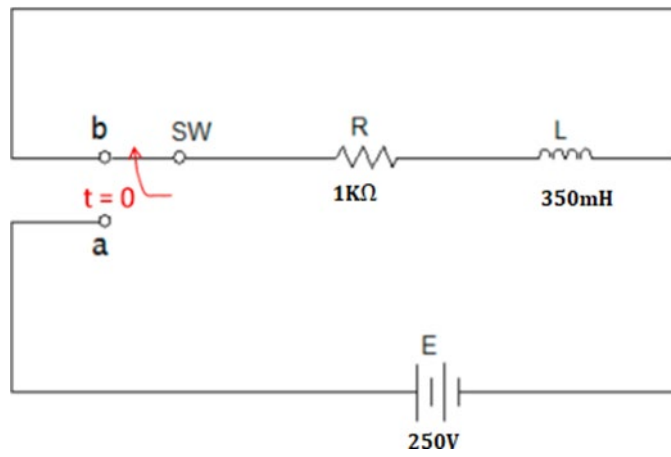


Figure A4(c)/ *Rajah A4(c)*

[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***

CLO1

- (a) A magnetic core has a mean length of 40 cm and a cross-sectional area of 6 cm<sup>2</sup>. The core is made of material with a relative permeability of 1200. Write the principle of electromagnetic induction and differentiate between self-induction and mutual induction with suitable examples. Calculate the magnetomotive force (MMF) required to establish a flux of 2.5 mWb in the core.

*Satu teras magnet mempunyai panjang purata 40 cm dan luas keratan rentas 6 cm<sup>2</sup>. Teras tersebut diperbuat daripada bahan dengan kebolehtelapan relatif sebanyak 1200. Nyatakan prinsip aruhan elektromagnet dan bezakan antara aruhan sendiri dan aruhan bersama dengan contoh yang sesuai. Kira daya gerak magnet (MMF) yang diperlukan untuk menghasilkan fluks sebanyak 2.5 mWb dalam teras tersebut.*

[20 marks]

*[20 markah]***SOALAN TAMAT**

## APPENDIX – Related Formulas

|  |   |  |
|--|---|--|
| $Q = It$   | $R = \frac{\rho l}{A}$  | $V = IR$   |
| $P = IV$   | $R_T = R_1 + R_2 + \dots + R_n$   | $R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}}$  |
| $W = Pt$   | $C = \frac{Q}{V}$   | $E = \frac{V}{d}$  |
| $I_L = \frac{V_{TH}}{R_L + R_{TH}}$                                      | $I_L = \frac{R_N}{R_N + R_L} \times I_N$  | $D = \frac{Q}{A}$  |
| $C = \frac{\epsilon_r \epsilon_0 A}{d}$                                  | $\epsilon = \epsilon_0 \epsilon_r = \frac{D}{E}$<br>$\epsilon_0 = 8.854 \times 10^{-12}$        | $\tau = RC$<br>$\tau = \frac{L}{R}$                                      |
| $\mu = \mu_0 \mu_r$<br>$\mu_0 = 4\pi \times 10^{-7}$                     | $E_C = \frac{1}{2} CV^2$  | $E_L = \frac{1}{2} LI^2$   |
| $v_C(t) = V_{max} (1 - e^{-t/\tau})$<br>$v_C(t) = V_{max} (e^{-t/\tau})$ | $i_C(t) = I_{max} (e^{-t/\tau})$<br>$i_C(t) = -I_{max} (e^{-t/\tau})$                           | $i_L(t) = I_{max} (1 - e^{-t/\tau})$<br>$i_L(t) = I_{max} (e^{-t/\tau})$ |
| $E = -L \frac{dI}{dt}$   | $E = -N \frac{d\phi}{dt}$   | $L = \frac{N\phi}{I}$  |
| $H = \frac{F_m}{l}$  | $L = \frac{N^2 \mu_r \mu_0 A}{l}$   | $F_m = IN$   |
| $\mu = \frac{B}{H}$  | $B = \frac{\phi}{A}$  | $S = \frac{F_m}{\phi}$   |
| $V_{R1} = \frac{R_1}{R_1 + R_2 + \dots + R_n} \times E$                  | $S = \frac{l}{\mu_0 \mu_r A}$   | $I_{R1} = \frac{R_2}{R_1 + R_2} \times I$                                |
| $R_T = \frac{R_1 \times R_2}{R_1 + R_2}$                                 | $I_{R1} = \frac{\frac{1}{R_1}}{\frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}} \times I$ |  |