



**KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION**

COURSE NAME : TEKNOLOGI ELEKTRIK
COURSE CODE : DEG 1082
EXAMINATION : OCTOBER 2018
DURATION : 2 HOURS

INSTRUCTION TO CANDIDATES

1. This examintaion paper consists **FIVE (5)** questions. Answer **FOUR (4)** questions only in the answer booklet provided.

2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator.

3. Please check to make sure that this examination pack consist of:
 - i. Question Paper
 - ii. Answer Booklet

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This examination paper consists of 9 printed pages including front page

This part contains of **FIVE(5)** questions. Answer **FOUR (4)** questions only in the answer booklet provided.

*Bahagian ini mengandungi **LIMA (5)** soalan. Jawab **EMPAT (4)** soalan sahaja di dalam buku jawapan yang disediakan.*

QUESTION 1 / SOALAN 1

- a) Show the relationship for current and voltage by sketching the phasor diagram and the specific properties for the following circuit:
- purely inductive circuit.
 - purely capacitive circuit.

Tunjukkan hubungan arus dan voltan dengan melakarkan gambarajah pemfasa serta sifat tertentu untuk litar berikut:

- litar pearuh tulen.*
- litar pemuat tulen.*

(10 marks/ markah)

- b) Referring to Figure Q1(b), load A having 500W and negative 500VAR. Load B having 1.5kVA and power factor is 0.8 lagging. The Ampere meter A_2 reading is 3.6 A.
- Calculate the value of voltage supplied by the source, V_s .
 - Draw the power triangle and calculate the power factor for the overall circuit.
 - When switch S is closed, the overall power factor is 0.96 lagging. Calculate the value of capacitor, C.

Merujuk Rajah Q1(b), beban A mempunyai 500W dan negatif 500VAR. Beban B pula mempunyai 1.5kVA dan faktor kuasa 0.8 mengekor. Bacaan meter Ampere A_2 adalah 3.6A.

- Kirakan nilai voltan bekalan V_s .*
- Lukiskan rajah segi tiga kuasa dan kirakan faktor kuasa keseluruhan litar.*
- Apabila suis S ditutup, faktor kuasa keseluruhan litar adalah 0.96 mengekor. Kirakan nilai pemuat C.*

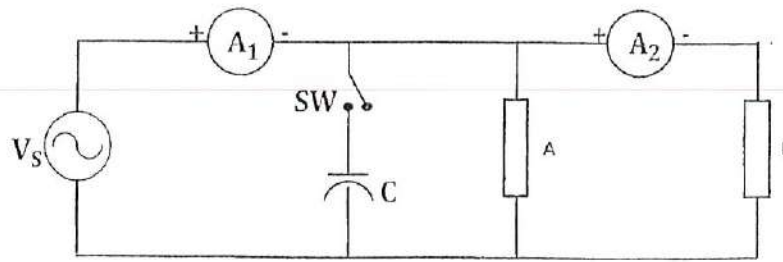


Figure Q1(b) / Rajah Q1(b)

(15 marks/ markah)

QUESTION 2 / SOALAN 2

- a) State the definition of three phase system and give two (2) advantages of three phase system.

Nyatakan definisi sistem tiga fasa dan berikan dua (2) kebaikan sistem tiga fasa.

(10 marks/ markah)

- b) Figure Q2(b) show a balanced three phase load having impedance $7+j4\Omega$. The three phase delta connected generator supplies voltage 333V. Determine:
- the line current, I_T for the circuit and the current in each load.
 - the active, reactive and complex power.
 - draw the phasor diagram for all voltage and current parameter.

Rajah Q2(b) menunjukkan beban tiga fasa seimbang mempunyai galangan $7+j4\Omega$. Penjana tiga fasa sambungan delta membekalkan voltan 333V. Tentukan:

- arus talian, I_T bagi litar dan arus dalam setiap beban.*
- kuasa aktif, kuasa regangan dan kuasa kompleks.*
- lukiskan rajah pemfasa untuk semua parameter voltan dan arus.*

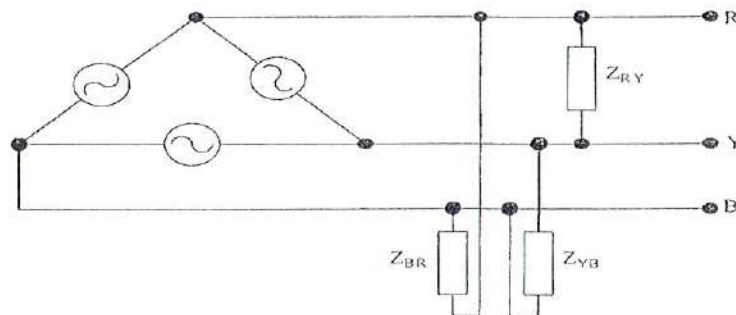


Figure Q2(b) / Rajah Q2(b)

(15 marks/ markah)

QUESTION 3 / SOALAN 3

a) Write the equations and its unit for following terms with reference to a magnetic circuit.

- i) Electromagnetic force, F .
- ii) Magnetic field strength, H .
- iii) Flux density, B .
- iv) Reluctance, S .
- v) Permeability, μ .

Tuliskan persamaan dan unitnya bagi istilah berikut merujuk kepada litar magnet.

- i) Daya elektromagnet, F .
- ii) Kekuatan medan magnet, H .
- iii) Ketumpatan fluk, B .
- iv) Enggan, S .
- v) Ketelapan, μ .

(10 marks/ markah)

b)

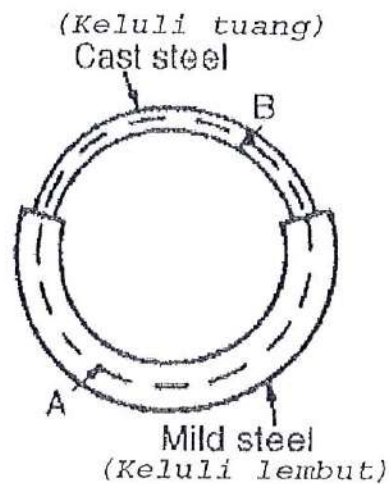


Figure Q3(b)/Rajah Q3(b)

	Mean length/ <i>panjang min</i>	Cross section area/ <i>luas keratan rentas</i>
Mild steel / <i>keluli lembut</i>	450mm	280mm ²
Cast steel / <i>Keluli tuang</i>	350mm	220mm ²

Table Q3(b)/Jadual Q3(b)

Find the electromagnetic force, F required to create $250\mu\text{Wb}$ in the magnetic circuit. Determine also the current, I if the coil of 500 turns are wound around the magnetic circuit. The magnetization curve is shown in **APPENDIX B**

*Tentukan jumlah daya gerak magnet, F yang diperlukan untuk menghasilkan urat daya sebanyak $250\mu\text{Wb}$ didalam litar magnet. Tentukan juga arus, I jika gegelung yang mempunyai 500 lilitan dililitkan di litar magnet tersebut. Rajah lengkung permagnetan ditunjukkan di dalam **LAMPIRAN B**.*

(15 marks/ markah)

QUESTION 4 / SOALAN 4

- a) State the definition of step up transformer and step down transformer.

Nyatakan definisi bagi pengubah langkah naik dan pengubah langkah turun.

(4 marks/ markah)

- b)

	Open circuit test/ <i>ujian litar buka</i>	Short circuit test/ <i>ujian litar pintas</i>
V	110V	9.5V
I	1.25A	25A
P	90W	140W

Table Q4(b)/Jadual Q4(b)

The test data from a single phase 5KVA, 240V/110V transformer is shown in Table Q4(b). Determine:

- the core loss current I_c , and the magnetism current I_m , in the core.
- core loss resistance R_c , magnetism reactance X_m , equivalent resistance R_{sn} and equivalent reactance X_{sn} .
- equivalent circuit referred to low voltage (LV) side.

Data ujian untuk pengubah satu fasa 5KVA, 240V/100V adalah seperti Jadual Q4(b). Tentukan:

- i) arus kehilangan besi I_c , dan arus permagnetan I_m , dalam teras.
- ii) rintangan kehilangan besi R_c , regangan permagnetan X_m , rintangan setara R_{sn} dan regangan setara X_{sn} .
- iii) litar setara pengubah merujuk ke bahagian voltan rendah (VR).

(21 marks/ markah)

QUESTION 5 / SOALAN 5

- a. What is difference between motor and generator?

Apakah perbezaan antara motor dan penjana?

(2 marks/ markah)

- b. A shunt field DC motor has a resistance field of 160Ω . It is connected to a system 240V. Calculate the current **to** or **from** the supply if the machine is in operation:

- i) as the generator armature current 60A. What is the value of the induced emf if armature resistance is 5.5Ω .
- ii) as the motor armature current is 40A. What is the value of the induced emf if armature resistance is 5.5Ω .

Suatu mesin AT medan pirau mempunyai rintangan medan 160Ω . Ia disambungkan kepada sistem yang mengandungi voltan tetap 240V. Kirakan arus **ke** atau **dari** bekalan jika mesin beroperasi:

- i) sebagai penjana dengan arus angkir 60A. Berapakah nilai dge teraruh apabila rintangan angker adalah 5.5Ω .
- ii) sebagai motor dengan arus angkir 40A. Berapakah nilai dge teraruh apabila rintangan angker adalah 5.5Ω .

(8 marks/ markah)

- c. A shunt field DC generator, delivers a terminal voltage of 220V to a resistance load of 80Ω . The generator has field and armature resistances of 420Ω and 0.5Ω respectively, determine:

- i) the DC generator circuit.
- ii) the load current.
- iii) the field current.
- iv) the power at field.

- v) the armature current.
- vi) induced emf at the armature.
- vii) the total power delivered to the load.

Penjana AT medan pirau membekalkan voltan terminal sebanyak 220V kepada beban perintang sebanyak 80Ω . Penjana tersebut mempunyai rintangan medan dan angker sebanyak 420Ω dan 0.5Ω masing-masing, tentukan:

- i) litar bagi penjana AT.*
- ii) arus beban.*
- iii) arus medan.*
- iv) kuasa pada medan.*
- v) arus angker.*
- vi) dge teraruh pada angker.*
- vii) jumlah kuasa yang dibekalkan kepada beban.*

(15 marks/ markah)

APPENDIX A / LAMPIRAN A

$$V = |Z|$$

$$pf = \frac{P}{S} = \cos\theta_c$$

$$X_c = \frac{V^2}{X_c}$$

$$C = \frac{1}{\omega_c}$$

$$V_T = \sqrt{3}V_F$$

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

$$Dgm, F = Hl = \sqrt{I}$$

$$\theta_c = \cos^{-1}\left(\frac{P_{lb}}{V_{lb} \times I_{lb}}\right)$$

$$R_c = \frac{V_{lb}}{I_c}$$

$$X_m = \frac{V_{lb}}{I_m}$$

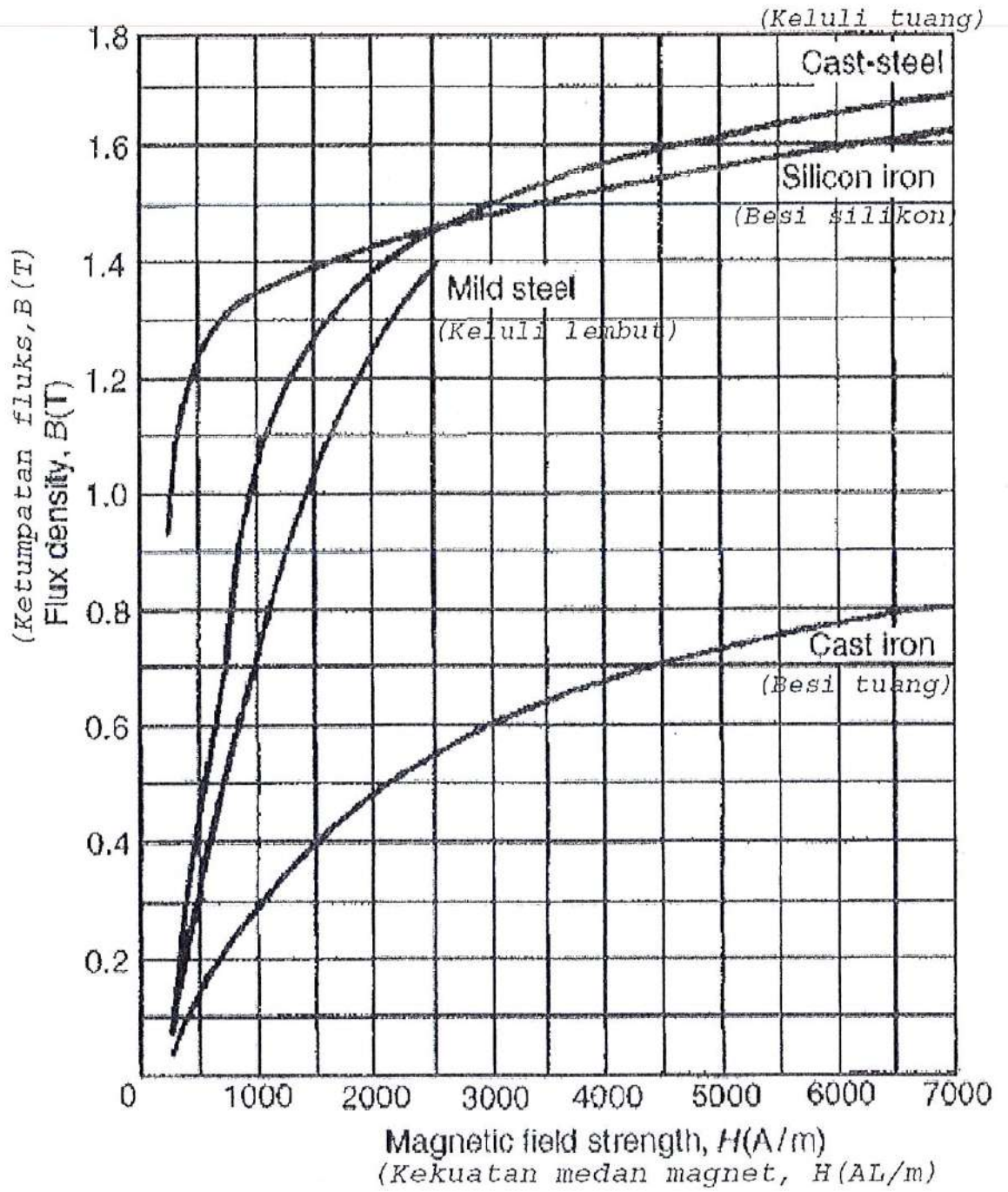
$$R_{sn} = \frac{P_{lb}}{I_p^2}$$

$$Z_{sn} = \frac{V_{lp}}{I_{lp}}$$

$$X_{sn} = j\sqrt{Z_{sn}^2 - R_{sn}^2}$$

$$E = \phi$$

APPENDIX B / LAMPIRAN B



END OF QUESTION PAPER