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 PETROKIMIA

PEPERIKSAAN AKHIR

SESI II : 2023/2024

DGP10013 : ELECTRICAL TECHNOLOGY

TARIKH : 28 MEI 2024
MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1

SOALAN 1

(a) List **TWO (2)** factors that affect the resistance of conductor material.

CLO1 *Senaraikan **DUA (2)** faktor yang memberi kesan kepada bahan pengalir.*

[4 marks]

[*4 markah*]

(b) A circuit is connected as in Figure 1 (b) below, approximate the value of:

CLO1 *Sebuah litar disambung seperti dalam Rajah 1(b) di bawah,anggarkan nilai:*

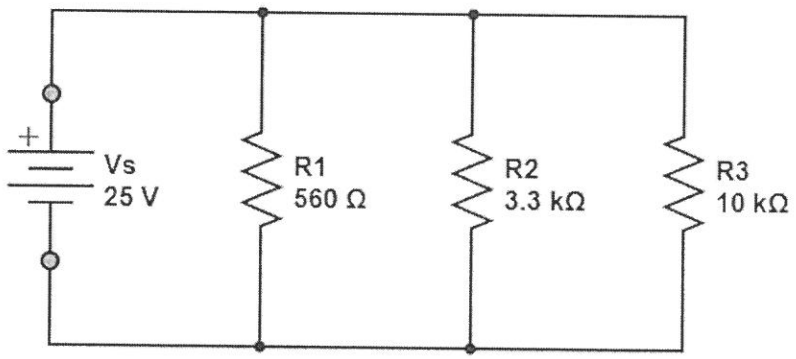


Figure 1(b)/*Rajah 1(b)*

i. Voltage on resistor R1 (V_{R1}).

Voltan pada perintang R2 (V_{R1}).

[2 marks]

[2 *markah*]

ii. Total Resistance (R_T).
Jumlah Rintangan (R_T).

[3 marks]
[3 *markah*]

iii. The current value on resistor R3 (I_{R3}), if total current is 54.72mA.
Nilai arus pada perintang R1 (I_{R1}), jika jumlah arus ialah 54.72mA.

[3 marks]
[3 *markah*]

CLO1 (c) Calculate I_1, I_2 and I_3 for the circuit in Figure 1(c) with the following parameter using Kirchoff Law:
Kira I_1, I_2 dan I_3 bagi litar dalam Rajah 1(c) dengan parameter yang berikut dengan menggunakan Hukum Kirchoff:

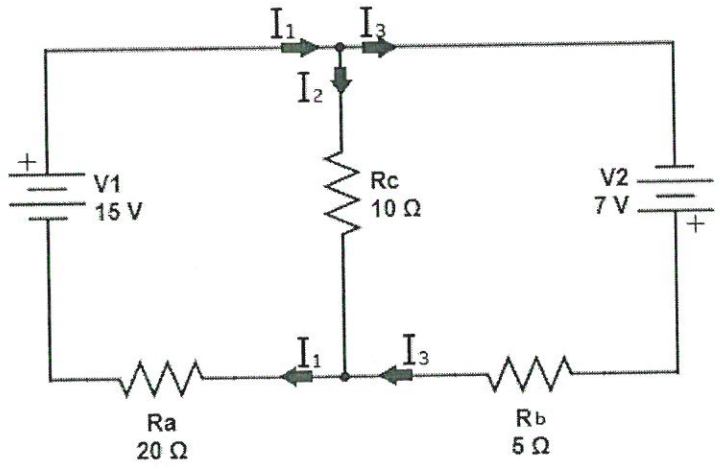


Figure 1(c)/*Rajah 1(c)*

[13 marks]
[*13 markah*]

QUESTION 2

SOALAN 2

CLO1 (a) Name a, b and c in Impedance Triangle shows in Figure 2 (a).

Namakan a, b and c dalam Segigita Galangan yang ditunjukkan dalam Rajah 2(a) .

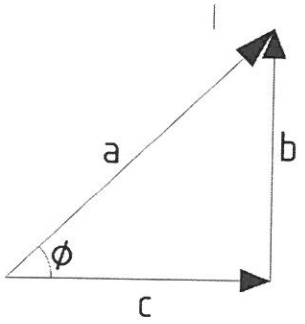


Figure 2(a)/*Rajah 2(a)*

[3 marks]

[*3 markah*]

CLO1 (b) Capacitor and Inductor, both are passive elements.

Pemuat dan Peraruh, kedua- duanya adalah elemen pasif .

i. Approximate Total Capacitance in Figure 2 (b (i)).

Anggarkan Jumlah Kemuatan dalam Rajah 2 (b (i)).

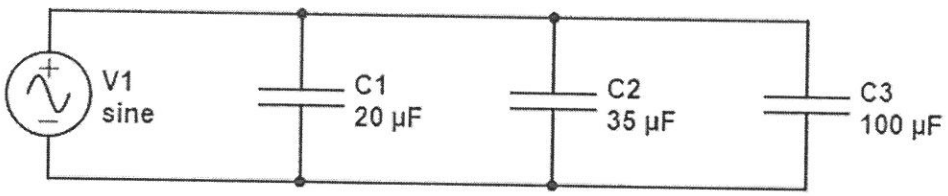


Figure 2(b (i))/*Rajah 2(b (i))*

[5 marks]

[*5 markah*]

ii. Approximate Total Inductance in Figure 2 (b (ii)).
Anggarkan Jumlah Pearuh dalam Rajah 2 (b (ii)).

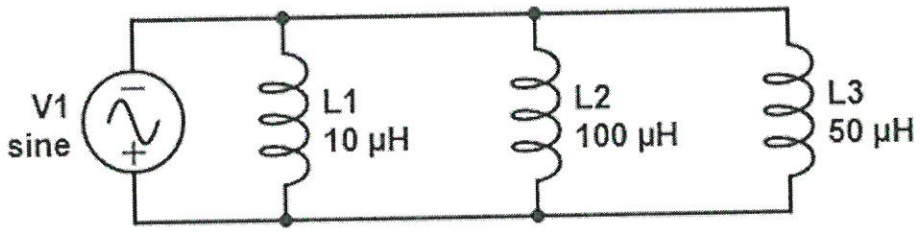


Figure 2(b (ii))/*Rajah 2(b (ii))*

[6 marks]
[6 *markah*]

CLO1 (c) Impedance is the opposition in electric circuit.
Galangan adalah halangan dalam litar elektrik.

i. Calculate Impedance (Z) by referring to Figure 2 (c (i)).
Kira Galangan (Z) dengan merujuk kepada Rajah 2 (c (i)).

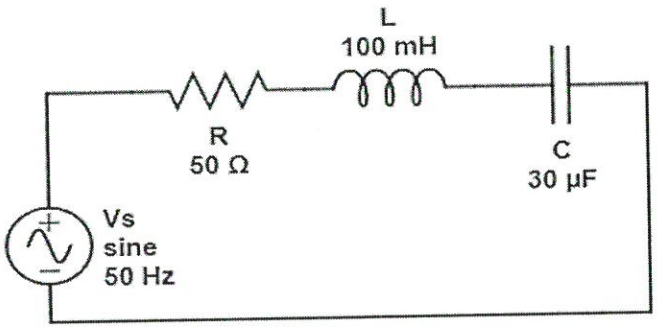


Figure 2 (c (i))
Rajah 2 (c (i))

[9 marks]
[*9 markah*]

ii. Draw Impedance Triangle for Figure 2 (c (i)).
Lukis Segitiga Galangan untuk Rajah 2 (c (i).

[2 marks]
[2 *markah*]

QUESTION 3

SOALAN 3

CLO1 (a) Define Magnetic Flux Density, B with an aid of a formula.

Definisikan Ketumpatan Fluks Magnet, B dengan bantuan formula.

[4 marks]

[4 *markah*]

CLO1 (b) Elaborate the effect of number of turns and current strength to electro-magnetic strength.

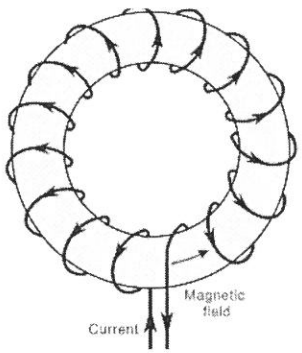
Huraikan kesan bilangan putaran dan kekuatan arus kesan kepada kekuatan electromagnet.

[9 marks]

[*9 markah*]

CLO1 (c) A coil is wound uniformly on a ring of non-magnetic material and all related information given in Figure 3 (c) , calculate:

Satu gegelung melingkari cincin bukan bahan magnet secara seragam dan semua maklumat berkaitan diberi dalam Rajah 3 (c), kira:



300 turns
Radius = 10cm
Current, I = 5A

Figure 3 (c)/*Rajah 3 (c)*

i. Length, ℓ

Panjang , ℓ

[4 marks]

[4 *markah*]

ii. Magnetic Field Strength, H
Kekuatan Medan Magnet, H

[4 marks]
[4 *markah*]

iii. Magnetomotive Force, Fm.
Daya magnetomotif, Fm.

[4 marks]
[4 *markah*]

QUESTION 4
SOALAN 4

CLO1 (a) The Transformer is classified into three types based on the voltage level produced. Name **TWO (2)** types of Transformer.
*Pengubah diklasifikasikan kepada tiga jenis, berdasrkan kepada aras voltan yang dihasilkan. Namakan **DUA (2)** jenis Pengubah.*

[4 marks]
[4 *markah*]

CLO1 (b) Explain Core Type Transformer and Shell Type Transformer with the aid of a Figure.
Bincangkan Pengubah Jenis Teras dan Pengubah Jenis Cangkerang dengan bantuan rajah.

[10 marks]
[10 *markah*]

CLO1

(c) A transformer is used to provide a 240V A.C supply. It has 120 turns on primary side and 1200 turns on secondary side as an ideal transformer.
Sebuah pengubah yang biasa membekalkan 240V bekalan AU. Ia mempunyai 120 putaran pada sebelah primer dan 1200 putaran pada sebelah sekunder sebagai pengubah ideal.

i. Calculate secondary voltage, Vs.
Kira voltan sekunder, Vs.

[4 marks]
[4 *markah*]

ii. Sketch a schematic diagram of the transformer with information given.
Lakarkan rajah skematik bagi pengubah tersebut dengan maklumat yang diberi.

[5 marks]
[5 *markah*]

iii. Calculate Expected Ratio, K.
Kira Nisbah Terjangka,K.

[2 marks]
[2 *markah*]

SOALAN TAMAT

Formula for Basic Electrical Principles

Ohms Law:

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

Charge: Q = It

Resistivity :

$$R = \frac{\rho l}{A} \; or \; \mathrm{R} = \mathrm{k}\frac{1}{A} \; or \; R = kl$$

Power :

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

Electrical Energy: E = Pt

Resistance:

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

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

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:

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

Charge on capacitor :

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

Capacitor in series:

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

Capacitor in parallel:

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

Inductor in series:

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

Inductor in parallel:

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

Capacitive reactance, Xc:

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

Inductive reactance, X_L:

$$\mathrm{X_L} = 2\pi \mathrm{fL}$$

R-C series :

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

R-L series :

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

R-L-C series:

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

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

Electromagnetic induction:

$\mathrm{E} = \mathrm{Blv}\sin\theta$, $\mathrm{F_m} = \mathrm{H}l$, $\mathrm{F_m} = \mathrm{IN}$, $\mathrm{F_m} = \mathrm{S}\emptyset$

$$\mathrm{B} = \frac{\emptyset}{A}, \quad \mu = \mu_o \mu_r \; , \mu = \frac{B}{H}$$

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

Transformer:

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

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

$$\mathrm{S} = V_1 \mathrm{I}_1 = V_2 \mathrm{I}_2$$

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