



**KOLEJ YAYASAN PELAJARAN JOHOR
ONLINE FINAL EXAMINATION**

COURSE NAME : TEKNOLOGI ELEKTRIK
COURSE CODE : DEG 1082
EXAMINATION : DECEMBER 2021
DURATION : 2 HOURS

**INSTRUCTION TO CANDIDATES/
ARAHAN KEPADA CALON.**

1. This examination paper consists of **ONE (1)** part : / PART A (100 Marks) /
*Kertas soalan ini mengandungi **SATU (1)** bahagian:* *BAHAGIAN A (100 Markah)*

2. Answer ALL questions in the answer sheet which is A4 size paper (or other paper with the consent of the relevant lecturer). /
Jawab SEMUA soalan di dalam kertas jawapan iaitu kertas bersaiz A4 (atau lain-lain kertas dengan persetujuan pensyarah berkaitan).

3. Write your details as follows in the upper left corner for each answer sheet: /
Tulis butiran anda sepertimana berikut di penjuru atas kiri bagi setiap kertas jawapan:
 - i. Student Full Name / *Nama Penuh Pelajar*
 - ii. Identification Card (I/C) No. / *No. Kad Pengenalan*
 - iii. Class Section / *Seksyen Kelas*
 - iv. Course Code / *Kod Kursus*
 - v. Course Name / *Nama Kursus*
 - vi. Lecturer Name / *Nama Pensyarah*

4. Each answer sheet must have a page number written at the bottom right corner. /
Setiap helai kertas jawapan mesti ditulis nombor muka surat di penjuru bawah kanan.

5. Answers should be **neat and clear in handwritten form.** /
Jawapan hendaklah ditulis tangan, kemas dan jelas.

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

*This examination paper consists of 8 printed pages including front page
Kertas soalan ini mengandungi 8 muka surat termasuk kulit hadapan*

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

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

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.

(4 marks/ markah)

- b) Referring to **Figure Q1(b)**, load A having 800W and 200VAR. Load B having 1kVA and power factor is 0.8 lagging. The Ampere meter A_2 reading is 4.5A.
- 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.

(21 marks/ markah)

- a) *Tunjukkan hubungan arus dan voltan dengan melakarkan gambarajah pemfasa serta sifat tertentu untuk litar berikut:*
- litar pearuh tulen.*
 - litar pemuat tulen.*
- b) *Merujuk **Rajah Q1(b)**, beban A mempunyai 800W dan 200VAR. Beban B pula mempunyai 1kVA dan faktor kuasa 0.8 mengekor. Bacaan meter Ampere A_2 adalah 4.5A.*
- 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.*

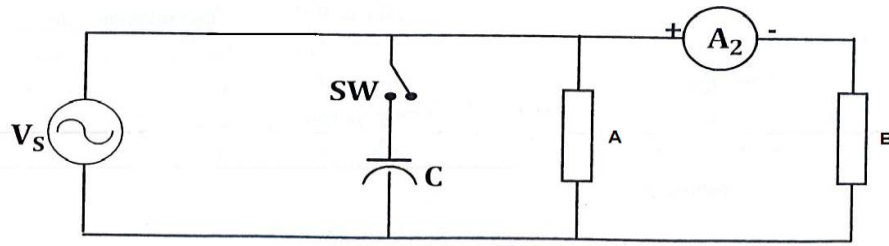


Figure Q1(b) / Rajah Q1(b)

QUESTION 2 / SOALAN 2

a) Explain the definition of three phase system and give **three (3)** advantages of three phase system.

(10 marks/ markah)

b) **Figure Q2(b)** show a balanced three phase load having impedance $15\angle 40^\circ \Omega$. The three phase delta connected generator supplies voltage 220V. Determine:

- i) the line current, I_T for the circuit and the current in each load.
- ii) the active power.
- iii) draw the phasor diagram for all voltage and current parameter.

(15 marks/ markah)

a) *Jelaskan definisi sistem tiga fasa dan berikan **tiga (3)** kebaikan sistem tiga fasa.*

b) ***Rajah Q2(b)** menunjukkan beban tiga fasa seimbang mempunyai galangan $15\angle 40^\circ \Omega$. Penjana tiga fasa sambungan delta membekalkan voltan 220V. Tentukan:*

- i) arus talian, I_T bagi litar dan arus dalam setiap beban.*
- ii) kuasa aktif.*
- iii) lukiskan rajah pemfasa untuk semua parameter voltan dan arus.*

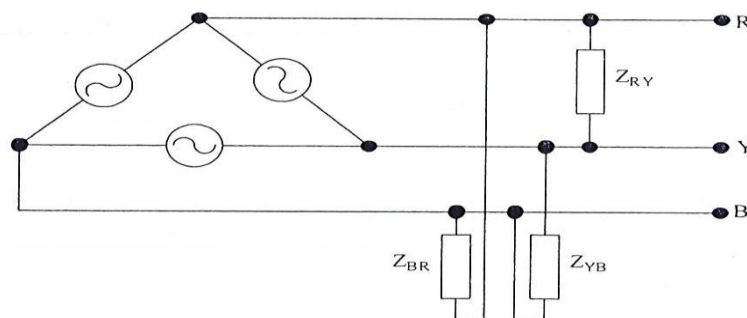


Figure Q2(b) / Rajah Q2(b)

QUESTION 3 / SOALAN 3

- a) Explain the following terms with reference to a magnetic circuit.
- Electromagnetic force, F .
 - Magnetic field strength, H .
 - Flux density, B .
 - Reluctance, S .
 - Permeability, μ .

(10 marks/ *markah*)

b)

	Mean length	Cross section area
Cast steel	350mm	$220 \times 10^{-6} \text{m}^2$
Mild steel	450mm	$280 \times 10^{-6} \text{m}^2$

Table Q3(b)

Find the electromagnetic force, F required to create $286 \mu\text{Wb}$ for the magnetic circuit in **Figure 3(b)**. Determine also the current, I if the coil of 500 turns are wound around the magnetic circuit. The magnetization curve is shown in **APPENDIX**.

(15 marks/ *markah*)

- a) Terangkan bagi istilah berikut merujuk kepada litar magnet.
- Daya elektromagnet, F .
 - Kekuatan medan magnet, H .
 - Ketumpatan fluk, B .
 - Enggan, S .
 - Ketelapan, μ

b)

	Panjang min	Luas keratan rentas
Keluli tuang	350mm	$220 \times 10^{-6} \text{m}^2$
Keluli lembut	450mm	$280 \times 10^{-6} \text{m}^2$

Jadual Q3(b)

Tentukan jumlah daya gerak magnet, F yang diperlukan untuk menghasilkan urat daya sebanyak $286 \mu\text{Wb}$ dalam litar magnet didalam **Rajah Q3(b)**. Tentukan juga arus, I jika gegelung yang mempunyai 500 lilitan dililitkan di litar magnet tersebut. Rajah lengkung permagnetan ditunjukkan di dalam **LAMPIRAN**.

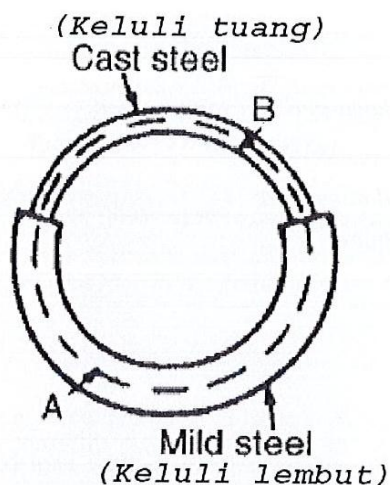


Figure Q3(b) / Rajah Q3(b)

QUESTION 4 / SOALAN 4

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

(4 marks/ markah)

- b)

	Open circuit test	Short circuit test
V	110V	9.5V
I	1.25A	25A
P	90W	140W

Table 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.

(21 marks/ markah)

- a) Terangkan definisi bagi pengubah langkah naik dan pengubah langkah turun.
- b)

	<i>Ujian litar buka</i>	<i>Ujian litar pintas</i>
V	110V	9.5V
I	1.25A	25A
P	90W	140W

Jadual Q4(b)

Data ujian untuk pengubah satu fasa 5KVA, 240V/110V 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 (V_R).

QUESTION 5 / SOALAN 5

- a) A shunt field DC motor has a resistance field of 160Ω . It is connected to a system 240V. Calculate the armature current if the machine is in operation:
- i) as the generator load current 60A. Also find the value of the induced emf if armature resistance is 5.5Ω .
 - ii) as the motor load current is 40A. Also find the value of the induced emf if armature resistance is 5.5Ω .
- (8 marks/ markah)**
- b) A shunt field DC generator, delivers a terminal voltage of 220V to a resistance load of 20Ω . The generator has field and armature resistances of 420Ω and 5Ω respectively, identify:
- 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.
- (15 marks/ markah)**

c) What is difference between motor and generator?

(2 marks/ markah)

a) Suatu mesin AT medan pirau mempunyai rintangan medan 160Ω . Ia disambungkan kepada sistem yang mengandungi voltan tetap 240V. Kirakan arus angkiran jika mesin beroperasi:

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

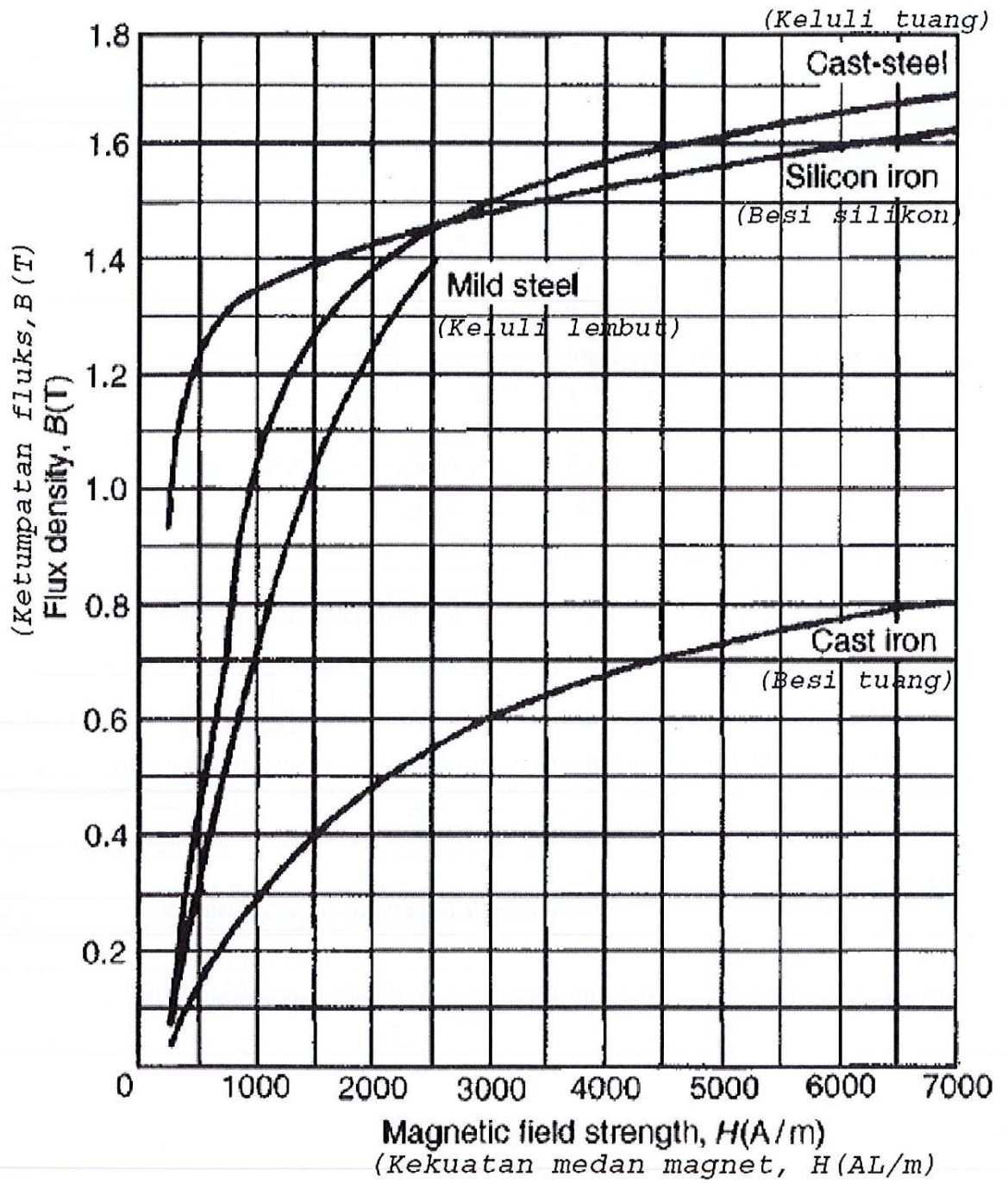
b) Penjana AT medan pirau membekalkan voltan terminal sebanyak 220V kepada beban perintang sebanyak 20Ω . Penjana tersebut mempunyai rintangan medan dan angker sebanyak 420Ω dan 5Ω masing-masing, kenalpasti:

- 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.

c) Apakah perbezaan di antara motor dan penjana?

[100 MARKS / MARKAH]

APPENDIX / LAMPIRAN



END OF QUESTION PAPER/ KERTAS SOALAN TAMAT