

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 II : 2023/2024

DET10013 : ELECTRICAL TECHNOLOGY

TARIKH : 07 JUN 2024

MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **ENAM (6)** halaman bercetak.

Bahagian A: Struktur (4 soalan)

Bahagian B: Esei (1 soalan)

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

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) State the definition of electric current and the related current formula.

Nyatakan definisi arus elektrik dan formula arus yang berkaitan.

[4 marks]

[4 markah]

CLO1

- b) With a suitable circuit diagram, explain the voltage drop and the current division in the parallel circuit.

Dengan gambar rajah litar yang sesuai, terangkan kejatuhan voltan dan pembahagian arus dalam litar selari

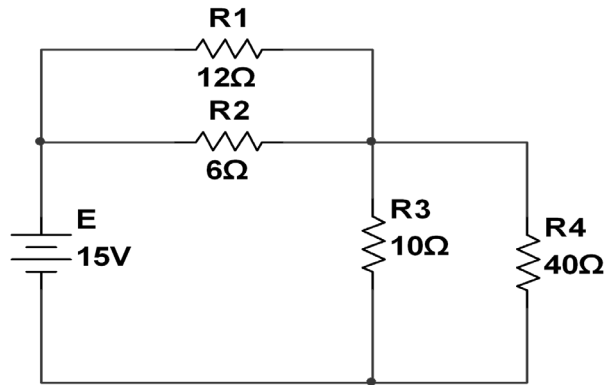
[6 marks]

[6 markah]

CLO1

- c) Figure A1(c) shows four resistors are connected in parallel-series with voltage supply 15V. By using voltage divider rule, calculate the voltage drop at resistor R1 and R4.

Rajah A1(c) menunjukkan empat perintang disambung secara selari-siri dengan bekalan voltan 15V. Dengan menggunakan peraturan pembahagi voltan, kirakan nilai kejatuhan voltan pada perintang R1 dan R4.

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

[10 marks]

[10 markah]

QUESTION 2**SOALAN 2**

CLO1

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

Senaraikan DUA (2) jenis pemuat berketub dan DUA (2) jenis pemuat tidak berketub.

[4 marks]

[4 markah]

CLO1

- b) With the aid of related formula, explain the factors affecting capacitance.

Dengan bantuan formula berkaitan, terangkan faktor yang mempengaruhi kemuatan.

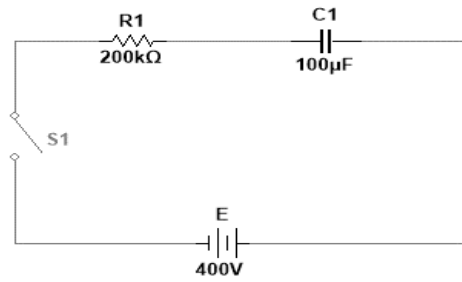
[6 marks]

[6 markah]

CLO1

- c) Based on Figure A2(c), when switch is closed, calculate the time constant, current and potential difference through the capacitor after 6 seconds and energy stored in capacitor.

Berdasarkan Rajah A2(c), apabila suis ditutup, kirakan pemalar masa, arus dan beza keupayaan melalui pemuat selepas 6 saat dan tenaga disimpan dalam pemuat.

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

[10 marks]

[10 markah]

QUESTION 3**SOALAN 3**

CLO1

- a) Describe the construction and function of an inductor.

Terangkan binaan dan fungsi peraruh.

[4 marks]

[4 markah]

CLO1

- b) With the aid of suitable diagram, express the formula for the total inductance in series and parallel connections.

Dengan bantuan gambarajah yang sesuai, nyatakan formula jumlah peraruh pada sambungan siri dan selari.

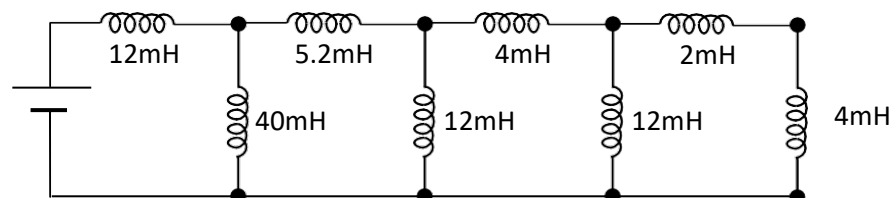
[6 marks]

[6 markah]

CLO1

- c) A voltage supply 10V is connected to eight inductors in series-parallel connection as shown in Figure A3(c). Calculate the total value of inductance for the circuit.

Bekalan voltan 10V disambungkan kepada lapan peraruh secara siri-selari seperti ditunjukkan dalam Rajah A3(c). Kirakan jumlah kearuhan untuk litar itu.

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

[10 marks]

[10 markah]

QUESTION 4

SOALAN 4

CLO1

- a) List **FOUR (4)** characteristics of magnetic field.

Senaraikan EMPAT (4) ciri medan magnet.

[4 marks]

[4 markah]

CLO1

- b) Explain the magnetic fields due to an electric current with a suitable diagram.

Terangkan medan magnet disebabkan oleh arus elektrik dengan gambarajah yang sesuai.

[6 marks]

[6 markah]

CLO1

- c) A voltage supply 30V is connected with four resistors in series-parallel connection as in Figure A4(c). Calculate the current flows at resistor R2 and R4 by using Current Divider Rule (CDR) method.

Bekalan voltan 30V disambungkan dengan empat perintang dalam sambungan siri-selari seperti dalam Rajah A4(c). Kirakan arus yang mengalir pada perintang R2 dan R4 dengan menggunakan kaedah Peraturan Pembahagi Arus (CDR).

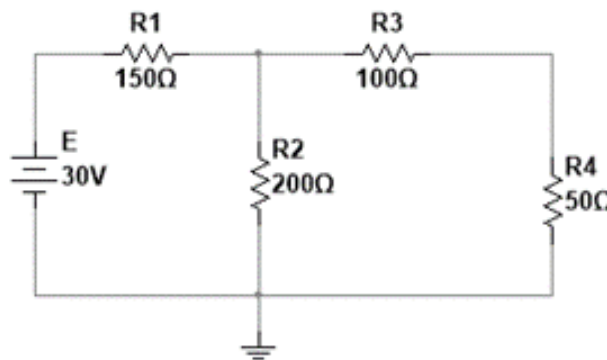


Figure A4(c) / Rajah A4(c)

[10 marks]

[10 markah]

SECTION B : 20 MARKS
BAHAGIAN B : 20 MARKAH

INSTRUCTION:

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

ARAHAN :

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

QUESTION

SOALAN

CLO1

Based on Figure B1, calculate the current flowing through resistor 5Ω by using Norton Theorem.

Berdasarkan Rajah B1, kirakan arus yang mengalir melalui perintang 5Ω dengan menggunakan Teorem Norton.

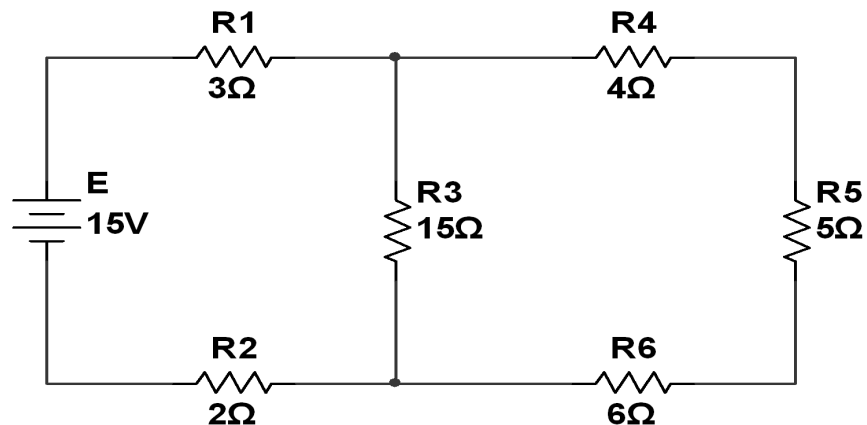


Figure B1 / *Rajah B1*

[20 marks]

[20 markah]

SOALAN TAMAT

APPENDIX – Related Formulas

$$Q = It$$

$$V = IR$$

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

$$W = Pt$$

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

$$C = \frac{\epsilon_r \epsilon_0 A}{d}$$

$$\tau = RC$$

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

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

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

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

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

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

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

$$F_m = IN$$

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

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

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

$$P = IV$$

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

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

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

$$\epsilon = \epsilon_0 \epsilon_r = \frac{D}{E}$$

$$\epsilon_0 = 8.854 \times 10^{-12}$$

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

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

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

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

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

$$\mu = \mu_0 \mu_r$$

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

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

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

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

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