KYPJ
KOLEJ YAYASAN
PELAJARAN JOHOR

KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION

COURSE NAME	:	TEKNOLOGI ELEKTRIK
COURSE CODE	:	DEG 1082
EXAMINATION	:	OCTOBER 2019
DURATION	:	2 HOURS

### INSTRUCTION TO CANDIDATES
ARAHAN KEPADA CALON

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

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

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

   Calon tidak dibenarkan untuk membawa sebarang bahan/ nota ke bilik peperiksaan tanpa arahan/ kebenaran daripada pengawas.

3. Please check to make sure that this examination pack consist of:

   Pastikan kertas soalan peperiksaan ini mengandungi :

   i. Question Paper

      Kertas Soalan

   ii. Answer Booklet

      Buku jawapan

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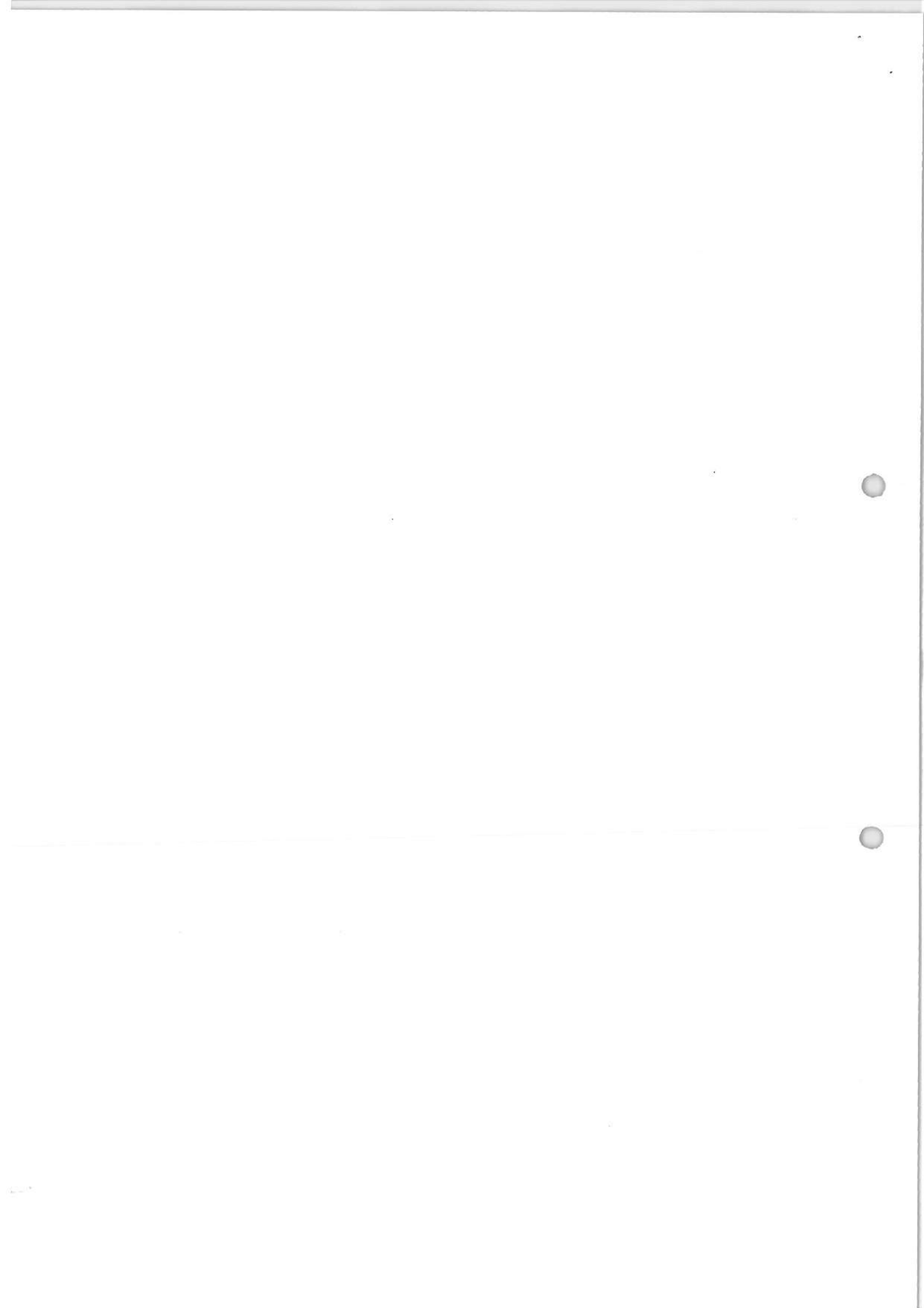
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*Bahagian ini mengandungi **LIMA (5)** soalan. Jawab **EMPAT (4)** soalan sahaja di dalam buku jawapan yang disediakan.*

QUESTION 1 / *SOALAN 1*

a) A loop impedance takes 480W of power and current of 5A supplied by120V, 50Hz. Calculate the impedance, Z, and power factor (pf) of circuit.

Satu gelung bergalangan mengambil kuasa sebanyak 480W dan arus 5A dari bekalan 120V, 50Hz. Kirakan galangan, Z serta faktor kuasa (fk) litar tersebut.

(5 marks/ *markah*)

b) A substation supplies the following loads:
   i)   450KW, unity p.f.
   ii) 2500KW, p.f 0.9 lagging.
   iii) 1500KVA, p.f 0.8 lagging.
   iv) 1000KVA, p.f 0.7 leading.

All the loads are suplied through on the same supply cables. Determine the total KW, KVAR, KVA and power factor of substation.

Satu pencawang elektrik membekalkan beban-beban seperti berikut:
   i)   450KW, faktor kuasa uniti.
   ii) 2500KW, faktor kuasa 0.9 mengekor.
   iii) 1500KVA, faktor kuasa 0.8 mengekor.
   iv) 1000KVA, faktor kuasa 0.7 mendahulu.

Kesemua beban dibekalkan melalui kabel pembekal yang sama. Dapatkan jumlah KW, KVAR, KVA dan faktor kuasa bagi pencawang tersebut.

(20 marks/ *markah*)

QUESTION 2 / *SOALAN 2*

a) State the definition of three phase system and state **two (2)** advantages of three phase system.

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

   (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. Find the line current I_R, I_Y, I_B and the active power absorbed by the motor at the following conditions:

   i) $t < t_1$.
   ii) $t > t_1$.

   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. Dapatkan arus talian I_R, I_Y, I_B dan kuasa aktif diserap oleh motor tersebut bagi keadaan berikut:
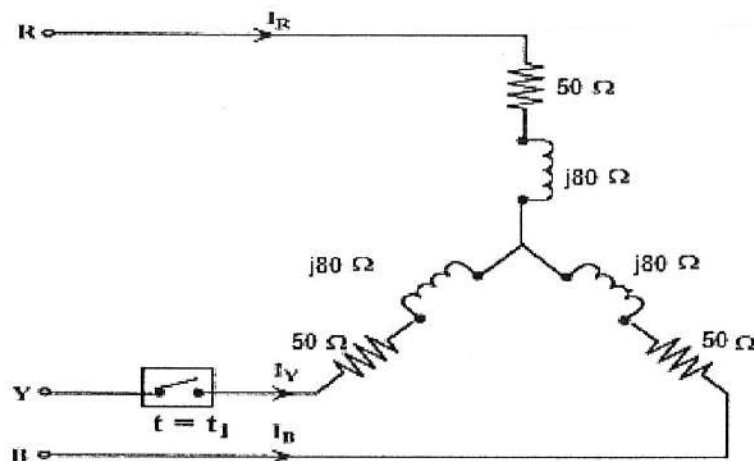
   i) $t < t_1$.
   ii) $t > t_1$.

Figure Q2(b) / *Rajah Q2(b)*

(15 marks/ *markah*)

QUESTION 3 / SOALAN 3

a) State 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) Reluxtance, S.

   v) Permeability, μ.

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

   i) Daya elektromagnet, F.

   ii) Kekuatan medan magnet, H.

   iii) Ketumpatan fluk, B.

   iv) Engganan, S.

   v) Ketelapan, μ.

   (10 marks/ *markah*)

b) A circular ring of magnetic material has a mean length of 2.0m and a cross section area of 0.002m². A cut of 6mm width is made in the ring. Calculate the magnetizing current to produce a flux of 3mWb in the gap air if the ring wound uniformly with a coil of 400 turns. Take the permeability of the ring material is 620.

   Satu gelang bulatan daripada bahan bermagnet mempunyai panjang min 2.0m dan luas keratin rentas 0.002m². Satu keratin selebar 6mm dikenakan pada gelang tersebut. Kirakan arus permagnetan untuk menghasilkan uratdaya 3mWb pada sela udara jika gelang dililit secara seragam dengan 400 lilitan. Ambil ketelapan relatif bahan gelang adalah 620.

   (15 marks/ *markah*)

QUESTION 4 / *SOALAN 4*

a) State the definition of single phase transformer in electrical system. Give the ratio are used in single phase transformer.

Nyatakan istilah pengubah satu fasa dalam sistem elektrik. Berikan bentuk nisbah yang digunakan di dalam pengubah satu fasa.

(4 marks/ *markah*)

b)

	Open circuit test/ ujian litar buka	Short circuit test/ ujian litar pintas
V	240V	55V
I	1.6A	12.5A
P	115W	360W

Table Q4(b)/*Jadual Q4(b)*

The test data from a single phase 30KVA, 2400V/240V 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 low voltage (LV) side.

*Data ujian untuk pengubah satu fasa 5KVA, 240V/100V 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 rendah (VR).*

(21 marks/ *markah*)

QUESTION 5 / SOALAN 5

a) State **two (2)** types of armature winding arrangement?

   *Nyatakan **dua (2)** jenis susunan bagi belitan angkir?*

   (2 marks/ *markah*)

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

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

   (8 marks/ *markah*)

c) A shunt field DC generator, delivers a terminal voltage of 240V to a resistance load of 70Ω. The generator has field and armature resistances of 350Ω and 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 240V kepada beban perintang sebanyak 70Ω. Penjana tersebut mempunyai rintangan medan dan angker sebanyak 350Ω dan 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*

$$V = IZ$$

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

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

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

$$X_C = \frac{V^2}{Xc}$$

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

$$C = \frac{1}{\omega X_C}$$

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

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

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

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

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

$$Dgm, F = Hl = NI$$

$$E = \phi n$$

[100 marks/ *markah*]

END OF QUESTION PAPER/ *KERTAS SOALAN TAMAT*