SULIT

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

JABATAN KEJURUTERAAN MEKANIKAL

PENILAIAN ALTERNATIF BERIKUTAN
PELAKSANAAN PERINTAH KAWALAN BERSYARAT

SESI JUN 2020

DJJ20053 / DJJ2022 : ELECTRICAL TECHNOLOGY

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KAEDAH PENILAIAN : PEPERIKSAAN ONLINE

JENIS PENILAIAN : SOALAN ESEI BERSTRUKTUR (2 SOALAN)

TARIKH PENILAIAN : 01 FEBRUARI 2021

TEMPOH PENILAIAN : 1 JAM

LARANGAN TERHADAP PLAGIARISM (AKTA 174)
PELAJAR TIDAK BOLEH MEMPLAGIAT APA-APA IDEA, PENULISAN, DATA ATAU CIPTAAN ORANG LAIN. PLAGIAT ADALAH SALAH SATU PENYELEWENGAN AKADEMIK. SEKIRANYA PELAJAR DIBUKTIKAN MELAKUKAN PLAGIARISM, PENILAIAN BAGI KURSUS BERKENAAN AKAN DIMANSUHKAN DAN DIBERI GRED F DENGAN NILAI MATA 0.
(RUJUK BUKU ARAHAN-ARAHAN PEPERIKSAAN DAN KAEDAH PENILAIAN (Diploma) EDISI 6, JUN 2019, KLAUSA 17.3)

INSTRUCTIONS:
This section consists of **TWO (2)** structured essay questions. Answer **ALL** questions.

ARAHAN:
*Bahagian ini mengandungi **DUA (2)** soalan esei berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO2
C3

(a) Refer to **Figure (1),** calculate;
*Merujuk kepada **Rajah (1),** kirakan;*

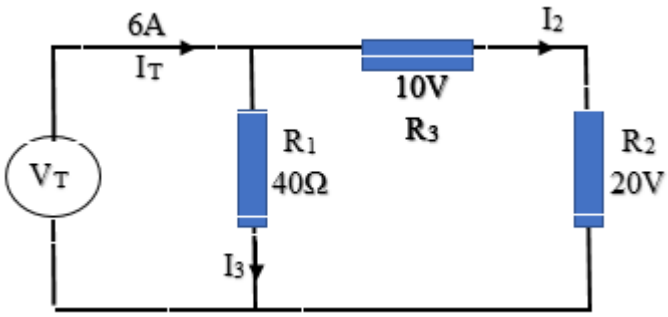

Figure (1) / *Rajah (1)*

i. Voltage terminal, V_T
Voltan terminal, V_T

[3 marks]
[3 *markah*]

ii. Voltage drops at R_1
Voltan susut pada R_1

[3 marks]
[*3 markah*]

iii. Value of resistor, R_2 & R_3
Nilai perintang, R_2 & R_3

[6 marks]
[*6 markah*]

CLO2
C3

(b) A series circuit consists of resistance of 50Ω, inductance of 0.15H and capacitance of 100μF. This circuit is connected to 100V, 50Hz. Calculate:

Suatu litar sesiri mengandungi perintang 50Ω, pearuh 0.15H dan pemuat 100μF. Bekalan kuasa 100V, 50Hz disambungkan kepada litar tersebut. Kirakan;

i. Impedance, Z
Galangan, Z

[7 marks]
[7 *markah*]

ii. Current flows in the circuit, I
Arus yang mengalir dalam litar, I

[3 marks]
[3 *markah*]

iii. Phase angle, Θ and Power Factor
Sudut fasa, Θ dan faktor kuasa

[3 marks]
[*3 markah*]

QUESTION 2
SOALAN 2

CLO2
C3

(a) A piece of mumetal length is 250mm and cross-sectional area is 4000mm^2. The relative permeability is 3000. Calculate:

Sekeping bahan mumetal yang mempunyai panjang 250mm dan luas keratan rentas 4000mm^2. Ketelapan bandingan bahan adalah 3000. Kirakan;

i. Reluctance of the piece of mumetal
Engganan bahan mumetal

[4 marks]
[4 *markah*]

ii. The absolute permeability of the mumetal
Ketelapan mutlak bahan mumetal

[4 marks]
[4 *markah*]

CLO2
C3

(b) An ideal transformer is connected to a supply of 10kVA, 60Hz. A 1000 turns has been wound to a coil at a 230V primary winding and a 1500 turns at a secondary winding:

Sebuah pengubah unggul disambungkan kepada bekalan kuasa 10kVA, 60Hz. Bekalan voltan, 230V diberi kepada 1000 lilit belitan primer, dan 1500 lilit belitan sekunder;

i. Calculate ratio of a transformer
Kirakan nisbah bagi pengubah

[4 marks]
[4 *markah*]

ii. Calculate value of secondary voltage
Kirakan nilai voltan sekunder

[4 marks]
[4 *markah*]

iii. Calculate value of primary current
Kirakan nilai arus primer

[4 marks]
[4 *markah*]

CLO2
C3

(c) Calculate the slip of an AC Motor with rotor speed of 2000 rpm and a synchronous speed of 2500 rpm.

Kirakan gelincir bagi motor AU yang mempunyai kelajuan rotor sebanyak 2000 psm dan kelajuan segerak, 2500 psm

[5 marks]
[5 *markah*]

SOALAN TAMAT

LIST OF FORMULA

INTRODUCTION TO ELECTRICAL CIRCUITS

$$R = \frac{\rho \ell}{A} \qquad V = IR$$

$$P = IV \qquad E = Pt$$

$$C = \frac{Q}{V}$$

KIRCHOFF'S LAW

$V_1 = V_1 + V_2 + V_3$

$\Sigma I_{IN} = \Sigma I_{OUT}$

$I_1 = I_2 + I_3$

SERIES

$V_T = V_1 + V_2 + \ldots\ldots + V_n$

$I_T = I_1 = I_2 = \ldots\ldots = I_n$

$R_T = R_1 + R_2 + \ldots\ldots + R_n$

$L_T = L_1 + L_2 + \ldots\ldots + L_n$

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

$$Vx = \frac{R_x}{R_T} V_T$$

PARALLEL

$V_T = V_1 = V_2 = \ldots\ldots = Vn$

$I_T = I_1 + I_2 + \ldots\ldots + I_n$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots\ldots + \frac{1}{R_n}$$

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

$C_T = C_1 + C_2 + \ldots\ldots + C_n$

$$Ix = \frac{R_T}{R_x} I_T$$

ALTERNATING CURRENT CIRCUIT

RL CIRCUIT

$$I = \frac{V}{Z}$$

$V_L = IX_L$

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

$$\theta = \tan^{-1}\left[\frac{X_L}{R}\right]$$

$$Cos\theta = \frac{R}{Z}$$

RC CIRCUIT

$$I = \frac{V}{Z}$$

$V_C = IX_C$

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

$$\theta = -\tan^{-1}\left[\frac{X_C}{R}\right]$$

$$Cos\theta = \frac{R}{Z}$$

RLC CIRCUIT

$$I = \frac{V}{Z}$$

$V_L = IX_L \qquad V_R = IR$

$V_C = IX_C$

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

$$\theta = \tan^{-1}\left[\frac{X_L - X_C}{R}\right]$$

$$Cos\theta = \frac{R}{Z}$$

AC MACHINES

$$N_s = \frac{120f}{P} \qquad \%S = \frac{N_s - N_r}{N_s} \times 100$$

$$N_r = Ns(1 - S) \qquad f_r = Sf$$

$$E = 2.22 K_d K_p f \phi Z$$

TRANSFORMER

$$\frac{V_p}{V_s} = \frac{N_p}{N_s} = \frac{I_s}{I_p} \qquad E_1 = 4.44 f N_1 \Phi_m$$

$$E_2 = 4.44 f N_2 \Phi_m$$

Complex Power, S (VA) = VI

Actual Power, P (W) = $VI \cos\theta$

Reactive Power, Q (VAR) = $VI \sin\theta$

I = Power / Voltage

Power losses = Core losses + $Ip^2Rp + Is^2Rs$

Output power = Power x power factor

Input power = output power + power losses

Efficiency, %η = output power / Input power x 100

ELECTROMAGNET

$$H = \frac{Fm}{l} = \frac{NI}{l}$$

$$B = \frac{\Phi}{A}$$

$$B = \mu H$$

$$\mu = \mu_o \mu_r$$

$$S = \frac{Fm}{\Phi} @ \frac{l}{\mu A}$$