SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENGAJIAN TINGGI

JABATAN KEJURUTERAAN PETROKIMIA

PEPERIKSAAN AKHIR

SESI II : 2021 / 2022

DGP10013 : ELECTRICAL TECHNOLOGY

TARIKH : 3 JULAI 2022
MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **ENAM (6)** 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)** structured questions. Answer **ALL** questions.

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

QUESTION 1
SOALAN 1

CLO1
C1

(a) Define Ohm's Law using the Ohm's Law formula.
Takrifkan Hukum Ohm menggunakan formula Hukum Ohm.

[4 mark]
[*4 markah*]

CLO1
C2

(b) Explain Parallel Circuit with the aid of a complete labeled circuit. The circuit must include a DC Power Supply, Resistor R_1 and Resistor R_2.
Terangkan Litar Selari dengan bantuan litar yang lengkap berlabel. Litar tersebut mesti mengandungi satu Bekalan Kuasa AT, Perintang R_1 dan Perintang R_2.

[8 marks]
[*8 markah*]

CLO1
C3

(c) Calculate current I_1, I_2 dan I_3 based on the circuit given in Diagram 1(i) by using the Kirchoff Law's method.
Kira arus I_1, I_2 dan I_3 dengan merujuk kepada Rajah 1(i), dengan menggunakan kaedah Hukum Kirchoff

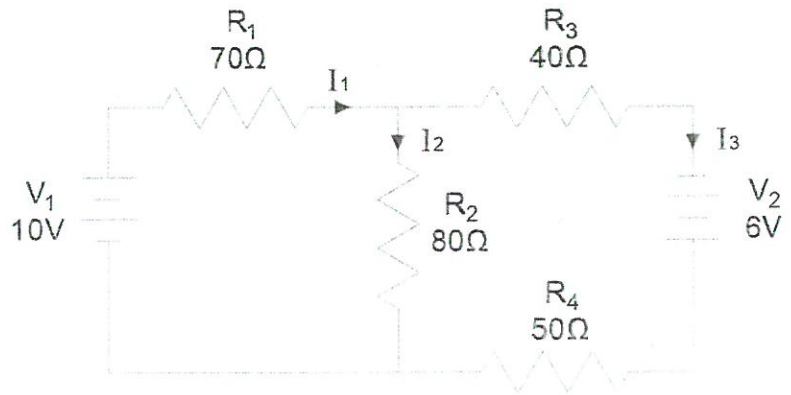

Diagram 1(i)
Rajah 1(i)

[13 marks]
[*13 markah*]

QUESTION 2
SOALAN 2

CLO1 C1

(a) Define Self Inductance.

Takrifkan Aruhan Kendiri.

[3 marks]
[*3 markah*]

CLO1 C2

(b) Approximate the Total Inductance, L_T for the following circuit.

Anggarkan nilai Aruhan Total, L_T bagi litar berikut.

i.

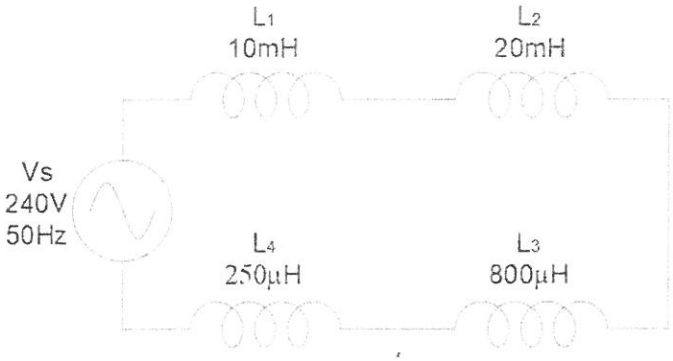

Diagram 2 (b) (i)
Rajah 2 (b)(i)

[5 marks]
[*5 markah*]

ii.

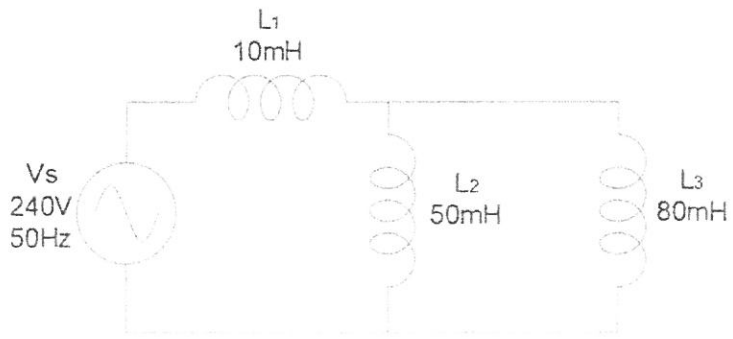

Diagram 2 (b) (ii)
Rajah 2 (b)(ii)

[6 marks]
[*6 markah*]

CLO1 C3 (c) Calculate the Impedance, Z for the following circuit.

Kira Galongan, Z bagi litar berikut.

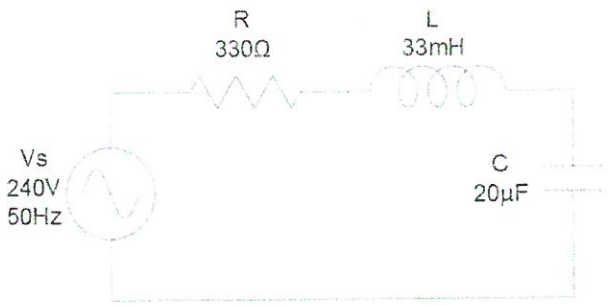

Diagram 2 (c)
Rajah 2 (c)

[11 marks]
[*11 markah*]

QUESTION 3
SOALAN 3

CLO1 C1 (a) Describe Magnetic Flux.

Jelaskan Fluks Magnetik.

[4 marks]
[*4 markah*]

CLO1 C2 (b) Explain Lenz Law with the aid of a suitable diagram.

Terangkan Hukum Lenz dengan bantuan rajah yang sesuai.

[9 marks]
[*9 markah*]

CLO1 C3 (c) A Current of 30mA is passing through a 700 turns Coil wound with 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, Fm

Kira Kuasa Magnetomotif, Fm

[4 marks]
[4 *markah*]

iii. Calculate Magnetic Field Strength, H

Kira Kekuatan Medan Magnet, H

[4 marks]
[*4 markah*]

QUESTION 4
SOALAN 4

CLO1 C1 (a) Describe **TWO (2)** functions of Transformer.

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

[4 marks]
[*4 markah*]

CLO1 C2 (b) Compare Step-Down Transformer to Step-Up Transformer using suitable diagram.

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

[10 marks]
[*10 markah*]

CLO1 C3 (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

Ohms 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:

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:

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

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:

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

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

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

Transformer:

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

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

$$S = V_1 I_1 = V_2 I_2$$

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