

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 MEKANIKAL

PEPERIKSAAN AKHIR

SESI II : 2024/2025

DJJ20263 : ELECTRICAL AND ELECTRONIC TECHNOLOGY

TARIKH : 10 MEI 2025

MASA : 8.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** 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 (a) Define electric and electronics.
Takrifkan elektrik dan elektronik.

[4 mark]

[4 markah]

- CLO1 (b) Explain **THREE (3)** factors that affect the resistance of conductor.
*Jelaskan **TIGA (3)** faktor yang mempengaruhi rintangan pengalir.*

[6 marks]

[6 markah]

- CLO1 (c)

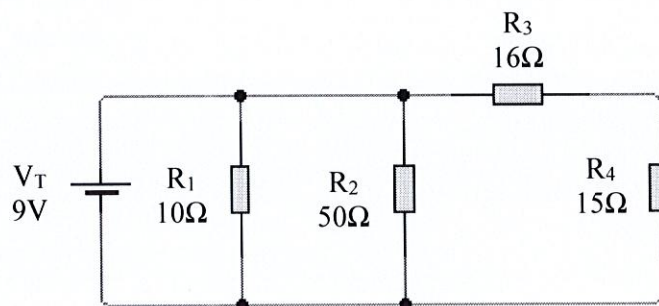


Figure 1(c) / Rajah 1(c)

Referring to the circuit in figure 1(c), calculate:

Berpandukan litar dalam rajah 1(c), kirakan:

- i. Total resistance in the circuit, R_T
Jumlah rintangan di dalam litar, R_T

[6 marks]

[6 markah]

- ii. Total current in the circuit, I_T
Jumlah arus di dalam litar, I_T

[3 marks]

[3 markah]

- iii. Voltage drops in R_3 using Voltage Divider Law, V_3
Kejatuhan voltan pada R_3 menggunakan Hukum Pembahagi Voltan, V_3

[3 marks]

[3 markah]

- iv. Current flows in R_2 , I_2
Arus yang melalui R_2 , I_2

[3 marks]

[3 markah]

QUESTION 2**SOALAN 2**

- CLO1 (a) Define electromagnetism and electrostatic
Takrifkan elektromagnetisme dan elektrostatik

[4 mark]
[4 markah]
- CLO1 (b) i. Elaborate the current flow in solenoid.
Huraikan aliran arus dalam solenoid.

[4 marks]
[4 markah]
- ii. Explain the fundamentals of transformer construction with aid of figure.
Jelaskan asas pembinaan "transformer" dengan bantuan rajah.

[4 marks]
[4 markah]
- CLO1 (c) A 150mm long round iron core has a 50mm² of cross-sectional area. It is wound with 500 turns of coil. When measurement, the flux produced in the iron core is 0.2 mWb when 10 mA of current flows through the wound.
Sebuah teras besi bulat dengan panjang 150mm mempunyai luas keratan rentas sebanyak 50 mm². Teras besi dililit dengan 500 lilitan pengalir. Apabila diukur, nilai fluks yang terhasil di dalam teras besi adalah 0.2 mWb apabila 100mA arus mengalir melaluinya.
- i. Draw the magnet circuit completely
Lukis dengan lengkap rajah litar magnet

[3 marks]
[3 markah]

Calculate:

Kirakan:

- ii. Magnetic flux density, B
Ketumpatan fluks magnet, B

[2 marks]

[2 markah]

- iii. Electromagnetic move force, F_M
Daya gerak elektromagnetik, F_M

[2 marks]

[2 markah]

- v. Magnetic field strength, H
Kekuatan medan magnet, H

[2 marks]

[2 markah]

- vi. Iron core permeability, μ
Ketelapan teras besi, μ

[2 marks]

[2 markah]

- vii. Relative permeability, μ_r
Ketelapan relatif, μ_r

[2 marks]

[2 markah]

QUESTION 3**SOALAN 3**

- CLO1 (a) Describe briefly type of DC motor and AC motor.
Terangkan secara ringkas jenis motor DC dan motor AC.
[4 mark]
[4 markah]
- CLO1 (b) Explain **THREE (3)** basic parts of electrical motor.
*Jelaskan **TIGA (3)** binaan asas motor elektrik.*
[6 marks]
[6 markah]
- CLO1 (c) The frequency of the supply to the stator of an 8-pole induction motor is 50 Hz and the rotor frequency is 3 Hz. Calculate the value:
Sebuah motor pearuh 8-kutub mempunyai frekuensi 50 Hz dan frekuensi rotor ialah 3 Hz. Hitungkan nilainya:
- i. Synchronous speed, N_s
Kelajuan segerak, N_s
[3 marks]
[3 markah]
- ii. Slip, S
Gelinciran, S
[3 marks]
[3 markah]
- iii. Rotor speed, N_R
Kelajuan rotor, N_R
[3 marks]
[3 markah]

- iv. Rotor frequency if the new value of the rotor speed is 600 rpm
Frekuensi rotor jika nilai kelajuan rotor yang baru ialah 600rpm
[4 marks]
[4 markah]
- v. Stator frequency, f_s
Frekuensi stator, f_s
[2 marks]
[2 markah]

QUESTION 4**SOALAN 4**

CLO1

- (a) Give **FOUR (4)** differences between open loop and closed loop system in electronic control system.

*Berikan **EMPAT (4)** perbezaan antara gelung terbuka dan gelung tertutup dalam sistem kawalan elektronik.*

[4 mark]

[4 markah]

CLO1

(b)

- i. Explain **TWO (2)** of a Push Button Switch application.

*Jelaskan **DUA (3)** penggunaan “Push Button Switch”.*

[4 marks]

[4 markah]

- ii. Explain the main differences between a sensor and a transducer with examples.

Dengan bantuan contoh, jelaskan perbezaan utama antara “sensor” dan “transducer”.

[4 marks]

[4 markah]

CLO1

(c)

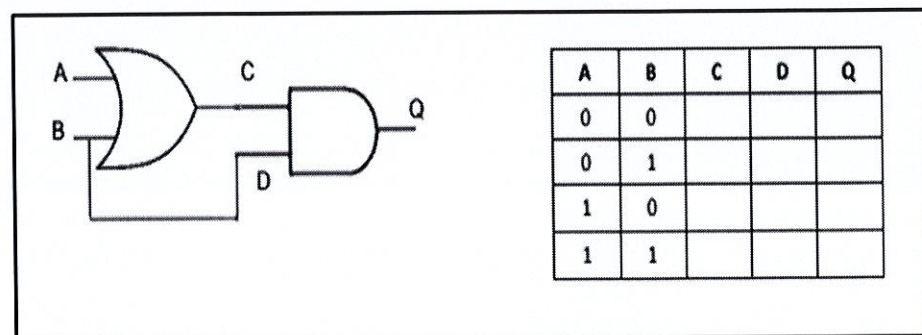


Figure 4(c)(i) / Rajah 4(c)(i)

- i. The Figure 4(c)(i) below shows a logic circuit and its incomplete truth table. Complete its truth table.

Rajah 4(c)(i) di bawah menunjukkan satu litar logik dan jadual kebenarannya yang tidak lengkap. Lengkapkan jadual kebenaran tersebut.

[6 marks]

[6 markah]

- ii. Draw a logic circuit for $(A + B)'(C + D)C'$.

Lukis satu litar logik bagi $(A + B)'(C + D)C'$.

[7 marks]

[7 markah]

SOALAN TAMAT

DJJ20263 – ELECTRICAL AND ELECTRONIC TECHNOLOGY

FORMULA

Introduction to Electrical and Electronic	Electromagnetism and Electrostatic
$V = IR \quad P = IV \quad E = Pt \quad Q = CV$ <u>Series Circuit</u> $R_T = R_1 + R_2 + R_3 + \dots R_n$ $V_T = V_1 + V_2 + V_3 + \dots V_n$ $I_T = I_1 = I_2 = I_3 = \dots = I_n$ <u>Voltage Divider Law</u> $V_x = \left(\frac{R_x}{R_T}\right) V_T$ <u>Parallel Circuit</u> $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots \frac{1}{R_n} \quad \text{or}$ $R_T = \frac{R_1 R_2 R_3}{R_2 R_3 + R_1 R_3 + R_1 R_2}$ $V_T = V_1 = V_2 = V_3 = \dots = V_n$ $I_T = I_1 + I_2 + I_3 + \dots I_n$ <u>Current Divider Law</u> $I_x = \left(\frac{R_T}{R_x}\right) I_T$	<u>Electromagnetism</u> $\Phi = B \times A \quad B = \frac{\Phi}{A} \quad B = \mu H$ $F_M = NI \quad H = \frac{F_M}{l}$ $\mu = \mu_0 \mu_r \quad \mu = \frac{B}{H} \quad \mu_0 \mu_r = \frac{B}{H}$ $S = \frac{F_M}{\Phi} \quad S = \frac{l}{\mu H} \quad S = \frac{l}{\mu_0 \mu_r A}$ <u>Transformer</u> $\frac{V_P}{V_S} = \frac{N_P}{N_S} = \frac{I_S}{I_P}$ $E_P = 4.44 f N_P \Phi \quad E_S = 4.44 f N_S \Phi$ <u>Inductor</u> $E = \frac{1}{2} L I^2$ Series inductor $L_T = L_1 + L_2 + L_3 + \dots L_n$ Parallel inductor $\frac{1}{L_T} = \frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3} + \dots \frac{1}{L_n}$ <u>Capacitor</u> $E = \frac{1}{2} QV$ Series capacitor $\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots \frac{1}{C_n}$ Parallel capacitor $C_T = C_1 + C_2 + C_3 + \dots C_n$
Motor and Generator	Automation Control System
$N_S = \frac{120f}{P} \quad N_r = N_S (1 - S)$ $S = \frac{N_S - N_r}{N_S} \quad \%S = \frac{N_S - N_r}{N_S} \times 100\%$ $f_r = S \times f$ $f = f_r + f_s$	<u>Boolean Expression</u> AND Gate: $Y = A \cdot B$ (A AND B) OR Gate: $Y = A + B$ (A OR B) NOT Gate: $Y = A$ (NOT A) NAND Gate: $Y = A \cdot B$ (NOT (A AND B)) NOR Gate: $Y = A + B$ (NOT (A OR B)) XOR Gate: $Y = A \oplus B$ (A XOR B) XNOR Gate: $Y = A \oplus B$ (NOT (A XOR B))