

**INSTRUCTION:**

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

**ARAHAN:**

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

**QUESTION 1****SOALAN 1**

CLO1  
C1

- (a) List the colour of resistance with value of  $13\text{M}\Omega \pm 10\%$ .

*Senaraikan warna bagi perintang dengan nilai  $13\text{M}\Omega \pm 10\%$ .*

[6 marks]

[6 markah]

CLO1  
C2

- (b) Short Circuit will occur if some errors exist in the circuit. By using a diagram, explain the short circuit.

*Litar pintas akan berlaku apabila wujudnya beberapa ralat pada litar. Dengan bantuan rajah, jelaskan litar pintas tersebut.*

[7 marks]

[7 markah]

CLO1  
C3

- (c) Calculate the value of  $I_{r1}$ ,  $I_{r2}$  and  $I_R$  by referring to **Figure 1 (c)** using Kirchoff Law.

*Kira nilai  $I_{r1}$ ,  $I_{r2}$  and  $I_R$  dengan merujuk kepada **Rajah 1 (c)** menggunakan Hukum Kirchoff.*

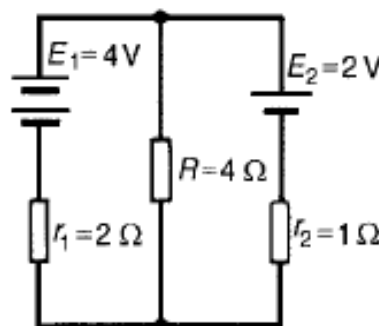


Figure 1 (c)

Rajah 1 (c)

[12 marks]

[12 markah]

## QUESTION 2

## SOALAN 2

CLO1  
C1

(a) Draw the symbol and state the unit for Inductor and Capacitor.

*Lukiskan simbol dan nyatakan unit bagi Pearuh dan Pemuat.*

[5 marks]

[5 markah]

CLO1  
C2

(b) Series circuit is a connection when there is only one path for current to flow. Calculate:

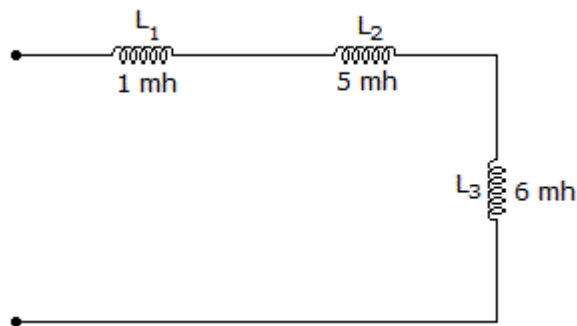
*Litar Siri adalah sambungan apabila hanya ada satu laluan bagi arus untuk mengalir.**Kira:*i. The Total Inductance in **Figure 2 (b)(i)**.*Jumlah Aruhan bagi **Rajah 2 (b)(i)**.*

Figure 2 (b)(i)

*Rajah 2 (b)(i)*

[4 marks]

[4 markah]

- ii. The Total Capacitance in **Figure 2 (b)(ii)**.

*Jumlah Kemuatan bagi **Rajah 2 (b)(ii)**.*

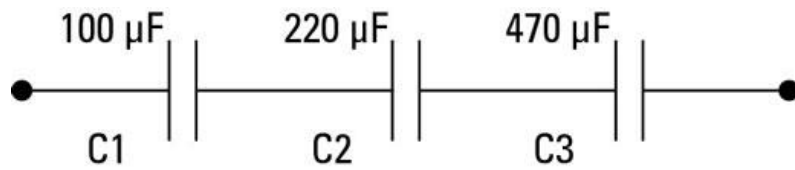


Figure 2 (b)(ii)

*Rajah 2 (b)(ii)*

[6 marks]

[6 markah]

CLO1  
C3

- (c) Calculate the Total Impedance, Z in **Figure 2 (c)**.

*Kira Jumlah Galangan, Z bagi **Rajah 2 (c)**.*

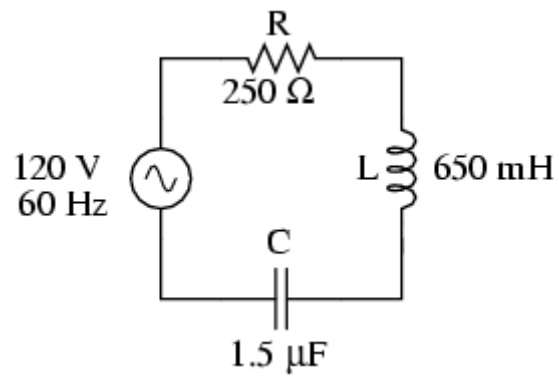


Figure 2 (c)

*Rajah 2 (c)*

[10 marks]

[10 markah]

## QUESTION 3

## SOALAN 3

CLO1  
C1

(a) Define Magnet, Magnetism and Pure Magnet.

*Definisikan Magnet, Kemagnetan, dan Magnet Tulen.*

[6 marks]

[6 markah]

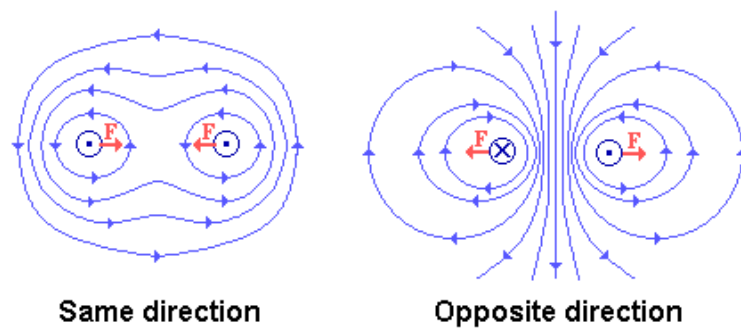
CLO1  
C2(b) Describe what happened in **Figure 3 (b)**.*Terangkan apa yang berlaku dalam **Rajah 3 (b)**.*

Figure 3 (b)

*Rajah 3 (b)*

[10 marks]

[10 markah]

CLO1  
C3

(c) One soft iron solenoid with cross sectional area of  $600\text{mm}^2$  has an average length of 300mm and is wound with 300 turns of wire with 2A current running through it. Given the relative permeability,  $\mu_r$  is 900. Calculate.

*Satu solenoid besi lembut dengan luas keratan rentas  $600\text{mm}^2$  mempunyai purata panjang 300mm dan digelung dengan 300 gelung wayar dengan arus 2A melaluinya. Diberi ketelapan relatif  $\mu_r$  adalah 900. Kira:*

i. Magnetomotive Force,  $F_m$ .

*Dayagerak Magnet,  $F_m$ .*

[3 marks]

[3 markah]

ii. Magnetic Field Strength,  $H$ .

*Kekuatan Medan Magnet,  $H$ .*

[3 marks]

[3 markah]

iii. Magnetic Flux Density,  $B$ .

*Ketumpatan Fluks Magnet,  $H$ .*

[3 marks]

[3 markah]

**QUESTION 4****SOALAN 4**CLO1  
C1

(a) Draw a schematic diagram for Step Up Transformer and Step Down Transformer.

*Lukiskan diagram skematik bagi Pengubah Langkah Naik dan Pengubah Langkah Turun.*

[6 marks]

[6 markah]

CLO1  
C2

(b) Describe Isolator (Coupling) Transformer.

*Terangkan Pengubah Pengasing.*

[9 marks]

[9 markah]

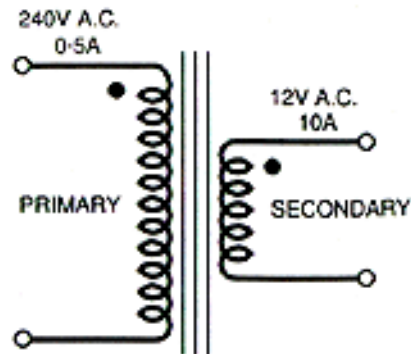
CLO1  
C3(c) **Figure 4 (c)** below shows a Transformer with 2400 Primary Turns.**Rajah 4 (c)** di bawah menunjukkan sebuah Pengubah dengan 2400 putaran Primer.

Figure 4 (c)

Rajah 4 (c)

- i. Calculate the secondary voltage,  $V_s$ .

*Kira voltan sekunder,  $V_s$ .*

[5 marks]

[5 markah]

- ii. Calculate the Expected Ratio,  $K$ .

*Kira Nisbah Terjangka,  $K$ .*

[3 marks]

[3 markah]

- iii. Relate the answer for (ii) above to the type of transformer.

*Kaitkan jawapan pada (ii) di atas dengan jenis pengubah.*

[2 marks]

[2 markah]

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:**

$$\text{Series : } R_T = R_1 + R_2 + \dots + R_N$$

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

**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:**

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

**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,  $X_C$ :**

$$X_C = \frac{1}{2\pi f C}$$

**Inductive reactance,  $X_L$ :**

$$X_L = 2\pi f L$$

**R-C series :**

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

**R-L series :**

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

**R-L-C series:**

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

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

**Electromagnetic induction:**

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

$$B = \frac{\phi}{A}, \quad \mu = \mu_0 \mu_r, \quad \mu = \frac{B}{H}$$

$$S = \frac{F_m}{\phi} = \frac{Hl}{BA} = \frac{l}{\left(\frac{B}{H}\right)A} = \frac{l}{\mu_0 \mu_r A}$$



**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:**

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

**Transformer:**

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

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

$$S = V_1 I_1 = V_2 I_2$$

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