

INSTRUCTION:

This section consists of **FOUR (4)** structured/short answer questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur/soalan pendek. Jawab **SEMUA** soalan.

QUESTION 1**SOALAN 1**

CLO1

- (a) State the unit and symbol for Current and Voltage.

Nyatakan unit dan simbol bagi Arus dan Voltan.

[4 marks]

[4 markah]

CLO1

- (b) Based on Figure 1 (b), given $R_1 = 10\Omega$, $R_2 = 20\Omega$ and $R_3 = 15\Omega$. If the supplied power is 120 Volt, approximate :

Berdasarkan Rajah 1(b) diberi $R_1 = 10\Omega$, $R_2 = 20\Omega$ dan $R_3 = 15\Omega$. Jika bekalan kuasa yang dibekalkan ialah 120 volt, anggarkan:

- i. Total resistance, R_T / Jumlah rintangan, R_T

[2 marks]

[2 markah]

- ii. Total current, I_T / Jumlah arus, I_T

[3 marks]

[3 markah]

- iii. Current value I_2 on R_2 / Nilai arus I_2 pada R_2

[3 marks]

[3 markah]

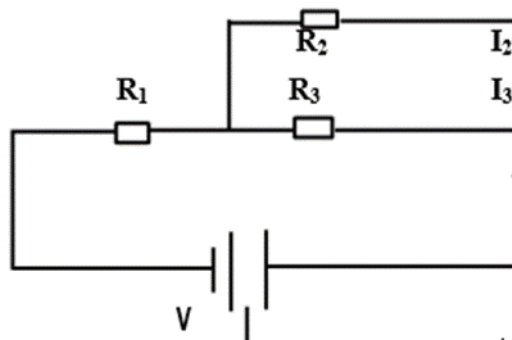


Figure1(b) / Rajah 1(b)

- (c) Calculate the current I_1 , I_2 and I_3 by applying Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) in Figure 1(c):

Kirakan arus I_1 , I_2 dan I_3 dengan menggunakan Hukum Kirchhoff Arus dan Hukum Kirchhoff Voltan dalam Rajah 1(c):

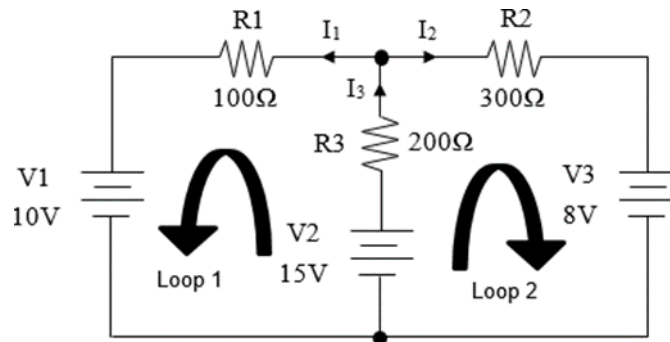


Figure 1(c) / Rajah 1(c)

Figure 1(c)/ Rajah 1(c)

[13 marks]

[13 markah]

QUESTION 2

SOALAN 2

CLO1

- (a) Define capacitor with **ONE (1)** example.

*Takrifkan pemuat dengan **SATU (1)** contoh .*

[3 marks]

[3 markah]

CLO1

- (b) Two capacitors have own their capacities which are $6\mu\text{F}$ and $10\mu\text{F}$ connected in series with a 200V power supply. Approximate:

Dua buah pemuat mempunyai kemuatan masing-masing dengan nilai $6\mu\text{F}$ dan $10\mu\text{F}$ dihubungkan bersiri dengan satu bekalan kuasa 200V. Anggarkan:

- i. Total capacitance and each capacitor charge.

Jumlah kemuatan dan cas setiap pemuat.

[5 marks]

[5 markah]

- ii. Voltage drop for each capacitor.

Bezaupaya merentasi setiap pemuat.

[6 marks]

[6 markah]

- CLO1 (c) A series RLC circuit containing a resistance of 20Ω , an inductance of $0.5H$ and a capacitor of $100\mu F$ are connected in series across a $150V$, $70Hz$ supply. Based on this information :
- Satu litar RLC yang mengandungi perintang 20Ω , satu pearuh $0.5H$ dan satu Pemuat berkapasiti $100\mu F$ telah disambungkan secara sesiri yang merentasi bekalan $150V$, $70Hz$. Berdasarkan litar ini:*
- Calculate the total circuit impedance, Z
Kira jumlah Galangan (Z) litar.

[9 marks]
[9 markah]
 - Calculate the circuit current, I .
Kirakan arus litar, I .

[2 marks]
[2 markah]

QUESTION 3**SOALAN 3**

- CLO1 (a) List **FOUR (4)** factors that affect electromagnetic strength.
*Senaraikan **EMPAT (4)** faktor yang mempengaruhi kekuatan elektromagnetik.*

[4 marks]
[4 markah]
- CLO1 (b) Explain Maxwell Screw Law and Flux Cut Conductor method with an aid of diagram.
Terangkan kaedah Hukum Skrew maxwell dan Potongan Fluk Konduktor dengan bantuan rajah.

[9 marks]
[9 markah]

CLO1

- (c) A core stainless steel of 50 cm length and cross sectional area 4 cm^2 are wound with 1000 turns coil and 5A current flowing through them. The value of relative permeability is 1200. Calculate:

Satu keluli tahan karat dengan panjang 50 cm dan luas keratan rentas 4 cm^2 dililit dengan gegelung 1000 lilitan dan arus 5A mengalir melaluinya. Nilai relative kebolehtelapan ialah 1200. Kirakan:

- i. Magnetomotive force, F_m .

Daya Gerak Magnet, F_m .

[4 marks]

[4 markah]

- ii. Magnetic Field Strength, H

Kekuatan Medan Magnet, H

[4 marks]

[4 markah]

- iii. Absolute permeability, μ .

Kebolehtelapan sebenar, μ .

[4 marks]

[4 markah]

QUESTION 4**SOALAN 4**

- | | |
|------|--|
| CLO1 | <p>(a) Define a Transformer.
<i>Takrifkan sebuah Pengubah.</i></p> <p style="text-align: right;">[4 marks]
[4 markah]</p> |
| CLO1 | <p>(b) Elaborate basic principle of a transformer with an aid of diagram.
<i>Terangkan prinsip asas pengubah dengan bantuan rajah.</i></p> <p style="text-align: right;">[10 marks]
[10 markah]</p> |
| CLO1 | <p>(c) A 50kVA, 800V/200V, 50 Hz single-phase transformer has 60 secondary turns. Calculate:
<i>Sebuah pengubah fasa tunggal 50kVA, 800V/200V, 50 Hz mempunyai 60 lilitan sekunder. Kirakan:</i></p> <p>i. Primary Current, I_p and secondary current, I_s.
<i>Arus di gegelung primer, I_p dan sekunder, I_s.</i></p> <p style="text-align: right;">[5 marks]
[5 markah]</p> <p>ii. Number of primary turns, N_p.
<i>Bilangan lilitan gegelung primer, N_p.</i></p> <p style="text-align: right;">[4 marks]
[4 markah]</p> <p>iii. Expected Ratio, K.
<i>Kira Nisbah Terjangka, K.</i></p> <p style="text-align: right;">[2 marks]
[2 markah]</p> |

SOALAN TAMAT

Formula for Basic Electrical Principles

Ohms Law:

$$V = IR \text{ or } I = \frac{V}{R} \text{ or } R = \frac{V}{I}$$

Charge: $Q = It$

Resistivity :

$$R = \frac{\rho l}{A} \text{ or } R = k \frac{l}{A} \text{ or } R = kl$$

Power :

$$P = I^2 R \text{ or } P = IV \text{ or } P = \frac{V^2}{R}$$

Electrical Energy: $E = Pt$

Resistance:

Series : $R_T = R_1 + R_2 + \dots + R_N$

Parallel : $R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_N}}$

Parallel 2 branch:

$$R_T = \frac{R_1 R_2}{R_1 + R_2}$$

Voltage divider rule (VDR):

$$V_N = \left(\frac{R_N}{R_T} \right) V_T$$

Current divider rule (CDR):

$$I_N = \left(\frac{R_T}{R_N} \right) I_T$$

Current divider rule for 2 branch:

$$I_1 = \left(\frac{R_2}{R_1 + R_2} \right) I_T \text{ or } I_2 = \left(\frac{R_1}{R_1 + R_2} \right) I_T$$

Charge on capacitor :

$$Q = CV \text{ or } C = \frac{Q}{V} \text{ or } V = \frac{Q}{C} , E = \frac{1}{2} QV$$

Capacitor in series:

$$C_T = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots + \frac{1}{C_N}}$$

Capacitor in parallel:

$$C_T = C_1 + C_2 + \dots + C_N$$

Inductor in series:

$$L_T = L_1 + L_2 + \dots + L_N$$

Inductor in parallel:

$$L_T = \frac{1}{\frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3} + \dots + \frac{1}{L_N}}$$

Capacitive reactance, X_C :

$$X_C = \frac{1}{2\pi fC}$$

Inductive reactance, X_L :

$$X_L = 2\pi fL$$

R-C series :

$$Z = \sqrt{R^2 + X_C^2} , V = IZ$$

R-L series :

$$Z = \sqrt{R^2 + X_L^2} , V = IZ$$

R-L-C series:

$$Z = \sqrt{R^2 + (X_C - X_L)^2} , V = IZ$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2} , V = IZ$$

Electromagnetic induction:

$$E = Blv \sin \theta , F_m = Hl , F_m = IN , F_m = S\phi$$

$$B = \frac{\phi}{A} , \mu = \mu_o \mu_r , \mu = \frac{B}{H}$$

$$S = \frac{F_m}{\phi} = \frac{Hl}{BA} = \frac{l}{\left(\frac{B}{H} \right) A} = \frac{l}{\mu_o \mu_r A}$$

Transformer:

$$\frac{N_2}{N_1} = \frac{V_2}{V_1} \text{ or } \frac{V_1}{V_2} = \frac{N_1}{N_2}$$

$$\frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$$

$$S = V_1 I_1 = V_2 I_2$$

$$K = \frac{N_S}{N_P} = \frac{E_S}{E_P} = \frac{V_S}{V_P}$$