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)

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)

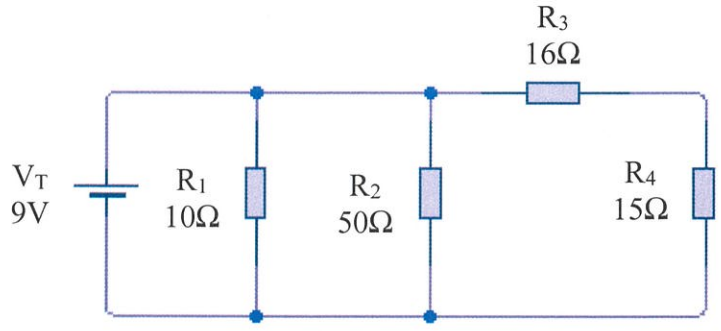


Figure 1(c) / Rajah 1(c)

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 50mm^2 of cross-sectional area. It is wounded 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 mm^2. Teras besi dililit dengan 500 lilitan pengalir. Apabila diukur, nilai fluks yang terhasil di dalam teas 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 elektrikal.*

[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*]

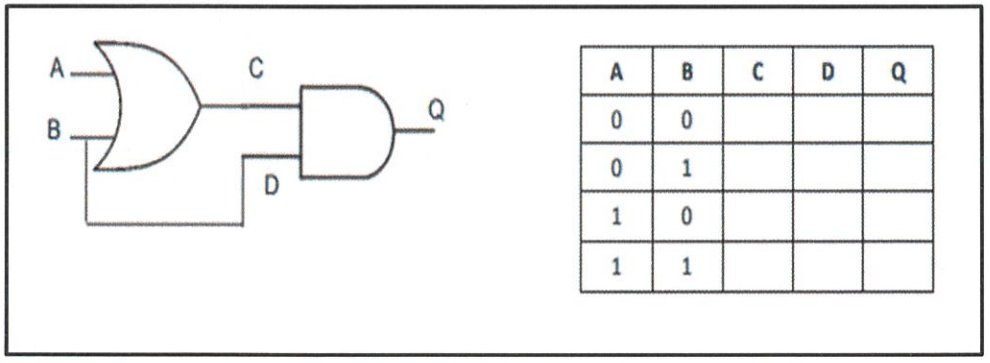
ii. Explain the main differences between a sensor and a transducer with examples.

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

[4 marks]

[*4 markah*]

CLO1 (c)



A	B	C	D	Q
0	0			
0	1			
1	0			
1	1			

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

$V = IR \qquad P = IV \qquad E = Pt \qquad Q = CV$

Series Circuit

$$R_T = R_1 + R_2 + R_3 + \cdots R_n$$

$$V_T = V_1 + V_2 + V_3 + \cdots V_n$$

$$I_T = I_1 = I_2 = I_3 = \cdots = I_n$$

Voltage Divider Law

$$V_X = \left(\frac{R_X}{R_T}\right) V_T$$

Parallel Circuit

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots \frac{1}{R_n} \quad \text{or}$$

$$R_T = \frac{R_1 R_2 R_3}{R_2 R_3 + R_1 R_3 + R_1 R_2}$$

$$V_T = V_1 = V_2 = I_3 = \cdots = V_n$$

$$I_T = I_1 + I_2 + I_3 + \cdots I_n$$

Current Divider Law

$$I_x = \left(\frac{R_T}{R_X}\right) I_T$$

Electromagnetism and Electrostatic

Electromagnetism

$$\Phi = B\,x\,A \qquad B = \frac{\Phi}{A} \qquad B = \mu H$$

$$F_M = NI \qquad H = \frac{F_M}{l}$$

$$\mu = \mu_0\,\mu_r \qquad \mu = \frac{B}{H} \qquad \mu_0\,\mu_r = \frac{B}{H}$$

$$S = \frac{F_M}{\Phi} \qquad S = \frac{l}{\mu H} \qquad S = \frac{l}{\mu_0\,\mu_r A}$$

Transformer

$$\frac{V_P}{V_S} = \frac{N_P}{N_S} = \frac{I_S}{I_P}$$

$$E_P = 4.44 f N_P \Phi \qquad E_S = 4.44 f N_S \Phi$$

Inductor

$$E = \frac{1}{2} LI^2$$

Series inductor

$$L_T = L_1 + L_2 + L_3 + \cdots L_n$$

Parallel inductor

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

Capacitor

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

Series capacitor

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

Parallel capacitor

$$C_T = C_1 + C_2 + C_3 + \cdots C_n$$

Motor and Generator

$$N_S = \frac{120f}{P} \qquad N_r = N_S\,(1 - S)$$

$$S = \frac{N_S - N_r}{N_S} \qquad \%S = \frac{N_S - N_r}{N_S}\,x\,100\%$$

$$f_r = S\,x\,f$$

$$f = f_r + f_S$$

Automation Control System

Boolean Expression

AND Gate: Y=A·B (A AND B)

OR Gate: Y=A+B (A OR B)

NOT Gate: Y=A (NOT A)

NAND Gate: Y=A·B (NOT (A AND B))

NOR Gate: Y=A+B (NOT (A OR B))

XOR Gate: Y=A⊕B (A XOR B)

XNOR Gate: Y=A⊕B (NOT (A XOR B))