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 : 2022/2023

DGP10013 : ELECTRICAL TECHNOLOGY

TARIKH : 14 JUN 2023
MASA : 8.30 PG - 10.30 PG (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)

SULIT

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1

SOALAN 1

CLO1 (a) Define Ohm's Law using the Ohm's Law formula.

Definisikan Hukum Ohm menggunakan formula Hukum Ohm.

[4 marks]

[4 *markah*]

CLO1 (b) Approximate the value of the following entities based on the circuit in Figure 1(b).

Anggarkan nilai entiti-entiti berikut dengan merujuk kepada litar pada Rajah 1(b).

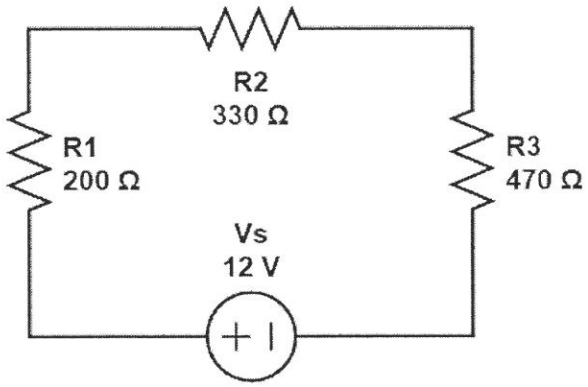

Figure 1(b) / *Rajah 1(b)*

(i) The total current, I_T.

Arus total, I_T.

[3 marks]

[*3 markah*]

(ii) The current at R2, I_{R2}.

Arus pada R2, I_{R2}.

[2 marks]

[*2 markah*]

(iii) The voltage at R3, V_{R3}.

Voltan pada R3, V_{R3}.

[3 marks]

[*3 markah*]

CLO2 (c) Calculate current I_1, I_2 dan I_3 based on the circuit given in Figure 1(c) using the Kirchoff Law's method.

Kira arus I_1, I_2 *dan* I_3 *dengan merujuk kepada Rajah 1(c), dengan menggunakan kaedah Hukum Kirchoff.*

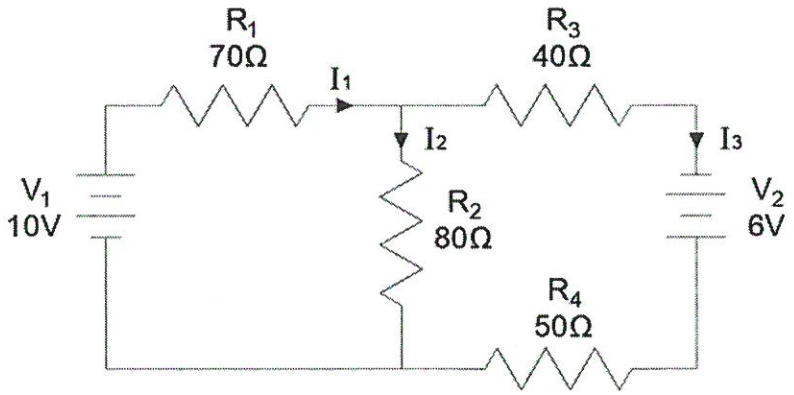

Figure 1(c) / *Rajah 1(c)*

[13 marks]

[*13 markah*]

QUESTION 2

SOALAN 2

CLO1 (a) Define Self Inductance.

Takrifkan Aruhan Kendiri.

[3 marks]
[*3 markah*]

CLO1 (b) Approximate the Total Inductance, L_T for both circuits in Figure 2(b)(i) and Figure 2(b)(ii).

Anggarkan nilai Aruhan Total, L_T bagi dua litar di Rajah 2(b)(i) dan Rajah 2(b)(ii).

(i)

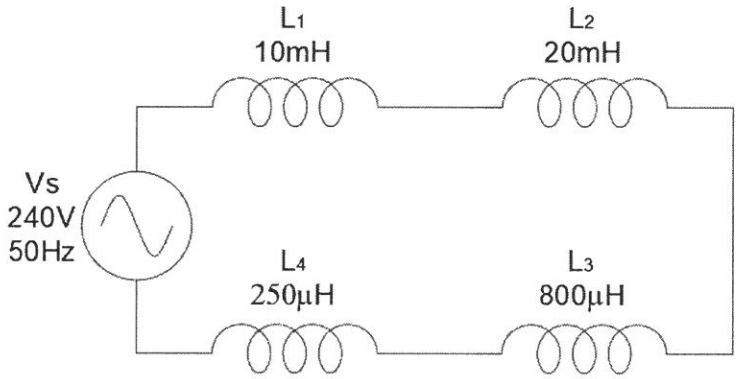

Figure 2(b)(i) / *Rajah 2(b)(i)*

[5 marks]
[*5 markah*]

(ii)

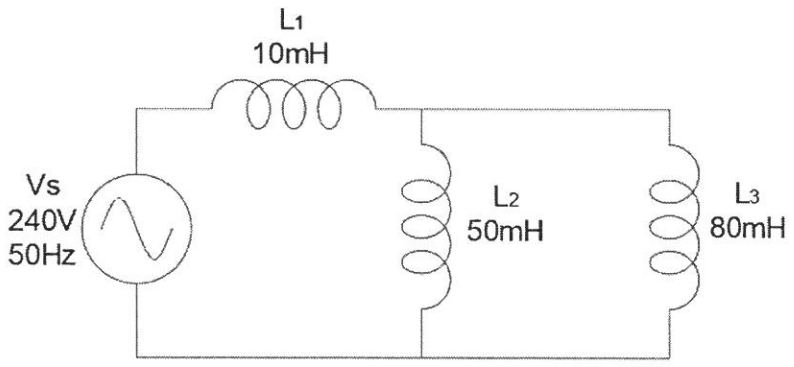

Figure 2(b)(ii) / *Rajah 2(b)(ii)*

[6 marks]
[*6 markah*]

CLO2 (c) Refer to Figure 2(c) below.

Rujuk Rajah 2(c) di bawah.

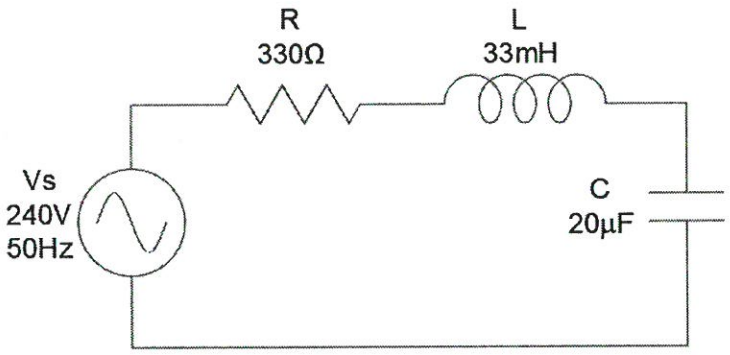

Figure 2(c) / *Rajah 2(c)*

(i) Calculate the Impedance, Z.

Kira Galangan, Z.

[9 marks]
[9 *markah*]

(ii) Sketch the Impedance Triangle with complete labeling.

Lakarkan Segitiga Galangan yang lengkap berlabel.

[2 marks]
[2 *markah*]

QUESTION 3

SOALAN 3

CLO1 (a) Describe Magnetic Flux.

Jelaskan Fluks Magnetik.

[4 marks]
[*4 markah*]

CLO1 (b) Explain Lenz Law with the aid of a suitable diagram.

Terangkan Hukum Lenz dengan bantuan rajah yang sesuai.

[9 marks]
[*9 markah*]

CLO2 (c) A Current of 30mA is passing through a 700 turns Coil wound with a radius of 4cm.

Suatu Arus 30mA melalui satu Gegelung yang mempunyai 700 lingkaran dengan jejari 4cm.

(i) Calculate Average Length, l

Kira Panjang Purata, l

[4 marks]
[*4 markah*]

(ii) Calculate Magnetomotive Force, F_m

Kira Kuasa Magnetomotif, F_m

[4 marks]
[4 *markah*]

(iii) Calculate Magnetic Field Strength, H

Kira Kekuatan Medan Magnet, H

[4 marks]
[*4 markah*]

QUESTION 4

SOALAN 4

CLO1 (a) Describe **TWO (2)** functions of Transformer.

*Terangkan **DUA (2)** fungsi Pengubah.*

[4 marks]
[*4 markah*]

CLO1 (b) Compare Step-Down Transformer to Step-Up Transformer using a suitable diagram.

Bandingkan Pengubah Langkah-Naik dengan Pengubah Langkah-Turun menggunakan rajah yang sesuai.

[10 marks]
[*10 markah*]

CLO2 (c) A Transformer has 1500 primary turns connected to a 1.1 kV supply and the Expected Ratio of the Transformer is 0.2. By assuming the Transformer is ideal,

Sebuah Pengubah yang mempunyai 1500 lilitan utama bersambung dengan bekalan 1.1kV dan Nisbah Terjangka ialah 0.2. Dengan menganggap Pengubah adalah ideal,

(i) Calculate the Secondary Turns and Secondary Voltage.
Kira Lilitan Sekunder dan Voltan Sekunder.

[5 marks]
[*5 markah*]

(ii) Sketch the Transformer with complete labelling.
Lakarkan Pengubah dengan label yang lengkap.

[4 marks]
[*4 markah*]

(iii) Write the type of Transformer.
Tuliskan jenis Pengubah.

[2 marks]
[*2 markah*]

SOALAN TAMAT

FORMULA FOR BASIC ELECTRICAL PRINCIPLES

Ohm's Law:

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

Charge:

Q = It

Resistivity:

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

Power:

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

Electrical Energy: E = Pt

Resistance in Series Circuit:

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

Resistance in Parallel Circuit:

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

Resistance in Parallel for 2 Branches:

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

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 Branches:

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

Charge on Capacitor:

$$Q = CV \; or \; C = \frac{Q}{V} \; or \; V = \frac{Q}{C}$$

$$E = \frac{1}{2} QV$$

Capacitor in Series Circuit:

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

Capacitor in Parallel Circuit:

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

Inductor in Series Circuit:

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

Inductor in Parallel Circuit:

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

Capacitive Reactance:

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

Inductive Reactance:

$$X_L = 2\pi f L$$

R-C Series Circuit:

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

R-L Series Circuit:

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

R-L-C Series Circuit:

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

Or

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

Electromagnetic Induction:

$$E = Blv\sin\theta$$

$$F_m = Hl \;,\; F_m = IN \;,\; F_m = S\emptyset$$

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

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

Transformer:

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

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

$$S = V_1 I_1 = V_2 I_2$$

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