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 7 printed pages including front page
Kertas soalan ini mengandungi 7 muka surat termasuk kulit hadapan

© Hak cipta Kolej Yayasan Pelajaran Johor

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 of current and voltage by sketching the phasor diagram and the spesific properties for the following circuit:
   i) purely resistive circuit.
   ii) purely capacitive circuit.

(4 marks/ *markah*)

b) **Figure Q1(b)** shows the combination of power triangles for load A and B that are parallel connected across 200V, 50Hz supply. The ABC triangle is the overall circuit power triangle. Determine:

   i) the current for each branch.
   ii) the total power triangle.
   iii) power factor for overall circuit

(21 marks/ *markah*)

a) *Tunjukkan hubungan arus dan voltan dengan melakarkan gambarajah pemfasa serta sifat tertentu untuk litar berikut:*
   i) *litar rintangan tulen.*
   ii) *litar pemuat tulen.*

b) ***Rajah Q1(b)** menunjukkan gabungan segitiga kuasa untuk beban A dan beban B yang di sambung selari merintangi bekalan 200V, 50Hz. Segitiga ABC merupakan segitiga kuasa bagi keseluruhan litar. Tentukan:*
   i) *arus bagi setiap cabang.*
   ii) *jumlah segitiga kuasa.*
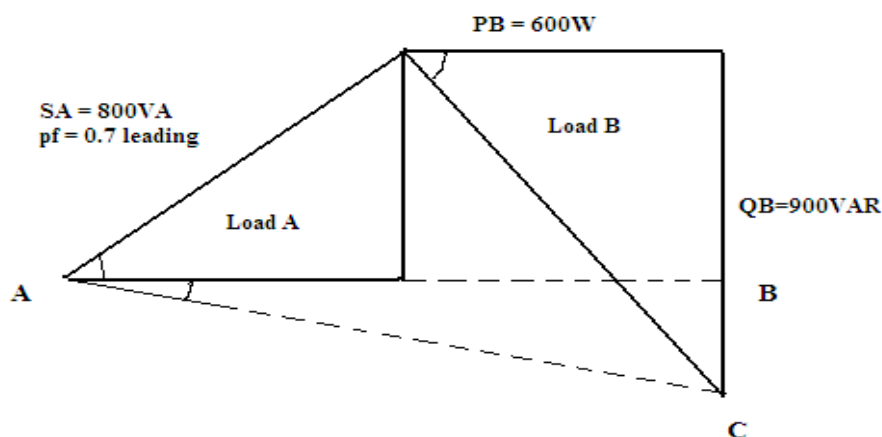   iii) *faktor kuasa keseluruhan litar.*

Figure Q1(b) / *Rajah Q1(b)*

QUESTION 2 / *SOALAN 2*

a) Explain definition of line voltage, V_L and phase current, I_P for delta connection in three phase system.

(10 marks/ *markah*)

b) A three phase motor is being modeled by a star connected circuit as shown in **Figure Q2(b)**. The motor received its supply from a three phase star connected generator, 220V, 50Hz. At $t=t_1$, line Y condition are an open circuit. Determine the line current I_R, I_Y, I_B, the active power and complex power absorbed by the motor at the following conditions $t < t_1$.

(15 marks/ *markah*)

a) *Terangkan definisi voltan talian, V_T dan arus fasa, I_F bagi sambungan delta dalam sistem tiga fasa.*

b) *Sebuah motor tiga fasa dimodelkan oleh satu litar sambungan bintang seperti* ***Rajah Q2(b).*** *Motor mendapat bekalan daripada penjana tiga fasa sambungan bintang, 220V, 50Hz. Pada ketika $t=t_1$, talian Y berkeadaan litar buka. Kirakan arus talian I_R, I_Y, I_B , kuasa aktif dan kuasa komplek diserap oleh motor tersebut bagi keadaan berikut $t < t_1$.*
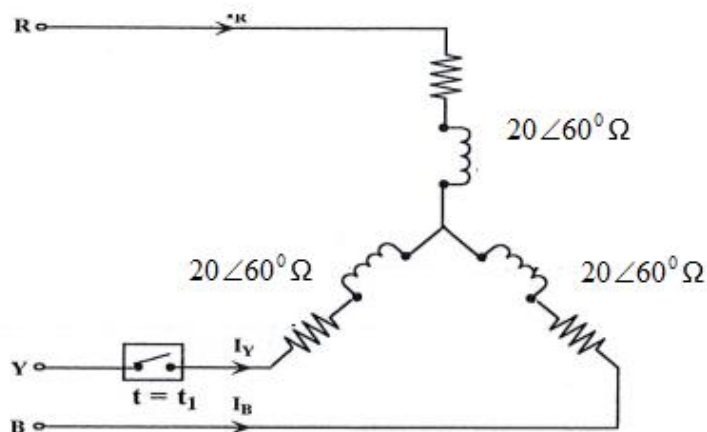
Figure Q2(b) / *Rajah Q2(b)*

QUESTION 3 / *SOALAN 3*

a) Explain the definition of the following terms in magnetic circuit:
   i) flux leakage.
   ii) eddy current losses.

(10 marks/ *markah*)

b)

B(Tesla)	0.75	0.91	1.25	1.35
H (AL/m)	2600	2860	3125	3250

Table Q3(b)

A ring has a mean length of 8cm and cross section area of 2.5×10^{-4} m^2 is made up of circular section of cast steel with the air gap 4mm. A coil of 280 turns are wound around the magnetic circuit. Using the B-H data in **Table Q3(b):**

i) draw the magnetic circuit.
ii) calculate the flux density, B and strength of magnetic field H, needed to create the 228µWb magnetic flux in the magnetic circuit.
iii) calculate the electromagnetic force, F and current, I produce by magnetic circuit.

(15 marks/ *markah*)

a) *Nyatakan definisi sebutan-sebutan berikut di dalam litar magnet:*

   i) *kebocoran fluks.*

   ii) *kehilangan arus pusar.*

b)

B(Tesla)	0.75	0.91	1.25	1.35
H (AL/m)	2600	2860	3125	3250

Jadual Q3(b)

Satu gelang panjang min 8cm dan luas keratan rentas 2.5 x10⁻⁴ m² diperbuat daripada keluli tuangan dengan mempunyai sela udara 4mm. Satu gegelung yang mempunyai 280 lilitan dililitkan di litar magnet tersebut. Dengan menggunakan data B-H dalam Jadual Q3(b):

   i) *lukiskan litar magnet.*

   ii) *kirakan ketumpatan fluks,B dan kekuatan medan magnet,H yang diperlukan untuk membina fluks magnet bernilai 228µWb dalam litar magnet.*

   iii) *kirakan daya gerak magnet, F dan arus,I yang terhasil dari litar magnet.*

QUESTION 4 / *SOALAN 4*

a) Explain the definition of transformer efficiency and give the method to test the efficiency.

(4 marks/ *markah*)

b)

	Open circuit test	Short circuit test
V	240V	55V
I	1.6A	12.5A
P	115W	340W

Table Q4(b)

The test data from a single phase 1KVA, 240V/2400V transformer is shown in **Table Q4(b).** Determine:

   i) the core loss current *Ic*, and the magnetism current *Im*, in the core.

   ii) core loss resistance *Rc*, magnitism reactance *Xm*, equivalent resistance *Rsn* and equivalent reactance *Xsn*.

   iii) equivalent circuit referred to high voltage (HV) side.

(21 marks/ *markah*)

a) *Terangkan definisi kecekapan pengubah dan berikan kaedah pengujian kecekapan tersebut.*

b)

	Ujian litar buka	Ujian litar pintas
V	240V	55V
I	1.6A	12.5A
P	115W	340W

Jadual Q4(b).

*Data ujian untuk pengubah satu fasa 1KVA, 240V/2400V adalah seperti **Jadual Q4(b).** Tentukan:*

    i)   *arus kehilangan besi Ic, dan arus permagnetan Im, dalam teras.*

    ii) *rintangan kehilangan besi Rc, regangan permagnetan Xm, rintangan setara Rsn dan regangan setara Xsn.*

    iii) *litar setara pengubah merujuk ke bahagian voltan tinggi (VT).*

QUESTION 5 / *SOALAN 5*

a)   List **four (4)** excitation methods of a DC generator. Draw the equivalent circuit for each method.

(8 marks/ *markah*)

b)   A shunt wound direct current generator supplies 22kW at 240V and runs at speed of 400 rpm. The armature and field resistances are 0.5Ω and 28Ω respectively. Find the speed of generator if it operates as a DC motor and taking inputs of 22kW at 240V.

(15 marks/ *markah*)

c)   Refer to **Figure Q5(c)**, name **two (2)** types of armature winding in DC machine.

(2 marks/ *markah*)

a)   Senaraikan **empat (4)** kaedah ujaan penjana AT. Lukiskan litar setara bagi setiap kaedah.

b)   Satu penjana AT belitan medan pirau membekalkan 22kW pada 240V dan berkendali pada kelajuan 400 ppm. Rintangan angker dan rintangan medan masing-masing adalah 0.5Ω dan 28Ω. Cari kelajuan penjana tersebut sekiranya berkendali sebagai motor AT dan mengambil masukan 22kW pada 240V.

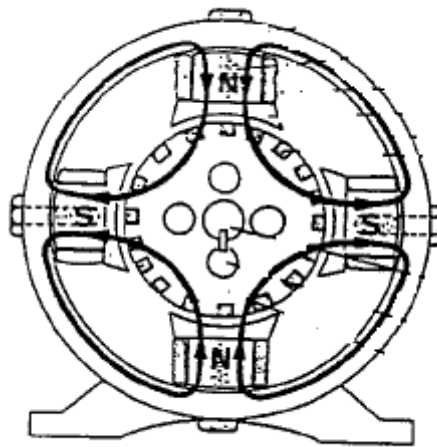c)   Rujuk **Rajah Q5(c)**, namakan **dua (2)** jenis belitan angker bagi mesin AT.

Figure Q5(c) / *Rajah Q5(c)*

[100 MARKS / *MARKAH*]

END OF QUESTION PAPER/ *KERTAS SOALAN TAMAT*