



**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 : 2025/2026

DJJ20263 : ELECTRICAL AND ELECTRONIC TECHNOLOGY

TARIKH : 30 APRIL 2026

MASA : 2.30 PETANG - 4.30 PETANG (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. Jawab SEMUA soalan.

QUESTION 1**SOALAN 1**

- | | |
|------|--|
| CLO1 | <p>(a) Give TWO (2) electrical and electronic components together with their symbols.</p> <p><i>Berikan DUA (2) komponen elektrik dan elektronik berserta simbolnya.</i></p> <p style="text-align: right;">[4 marks]</p> <p style="text-align: right;">[4 markah]</p> |
| CLO1 | <p>(b) Explain TWO (2) types of electrical energy sources and provide example for each type.</p> <p><i>Terangkan DUA (2) jenis sumber tenaga elektrik dan berikan contoh untuk setiap jenis.</i></p> <p style="text-align: right;">[6 marks]</p> <p style="text-align: right;">[6 markah]</p> |

CLO1

(c)

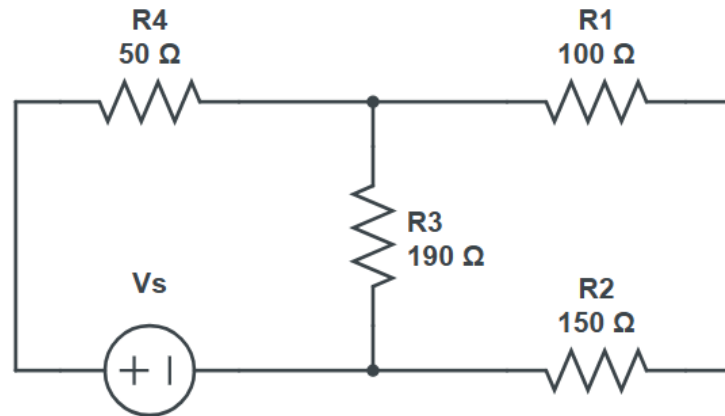


Figure 1(c) / Rajah 1

Referring to the circuit in Figure 1(c), calculate the respective problems:

Rujuk litar pada Rajah 1(c), kirakan permasalahan berkenaan:

- i. Total resistance in the circuit, R_T .

Jumlah rintangan di dalam litar, R_T .

[9 marks]

[9 markah]

- ii. Total current in the circuit, I_T when supply voltage, V_s is 24 V.

Jumlah arus di dalam litar, I_T apabila bekalan voltan adalah 24 V.

[3 marks]

[3 markah]

- iii. Total power in the circuit, P_T .

Jumlah kuasa di dalam litar, P_T .

[3 marks]

[3 markah]

QUESTION 2**SOALAN 2**

- CLO1 (a) Describe **TWO (2)** methods of producing induced electromotive force (emf) according to Faraday's Law.
*Terangkan **DUA (2)** kaedah penghasilan daya gerak elektrik teraruh berdasarkan hukum Faraday.*
- [4 marks]
[4 markah]
- CLO1 (b)
- i. Elaborate on the electromagnetic effect on a single conductor using the Right-Hand grip rule with a suitable diagram.
Jelaskan kesan elektromagnetik pada konduktor tunggal menggunakan peraturan gengaman tangan kanan berserta rajah yang sesuai.
- [4 marks]
[4 markah]
- ii. Interpret the type of transformer using the relationship between transformer ratio, K with the winding setup of the transformer.
Tafsirkan jenis pengubah menggunakan hubungan di antara nisbah pengubah, K dengan tetapan lilitan pengubah.
- [4 marks]
[4 markah]

CLO1

- (c) A core of stainless steel of 2500 mm length and cross-sectional area 60 mm^2 is wound with 1450 turns of coil and 5.3 A current flowing through it. The value of relative permeability is 730, calculate:

Satu teras keluli tahan karat dengan panjang 2500 mm dan luas keratan rentas 60 mm^2 dililit dengan 1450 lilitan gegelung dan arus 5.3 A mengalir melaluinya. Nilai ketelapan relatif ialah 730, hitungkan:

- i. Flux density, B

Ketumpatan fluks, B

[8 marks]

[8 markah]

- ii. The value of flux, Φ

Nilai fluks, Φ

[3 marks]

[3 markah]

- iii. Reluctance, S

Keengganan, S

[2 marks]

[2 markah]

QUESTION 3**SOALAN 3**

- CLO1 (a) Identify **FOUR (4)** basic components in electric motor.
*Kenal pasti **EMPAT (4)** komponen asas dalam motor elektrik.*
[4 marks]
[4 markah]
- CLO1 (b) Explain **THREE (3)** differences between AC motor and DC motor.
*Terangkan **TIGA (3)** perbezaan antara motor AC dan motor DC.*
[6 marks]
[6 markah]
- CLO1 (c) A three-phase induction motor has 6 poles and is supplied with a frequency of 80 Hz. The rotor frequency of the motor is 6 Hz. Based on the information given, calculate:
Sebuah motor aruhan 3 fasa mempunyai 6 kutub dan dibekalkan dengan frekuensi 80 Hz. Frekuensi rotor motor tersebut ialah 6 Hz. Berdasarkan maklumat yang diberi, kirakan:
- i. Percent of slip, %S.
Peratus gelinciran, %S.
[3 marks]
[3 markah]
 - ii. Synchronous speed, N_s and rotor speed, N_r .
Kelajuan segerak, N_s dan kelajuan rotor, N_r .
[6 marks]
[6 markah]
 - iii. The new rotor frequency, f_r and stator frequency, f_s if the slip percentage decreases to 5%.
Frekuensi rotor, f_r dan frekuensi stator, f_s yang baru sekiranya peratus gelinciran menurun ke 5%.
[6 marks]
[6 markah]

QUESTION 4**SOALAN 4**

- CLO1 (a) List **FOUR (4)** types of diagrams used in electronic control systems.
*Senaraikan **EMPAT (4)** jenis gambar rajah yang digunakan dalam sistem kawalan elektronik.*
- [4 marks]
[4 markah]
- CLO1 (b) A microcontroller-based control system uses switches and sensors as input devices. Explain:
Sistem kawalan berasaskan mikropengawal menggunakan suis dan sensor sebagai peranti masukan. Terangkan
- i. **TWO (2)** types of switches and their application.
DUA (2) jenis suis dan aplikasinya.
- [6 marks]
[6 markah]
- ii. Mechanism of sensor.
Mekanisme sensor.
- [2 marks]
[2 markah]

- CLO1 (c) Figure 4 (c)(i) shows a digital logic circuit consisting of two inputs, A and B, and a combination of logic gates.

Rajah 4 (c)(i) menunjukkan litar logik digital yang terdiri daripada dua input, A dan B, dan gabungan get logik.

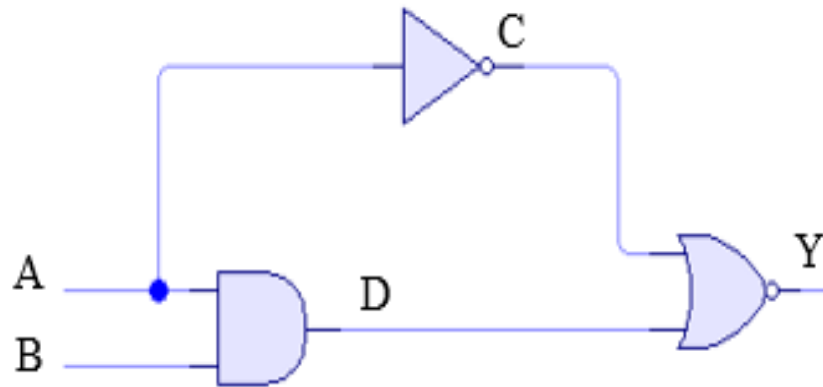


Figure 4(c)(i) / Rajah 4(c)(i)

- i. Complete the truth table below for the logic circuit in Figure 4(c)(i).
Lengkapkan jadual kebenaran di bawah untuk litar logik dalam Rajah 4(c)(i).

A	B	C	D	Y
0	0			
0	1			
1	0			
1	1			

[6 marks]

[6 markah]

- ii. Draw the logic circuit for the following Boolean expression:

$$Y = (\overline{A + B})(\overline{B} + C).$$

Lukiskan litar logik bagi ungkapan Boolean berikut:

$$Y = (\overline{A + B})(\overline{B} + C).$$

[7 marks]

[7 markah]

SOALAN TAMAT

DJJ20263 – ELECTRICAL AND ELECTRONIC TECHNOLOGY

FORMULA

Introduction to Electrical and Electronic	Electromagnetism and Electrostatic
$V = IR$ $P = IV$ $E = Pt$ $Q = CV$ <u>Series Circuit</u> $R_T = R_1 + R_2 + R_3 + \dots R_n$ $V_T = V_1 + V_2 + V_3 + \dots V_n$ $I_T = I_1 = I_2 = I_3 = \dots = I_n$ Voltage Divider Law $V_X = \left(\frac{R_X}{R_T}\right) V_T$ <u>Parallel Circuit</u> $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots \frac{1}{R_n}$ or $R_T = \frac{R_1 R_2 R_3}{R_2 R_3 + R_1 R_3 + R_1 R_2}$ $V_T = V_1 = V_2 = V_3 = \dots = V_n$ $I_T = I_1 + I_2 + I_3 + \dots I_n$ Current Divider Law $I_X = \left(\frac{R_T}{R_X}\right) I_T$	<u>Electromagnetism</u> $\Phi = B \times A$ $B = \frac{\Phi}{A}$ $B = \mu H$ $F_M = NI$ $H = \frac{F_M}{l}$ $\mu = \mu_0 \mu_r$ $\mu = \frac{B}{H}$ $\mu_0 \mu_r = \frac{B}{H}$ $S = \frac{F_M}{\Phi}$ $S = \frac{l}{\mu H}$ $S = \frac{l}{\mu_0 \mu_r A}$ <u>Transformer</u> $\frac{V_P}{V_S} = \frac{N_P}{N_S} = \frac{I_S}{I_P}$ $E_P = 4.44 f N_P \Phi$ $E_S = 4.44 f N_S \Phi$ <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
$N_S = \frac{120f}{P}$ $N_r = N_S (1 - S)$ $S = \frac{N_S - N_r}{N_S}$ $\%S = \frac{N_S - N_r}{N_S} \times 100\%$ $f_r = S \times f$ $f = f_r + f_s$	<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))