

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN KEJURUTERAAN MEKANIKAL

PEPERIKSAAN AKHIR

SESI JUN 2015

DJJ2022 : ELECTRICAL TECHNOLOGY

TARIKH : 27 OKTOBER 2015

MASA : 8.30 AM - 10.30 AM (2 JAM)

Kertas ini mengandungi **TUJUH (7)** halaman bercetak.
Soalan Struktur (4 soalan). Jawab semua soalan.
Dokumen sokongan yang disertakan : Rumus

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

INSTRUCTION:

This paper consists of **FOUR (4)** structured questions. Answer **ALL** question.

ARAHAN :

Bahagian ini mengandungi EMPAT (4) soalan struktur. Jawab SEMUA soalan.

QUESTION 1**SOALAN 1**CLO1
C1

- a) State the definition of the electrical quantities below:

Nyatakan definisi untuk istilah elektrik di bawah:

- i. Different potential

Beza upaya

- ii. Current

Arus

[5 marks]

[5 markah]

CLO1
C2

- b) Given that
- $R_1 = 2k\Omega$
- and
- $R_2 = 0.6k\Omega$
- . Both resistor are connected in parallel and supplied with 30V dc. Calculate these values:

Diberi nilai $R_1 = 2k\Omega$ dan $R_2 = 0.6k\Omega$. Kedua-dua perintang disambung secara selari dan dibekalkan dengan 30V DC. Kirakan nilai:

- i. The total resistance of the circuit

Jumlah rintangan dalam litar

- ii. The total current of the circuit

Jumlah arus dalam litar

- iii. The voltage drop at
- R_2

Voltan susut pada R_2

- iv. Current flow through
- R_1
- by using current division method

Arus mengalir melalui R_1 dengan menggunakan kaedah pembahagian arus

[8 marks]

[8 markah]

CLO1
C3

- c) Based on Figure 1, determine the current I_1 , I_2 and I_3 flows in the circuit by using Kirchhoff's Law and all the information given as labeled in the circuit.

Dengan merujuk kepada Rajah 1 di bawah, cari nilai arus I_1 , I_2 and I_3 yang mengalir di dalam litar dengan menggunakan Hukum Kirchoff dengan menggunakan maklumat yang dilabel di dalam litar tersebut.

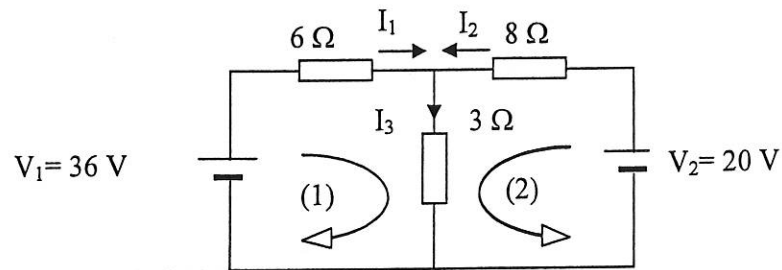


Figure 1
Rajah 1

[12 marks]

[12 markah]

QUESTION 2

SOALAN 2

CLO1
C1

- a) Describe Self Inductance with a diagram.
Huraikan Aruhan Diri dengan gambarajah.

[4 marks]

[4 markah]

CLO1
C2

- b) Differentiate between three phase system and single phase system in term of:
Bezakan sistem tiga fasa dan sistem satu fasa :
- i. Connection
Sambungan
 - i. Sinusoidal waveform
Bentuk gelombang

[6 marks]

[6 markah]

CLO1
C3

- c) A series RLC circuit with resistance 50Ω , inductance 150 mH and capacitance $100\mu\text{F}$ connected to a 100V , 50Hz AC supply. Calculate :
Sebuah litar sesiri RLC berintang 50Ω , berkearuhan 150 mH dan berkemuatan $100\mu\text{F}$ disambung ke bekalan kuasa 100V , 50Hz . Kirakan:
- i. Impedance, Z
Galangan, Z
 - ii. Current, I
Arus, I
 - iii. Power factor, $\cos \theta$
Faktor kuasa, $\cos \theta$
 - iv. Active power, P
Kuasa aktif, P

[15 marks]

[15 markah]

QUESTION 3

SOALAN 3

CLO1
C2

- a) i. Explain
- THREE (3)**
- factors affecting the electromagnetic strength.

Terangkan TIGA(3) faktor mempengaruhi kekuatan elektromagnet.

[6 marks]

[6 markah]

CLO1
C2

- ii. Illustrate the magnetic field when two current-carrying conductors are put nearby:

Lukiskan medan magnet yang terbentuk apabila dua pengalir pembawa arus diletakkan berdekatan:

- a. Has current flow in the same direction in the two conductors.

Arus mengalir pada arah yang sama pada kedua-dua pengalir.

- b. Has current flow in the opposite direction in the two conductors.

Arus mengalir pada arah yang berlawanan pada kedua-dua pengalir.

[6 marks]

[6 markah]

CLO1
C3

- b) A core of mild steel with loop shape has long average of 40cm and cross sectional area
- 2cm^2
- . The steel is wound with 1000 turns of coil and 4A current flowing through it. If given relative permeability is 1200.

Determine these values :

Sebatang teras keluli berbentuk gelang mempunyai panjang 40cm dan luas keratan rentas 2cm^2 . Keluli tersebut dililit dengan 1000 lilitan dan arus 4A mengalir melaluinya. Jika nilai ketelapan relatif adalah 1200. Tentukan nilai :

- i. Magneto motive force,
- F_m

Daya magnet, F_m

- ii. Magnetic field strength,
- H

Kekuatan medan magnet, H

- iii. Absolute permeability, μ
Ketelapan sebenar, μ
- iv. Flux density, B
Ketumpatan medan magnet, B
- v. The value of flux, Φ
Nilai fluks, Φ
- vi. The reluctance, S
Engganan, S

[13 marks]

[13 markah]

QUESTION 4

SOALAN 4

- CLO1
C1
- a) List **TWO (2)** types of transformer by referring to its design and state the usage for each type.
Senaraikan DUA(2) jenis pengubah dengan merujuk kepada binaan pengubah dan berikan contoh bagi setiap jenis.
- [6 marks]
[6 markah]
- CLO1
C2
- b) The stator of a 3-phase, 4 pole induction motor is connected to a 50 Hz supply. The rotor runs at 1455 rev/min at full load. Determine:
Stator motor aruhan 3- fasa , 4 kutub disambungkan kepada bekalan 50 Hz. sedang bergerak pada kelajuan 1455 putaran / min pada beban penuh. Tentukan:
- the synchronous speed
kelajuan segerak
 - the slip at full load
slip pada beban penuh
- [6 marks]
[6 markah]
- CLO1
C3
- c) A 100 kVA, 4000 V/200 V, 50 Hz single phase transformer has 100 secondary turns. Determine :
Sebuah transformer satu fasa 100 kVA, 4000 V/200 V, 50 Hz mempunyai lilitan sekunder 100 lilit. Kirakan:
- the primary and secondary current
Arus primer dan arus sekunder
 - the number of primary turns
Bilangan lilitan primer
 - the maximum value of the flux
Nilai maksimum fluks
- [13 marks]
[13 markah]

SOALAN TAMAT

<u>INTRODUCTION TO ELECTRICAL CIRCUITS</u>	<u>ALTERNATING CURRENT CIRCUIT</u>	<u>AC MACHINES</u>												
$R = \frac{\rho l}{A} \quad V = IR$ $P = IV \quad E = Pt$ $C = \frac{Q}{V}$	<table border="1" data-bbox="614 504 901 537"> <tr> <th>RL CIRCUIT</th> </tr> <tr> <td>$I = \frac{V}{Z}$</td> </tr> <tr> <td>$V_L = IX_L$</td> </tr> <tr> <td>$Z = \sqrt{R^2 + X_L^2}$</td> </tr> <tr> <td>$\theta = \tan^{-1} \left[\frac{X_L}{R} \right]$</td> </tr> <tr> <td>$\cos \theta = \frac{R}{Z}$</td> </tr> </table>	RL CIRCUIT	$I = \frac{V}{Z}$	$V_L = IX_L$	$Z = \sqrt{R^2 + X_L^2}$	$\theta = \tan^{-1} \left[\frac{X_L}{R} \right]$	$\cos \theta = \frac{R}{Z}$	$N_s = \frac{120f}{P} \quad \%S = \frac{N_s - N_r}{N_s} \times 100$ $N_r = N_s(1 - S) \quad f_r = Sf$						
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<p>KIRCHOFF'S LAW $V_1 = V_1 + V_2 + V_3$ $\Sigma I_{IN} = \Sigma I_{OUT}$ $I_1 = I_2 + I_3$</p>	<table border="1" data-bbox="614 896 901 929"> <tr> <th>RC CIRCUIT</th> </tr> <tr> <td>$I = \frac{V}{Z}$</td> </tr> <tr> <td>$V_C = IX_C$</td> </tr> <tr> <td>$Z = \sqrt{R^2 + X_C^2}$</td> </tr> <tr> <td>$\theta = \tan^{-1} \left[\frac{X_C}{R} \right]$</td> </tr> <tr> <td>$\cos \theta = \frac{R}{Z}$</td> </tr> </table>	RC CIRCUIT	$I = \frac{V}{Z}$	$V_C = IX_C$	$Z = \sqrt{R^2 + X_C^2}$	$\theta = \tan^{-1} \left[\frac{X_C}{R} \right]$	$\cos \theta = \frac{R}{Z}$	<p>TRANSFORMER</p> $\frac{V_p}{V_s} = \frac{N_p}{N_s} = \frac{I_s}{I_p} \quad E_1 = 4.44 f N_1 \Phi_m$ $E_2 = 4.44 f N_2 \Phi_m$						
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