

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENGAJIAN TINGGI**

JABATAN KEJURUTERAAN AWAM

PENILAIAN ALTERNATIF

SESI DISEMBER 2020

**DCB30082 : ELECTRICAL MACHINES & TELECOMMUNICATION
SYSTEM**

NAMA PENYELARAS KURSUS : JAMILAH BINTI HJ ABBAS

KAEDAH PENILAIAN : PEPERIKSAAN ONLINE

**JENIS PENILAIAN : SOALAN ESEI BERSTRUKTUR
(2 SOALAN)**

TARIKH PENILAIAN : 7 JULAI 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)**

INSTRUCTION:

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

ARAHAN :

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

QUESTION 1**SOALAN 1**CLO1
C3

- a) Explain **THREE (3)** differences in constructions between slip ring induction motor and a squirrel cage induction motor

Terangkan TIGA (3) perbezaan dalam binaan antara motor induksi jenis gelinciran pemutar dengan motor induksi sangkar tupai

[12 marks]

[12 markah]

CLO2
C3

- b) A 4 poles induction motor is running by 50 Hz supply and supplies the emf in the rotor at 2.5 Hz frequency. Calculate the slip and speed of the motor [13 marks]

Motor induksi 4 kutub berpusing frekuensi 50Hz dan membekalkan daya gerak elektrik di rotor pada frekuensi 2.5hz. Kirakan slip dan kelajuan motor.

[13 markah]

QUESTION 2**SOALAN 2**CLO1
C3

- a) Hassan has built a bungalow. Choose the electricity tariff rate imposed on the building. [5 marks]

Hassan telah membina sebuah banglo. Pilih kadar tarif elektrik yang

dikenakan terhadap bangunan tersebut.

[5 markah]

CLO2
C3

- b) A shunt motor that runs at 500 rpm takes 60A at 230V. The armature and shunt field resistances are 0.2Ω and 60Ω respectively. Iron and frictional losses amount to 2100W . Calculate:

Sebuah motor medan pirau bergerak pada 500 psm mengambil bekalan arus 60A pada 230V . Sekiranya rintangan angker 0.2Ω dan medan pirau adalah 60Ω . Kehilangan besi dan geseran ialah 2100W. Kirakan :

- | | | |
|------|---------------------------------|--------------------|
| i. | Armature torque | [12 marks] |
| | <i>Kilas angker</i> | <i>[12 markah]</i> |
| ii. | Total copper losses | [4 marks] |
| | <i>Jumlah kehilangan kuprum</i> | <i>[4 markah]</i> |
| iii. | Efficiency | [4 marks] |
| | <i>Kecekapan</i> | <i>[4 markah]</i> |

SOALAN TAMAT

FORMULA

DC generator

$$E_g = \frac{\phi Z N}{60} \times \frac{P}{A}$$

$$\eta = \frac{VI_L}{VI_L + \text{losses}} \times 100\%$$

Shunt wound generator

$$I_{sh} = \frac{V}{R_{sh}}$$

$$I_a = I_L + I_{sh}$$

$$V_T = E_g - I_a R_a$$

$$P_a = E_g I_a$$

$$P_L = VI_L$$

$$P_c = I_a^2 R_a + V.I_{sh}$$

Series wound generator

$$I_a = I_L = I_{se} = I$$

$$V_T = E_g - I(R_a + R_{se})$$

Short shunt compound generator

$$I_{se} = I_L$$

$$I_a = I_L + I_{sh}$$

$$I_{sh} = \frac{V + I_{se} R_{se}}{R_{sh}}$$

$$V_T = E_g - I_{se} R_{se} - I_a R_a$$

Long shunt compound generator

$$I_{se} = I_a = I_L + I_{sh}$$

$$I_{sh} = \frac{V}{R_{sh}}$$

$$V_T = E_g - I_a (R_a + R_{se})$$

Losses

$$P_c = I_a^2 R_a + V.I_{sh} \text{ (shunt)}$$

$$P_c = I_a^2 R_a + I_{se}^2 R_{se} + V.I_{sh} \text{ (compound)}$$

$$\text{Total losses} = P_{in} - P_{out}$$

DC motor

$$E_b = \frac{P\phi NZ}{60A}$$

$$T_a = 0.159\phi Z P \times \frac{I_a}{A}$$

$$T_a = 9.55 \times \frac{E_b I_a}{N}$$

$$F = BLI$$

$$\eta = \frac{VI_L - \text{losses}}{VI_L} \times 100\%$$

Shunt wound motor

$$E_b = V - I_a R_a$$

$$I_L = I_a + I_{sh}$$

$$I_{sh} = \frac{V}{R_{sh}}$$

$$N1/N2 = E_{b1}/E_{b2}$$

Series wound motor

$$I_a = I_L = I_{se} = I$$

$$E_b = V - I(R_a + R_{se})$$

$$N1/N2 = E_{b1}/E_{b2} \text{ } (\Phi1/\Phi2)$$

Short shunt compound motor

$$I_{se} = I_L$$

$$I_L = I_a + I_{sh}$$

$$I_{sh} = \frac{E_b}{R_{sh}}$$

$$E_b = V - I_{se} R_{se} - I_a R_a$$

Long shunt compound motor

$$I_{se} = I_a$$

$$I_{sh} = \frac{V}{R_{sh}}$$

$$I_L = I_a + I_{sh}$$

$$E_b = V - I_a (R_a + R_{se})$$

AC generator

$$f = \frac{NP}{120}$$

$$K_d = \frac{\sin\left(\frac{m\beta}{2}\right)}{m \sin\left(\frac{\beta}{2}\right)}$$

$$K_p = \cos\left(\frac{\alpha}{2}\right)$$

$$E_{ph} = 2.22 K_p K_d Z f \phi$$

$$E_{line} = \sqrt{3} E_{ph}$$

$$E_{line} = E_{ph}$$

AC motor

$$N_s = \frac{120f}{P}$$

$$s = \frac{N_s - N_r}{N_s} \times 100\%$$

$$N_r = N_s (1 - s)$$

$$f_r = sf$$

Transformer

$$\frac{E_1}{E_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$$

$$E = 4.44 f N \phi_m$$

$$\eta_{FL} = \frac{(VA \times p.f)}{(VA \times p.f) + IL + CL} \times 100\%$$

$$\eta_{1/2FL} = \frac{\left(\frac{1}{2} VA \times p.f\right)}{\left(\frac{1}{2} VA \times p.f\right) + IL + \left(\frac{1}{2}\right)^2 CL} \times 100\%$$