SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN PETROKIMIA

PEPERIKSAAN AKHIR

SESI JUN 2019

DGP1013: ELECTRICAL TECHNOLOGY

TARIKH : 04 NOVEMBER 2019
MASA : 2.30 PETANG - 4.30 PETANG (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.

Struktur (4 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

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 13MΩ ± 10%.

Senaraikan warna bagi perintang dengan nilai 13MΩ ± 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 padq 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.*

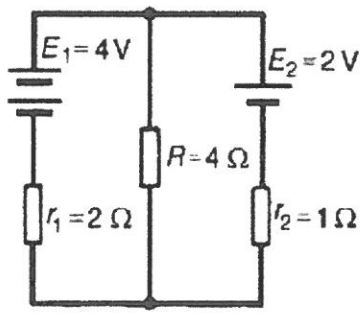

Figure 1 (c)

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)**.*

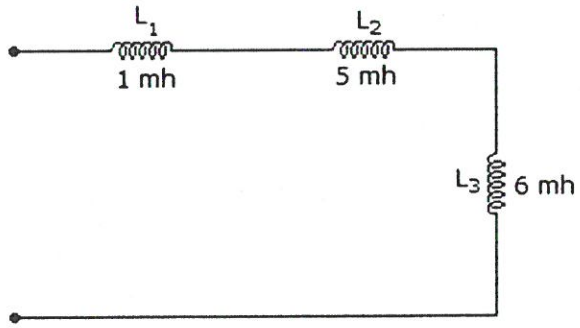

Figure 2 (b)(i)

Rajah 2 (b)(i)

[4 marks]

[*4 markah*]

ii. The Total Capacitance in **Figure 2 (b)(ii)**.
*Jumlah Kemuatan bagi **Rajah 2 (b(ii)**.*

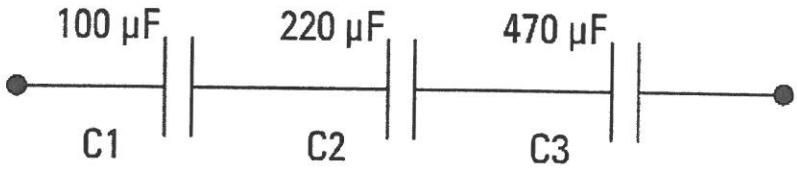

Figure 2 (b)(ii)
Rajah 2 (b)(ii)

[6 marks]
[*6 markah*]

CLO1 C3 (c) Calculate the Total Impedance, Z in **Figure 2 (c)**.
*Kira Jumlah Galangan, Z bagi **Rajah 2 (c)**.*

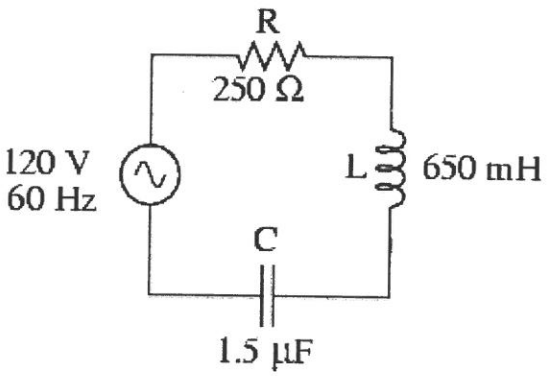

Figure 2 (c)
Rajah 2 (c)

[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)**.*

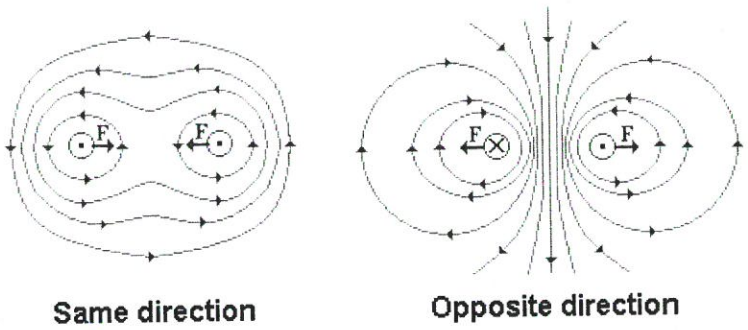

Figure 3 (b)

Rajah 3 (b)

[10 marks]

[*10 markah*]

CLO1 C3 (c) One soft iron solenoid with cross sectional area of 600mm^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, μ_r is 900. Calculate.

Satu solenoid besi lembut dengan luas keratan rentas 600mm^2 mempunyai purata panjang 300mm dan digelung dengan 300 gelung wayar dengan arus 2A melaluinya. Diberi ketelapan relatif μ_r adalah 900. Kira:

i. Magnetomotive Force, F_m.

Dayagerak Magnet, Fm.

[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 Transfomer with 2400 Primary Turns.
Rajah 4 (c) *di bawah menunjukkan sebuah Pengubah dengan 2400 putaran Primer.*

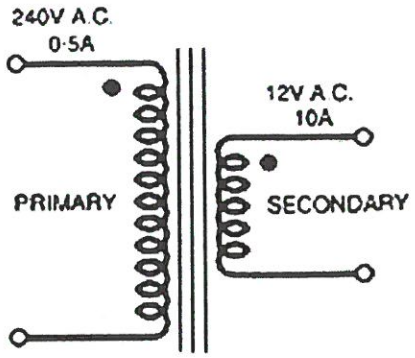

Figure 4 (c)

Rajah 4 (c)

i. Calculate the secondary voltage,Vs.

Kira voltan sekunder.Vs.

[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:

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

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:

$$R_T = \frac{R_1R_2}{R_1 + R_2}$$

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

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 :

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

R-L series :

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

R-L-C series:

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

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

Electromagnetic induction:

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

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

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

Charge on capacitor :

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

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:

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

Transformer:

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

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

$$S = V_1 I_1 = V_2 I_2$$

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