

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1**SOALAN 1**

CLO1
C1

- (a) Identify the value of resistor in **Figure 1 (a)**.
*Kenalpasti nilai rintangan dalam **Rajah 1 (a)**.*

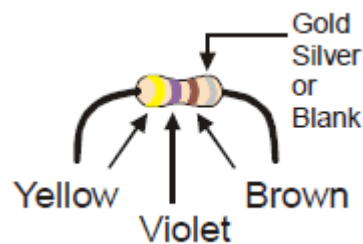


Figure 1 (a)

Rajah 1 (a)

[4 marks]

[4 markah]

CLO1
C2

- (b) There are many types of Electric Circuit. By using a diagram, explain Open Circuit.

Terdapat banyak jenis Litar Elektrik. Dengan menggunakan gambarajah, huraikan Litar Terbuka.

[8 marks]

[8 markah]

CLO1
C3

- (c) Calculate I_{R1} , I_{R2} and I_{R3} for the circuit in **Figure 1 (c)** below with the following parameter using Kirchoff Law.

*Kira I_{R1} , I_{R2} dan I_{R3} bagi litar dalam **Rajah 1 (c)** di bawah dengan parameter yang berikut menggunakan Hukum Kirchoff.*

$$V_1 = 15V$$

$$V_2 = 7V$$

$$R_1 = 20\Omega$$

$$R_2 = 5\Omega$$

$$R_3 = 10\Omega$$

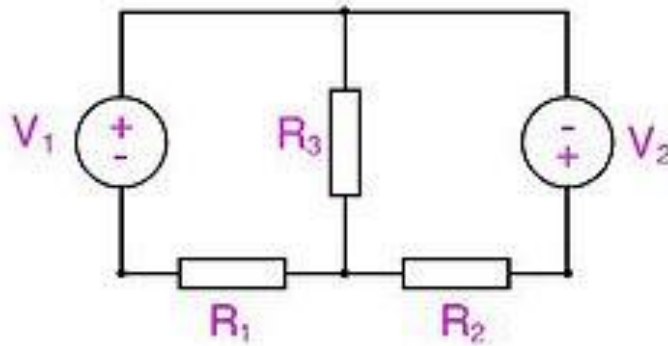


Figure 1 (c)

Rajah 1 (c)

[13 marks]

[13 markah]

QUESTION 2**SOALAN 2**CLO1
C1

- (a) Inductor is one of the most useful components in electronics. Identify the symbol and unit of inductor.

Pengaruh adalah salah satu komponen paling berguna dalam elektronik.

Kenalpasti simbol dan unit bagi pengaruh.

[3 marks]

[3 markah]

CLO1
C2

- (b) Capacitor is a component that can be used as an energy store. Explain the principles of capacitor when charging.

Pemuat adalah komponen yang boleh digunakan untuk menyimpan tenaga.

Jelaskan prinsip pemuat apabila mengecas.

[10 marks]

[10 markah]

CLO1
C3

- (c) A 12Ω resistor, $0.15H$ inductor and $100\mu F$ capacitor is connected in series with a $100V$, 50 Hz supply.

Perintang 12Ω , peraruh $0.15H$ dan pemuat $100\mu F$ disambung secara sesiri dengan bekalan $100V$, 50 Hz .

- i. Draw a complete circuit based on the characteristics stated above.

Lukiskan satu litar lengkap berdasarkan ciri-ciri di atas.

[3 marks]

[3 markah]

- ii. Calculate Inductive Reactance, X_L .

Kira Regangan Induktif, X_L .

[3 marks]

[3 markah]

- iii. Calculate Capacitive Reactance, X_C .

Kira Regangan Kapasitif, X_C .

[3 marks]

[3 markah]

- iv. Calculate Circuit Impedance, Z .

Kira Galangan litar, Z .

[3 marks]

[3 markah]

QUESTION 3**SOALAN 3**CLO1
C1

- (a) Define magnetic substance.
Definisikan bahan magnetik.

[3 marks]

[3 markah]

CLO1
C2

- (b) There are four main factors that affect electromagnetic strength. Elaborate each factor below:
Terdapat empat faktor yang memberi kesan kepada kekuatan magnet. Huraikan setiap faktor di bawah:

- i. Number of Turns.
Bilangan Putaran.

[5 marks]

[5 markah]

- ii. Current Strength.
Kekuatan Arus.

[5 marks]

[5 markah]

CLO1
C3

- (c) Part of magnetic circuit is made from steel of length 120mm, cross sectional area 15cm^2 and Relative Permeability 800. Given total magnetic flux is $200\text{ }\mu\text{Wb}$, calculate:
- Sebahagian litar magnet dibuat daripada keluli yang panjangnya 120mm, luas keratan rentas 15cm^2 dan Ketelapan Relatif 800. Diberi jumlah fluks magnet ialah $200\text{ }\mu\text{Wb}$, kira:*

- i. Absolute Permeability, μ .

Ketelapan Mutlak, μ .

[4 marks]

[4 markah]

- ii. Reluctance, S .

Engganan, S .

[4 marks]

[4 markah]

- iii. Magnetomotive Force, F_m .

Daya gerak magnet, F_m .

[4 marks]

[4 markah]

QUESTION 4**SOALAN 4**

- CLO1
C1 (a) Define Transformer.
Definisikan Pengubah. [5 marks]
[5 markah]
- CLO1
C2 (b) Compare Step Up Transformer to Isolation Transformer with an aid of a diagram.
Bandingkan Pengubah Langkah Naik dan Pengubah Pengasing dengan bantuan gambarajah. [10 marks]
[10 markah]
- CLO1
C3 (c) A Step-Up Transformer with a Primary Coil of 120 turns and Secondary Coil of 1200 turns has 240V connected to its primary.
Satu Pengubah Langkah Naik dengan Gegelung Primer sebanyak 120 pusingan dan Gegelung Sekunder sebanyak 1200 pusingan bersambung dengan 240V pada primernya.
- i. Sketch a schematic diagram of this transformer.
Lakarkan rajah skematik bagi pengubah ini. [3 marks]
[3 markah]
- ii. Calculate $V_{\text{secondary}}$.
Kira V_{sekunder} . [4 marks]
[4 markah]
- iii. Calculate Expected Ratio, K.
Kira Nisbah Terjangka, K. [3 marks]
[3 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 :

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

Inductive reactance, X_L :

$$X_L = 2\pi fL$$

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:

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

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

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

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:

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

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

$$S = V_1 I_1 = V_2 I_2$$

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