جامعة طنطا
كلية الهندسة
قسم هندسة القوى والآلات الكهربية
إمتحان الفصل الدراسى الأول للعام الجامعى ٢٠٠٨/٢٠٠٩
الفرقة الرابعة كهرباء

المادة: مقرر إختيارى تخصص (٢) تركيبات كهربية — الزمن : ٣ ساعات
التاريخ: ٢٠٠٩/١/٢٧م

أجب عن جميع الأسئلة الآتية:

(١) أ) أذكر خواص المواد الكهربية المستخدمة فى التركيبات الكهربية مع ذكر أنواع المواد الموصلة والمواد العازلة وما هى العوامل التى تتوقف عليها المتانة الكهربية للمواد المستخدمة فى التركيبات الكهربية.
ب) أذكر أنواع أجهزة الوقاية المختلفة اللازمة للوحات التوزيع الكهربية مع رسم مخطط لتصميم لوحة توزيع كهربية موضحا عليها جميع المكونات الرئيسية للوحة.
ج) إذكر الخطوات المطلوبة لتصميم وتنفيذ التمديدات الكهربية لتغذية مبنى سكنى. وضح ذلك بالرسم.

(٢) أ) وضح أهمية التأريض للأجهزة المعدنية المختلفة مع ذكر أنظمة التأريض المختلفة والمقارنة بينهما موضحا ذلك بالرسم .
ب) إشرح نموذج مبسط لنظام التأريض لغرفة محولات كهربية.

(٣) أ) وضح مع الرسم طرق تحسين معامل القدرة فى التمديدات الكهربية للأحمال المختلفة ومميزات وعيوب كل نوع.
ب) إشرح مع الرسم إستخدام مصادر الطاقة البديله (المولدات الإحتياطية) وأنواعها فى حالة حدوث إنقطاع المصدر الرئيسى للتيار الكهربى.

(٤) أ) إرسم دائرة حماية لخط توزيع ثلاثى الأوجه ضد زيادة الحمل.
(ب) خط توزيع AB يتغذى من الطرفين ، الطرف A بجهد ٢٣٦ فولت ومن الطرف B بجهد ٢٣٧ فولت
فإذا كان الطول الكلى للموزع يساوى ٢٠٠ متر والأحمال والمسافات الموصله عليه موزعة كالتالى:

الحمل بالأمبير	٢٠	٤٠	٢٥	٣٠
المسافة بالمتر من النقطة A	٥٠	٧٥	١٠٠	١٥٠

فإذا كانت المقاومه الكهربية لخط التوزيع تساوى ٠,٤ أوم لكل ١٠٠٠متر للخط الواحد المطلوب:
١- حساب التيار المار فى كل قطاع من الخط.
٢- تحديد نقطة أقل جهد من الخط.

(٥) أ) إذكر أنواع الإضاءة وإستخدام كل نوع منها وما هى العوامل التى يتوقف عليها حساب شدة الإستضاءه.
ب) صالة اجتماعات بمبنى إداري أبعادها ١٥م×١٠م مضاءة بعدد من المصابيح قدره المصباح الواحد ٥٠٠ وات وقوة الإستضاءة للمصباح الواحد ١٦ ليومن لكل وات باعتبار أن الإستضاءه فى الصالة لا تقل عن ١٩٥ ليومن/م٢ ومعامل الاستخدام يساوى ٠,٦٥ ومعامل الاستهلاك ٠,٧٥ إرسم تخطيط مناسب للصالة موضحا عليه توزيع المصابيح توزيعا منتظما.

جامعة طنطا
كلية الهندسة
قسم هندسة الإنتاج والتصميم الميكانيكي

المادة/ دراسات الجدوى للمشروعات
الفرقة الرابعة (الاقسام الكهربية)
لائحة قديمة

بسم الله الرحمن الرحيم
التاريخ : 2009 /1/29
الزمن : ساعتان

أجب عن الأسئلة الآتية:- (40 درجة)

السؤال الأول:-

1- الجدوى التسويقية هى إحدى مكونات دراسة الجدوى الاقتصادية - تكلم باختصار عن الجدوى التسويقية.
2- تكلم بالتفصيل عن عناصر التصنيع.

السؤال الثانى:-

1- يمكن تقسيم المصنع على حسب طرق عمليات الانتاج والتخطيط الى ثلاثة أقسام رئيسية اكتب نبذة مختصرة عن هذه الأقسام.
2- تكلم عن أهم:-
(أ)- العوامل المؤثرة فى حجم مرونة الطلب.
(ب)- العوامل التى يترتب عليها نقصان أو زيادة العرض.
3- ما المقصود بكل من :-
1- شركة التضامن
2- الشركة المساهمة
مع شرح لأهم مزايا وعيوب كل نوع.

السؤال الثالث:-

1- المقصود ب المخزون - ولماذا نحتفظ بالمخزون؟
2- ما المقصود بالجودة - اشرح باختصار مراحل تطور الرقابة على الجودة .

مع أطيب التمنيات بالنجاح
ا.د/عبد الفتاح مصطفى خورشد

Attempt all questions

Question 1: Marks: [17]

a- Show the difference between the methods used for the starting of single-phase induction motor. Compare briefly between these methods. Support your answer with necessary illustrations. [7]

b- A 1/4hp, 1ϕ, 120V, 60Hz, 1730rpm induction motor has stator winding resistance R_1=2.9Ω, magnetizing reactance X_{mag}=55.72Ω, and rotor resistance and leakage reactance referred to stator R'_2=2.7Ω, X'_2=3.26Ω. The rotational loss is 72.94W. Determine: (a) input power factor (b) developed torque (c) efficiency. The stator leakage reactance is assumed equal to the rotor leakage reactance referred to stator. [10]

Question 2: Marks: [17]

a- Compare, with the aid of equations and graphs whenever necessary, between each of the following pairs: [9]

- Universal motor and series motor
- Full step and half step operation
- Soft shopping and hard chopping

b- A universal motor is shunted by a resistance of 100Ω runs from a 50Hz supply. The motor has armature circuit resistance 2.0Ω. The current taken by the motor and the shunted resistance is equal to 4A each. The total current taken from the mains is equal to 7A. The motor gives an output of 746W. Find: (a) the power factor at which the motor works (b) the equivalent inductance of the motor (c) the iron loss assuming it is equal to windage and friction loss of the motor. [8]

Question 3: Marks: [17]

a- Define each of the following terms: [8]

- Detent torque
- Critical capacitance
- Reluctance torque
- Conduction period

b- A four phase 8/6 VRM has stator pole angle β=20°, rotor pole angle α=22°, air gap length $g=3\times10^{-2}$cm, active length=6cm. The stator and rotor iron can be considered to be of infinite permeability. Defining the zero of rotor angle at the position of phase-1 full alignment. (a) Plot with labels the inductance variation of all phases against rotor position. Mention the equations used. (b) Find the current of phase-1 required to produce flux density of 1.0T when phase-1 is in the position of maximum inductance. Make any required assumptions. [9]

Question 4: Marks: [17]

a- Write short notes about: [8]

- Three phase servo motor including the principle of operation, construction and control.
- Unipolar and bipolar drive circuit for stepper motor.

b- A three-stack, four poles, stepper motor has eight teeth on the rotor as well as on the stator. Determine the step size as excitation has changed from one stack to another. What are the possible numbers of phases? Write down the truth table of phase status and rotor angle. Support your answer with necessary diagrams. [9]

Question 5:

Marks: [17]

a- Compare between different types of linear motor from the view points construction and performance. [7]

b- A single sided Maglev permanent magnet linear motor vehicle with combined propulsion and levitation of PM-LSM. When the vehicle is running on-land with airgap of 9mm, the trust force coefficient K_{F0} = 10.93N/A. The levitation force coefficients are: [10]
force between iron stator and current-carrying windings $K_{zS}(\delta_e)$ = 3.1N/A^2
force between the stator current and PM $K_{zMs}(\delta_e)$ = 45.3N/A
force between PM and stator laminated-iron $K_{zM}(\delta_e)$ = 12.4N

The total vehicle weight is 11Kg. The armature windings are supplied with balanced three phase of I_1=4A Find the mechanical load angle as a ratio of pole pitch. Determine the attractive and repulsive components of levitation forces.

If the hydrodynamic resistance force F_{xR}(N) is expressed as a function of running speed v(m/s), it is found to be:

$$F_{xR} = 60.76\ v^2$$

Find the running speed in the above conditions.

ALL BEST WISHES

٤ قوى قديم تطبيقات الكترونيات القوى
١/cc

Tanta University

Electrical Eng. Dept.
Fourth Year
Course: Applications of Power Electrronics

Marks: 85
Time: 3 Hours.
Date: 22/1/2009

Final-Term Exam

Answer all the following questions:

1-1) Draw and explan the cosine control circuit of phase controlled converter.

1-2) Explain the types of triggering system. What are the advantages of pulse train triggering?

1-3) A three-phase ac switch with configuration inFig.1 has a three-phase 440-V, 60-Hz input and a three-phase wye connected load. The load power is 20 kW at a power factor of 0.86 lagging. Determine the voltage and current ratings of diodes and thyristors.

2-1) What are the normal specificationsof power supplies? Name three types of dc power supplies.

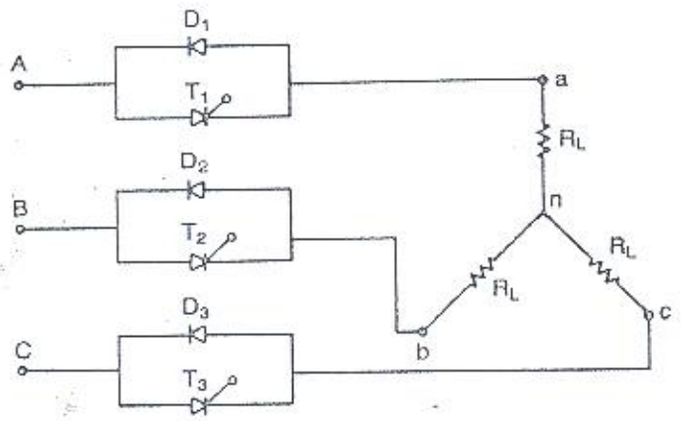
2-2) The dc output voltage of the full-bridge circuit in Fig.2, V_o=24 V at a load resistance of R=0.8 Ω . The inverter operates at the resonant frequency. The circuit parameters are $C_1=C_2=C=2$ μF, L=5 μH, and R=0. The dc input voltage, V_s=50 V. The on-state voltage drops of transistors and diodes are negligible. The turns ratio of the transformer, $a=N_s/N_p=0.5$. Determine the (a) average input current, I_s; (b) average transistor curret, I_A; c) peak tansistor current, I_p; (d) rms transistor current, I_R; and (e) open-circuit transistor voltage, V_{oc}. Neglect the losses in the transfomer, and the effect of the load on the resonant frequency is negligible.

3-1) The speed of a separately excited dc motor is controlled by a single-phase full-converter as shown in Fig.(3). The field circuit is also controlled by a full converter and the field current is set to themaximum possible value. The ac suppy voltage to the armature and field converters is one-phase, 208 V, 60Hz. The armature resistance is R_a=0.50 Ω, the field circuit resistance is R_f=345 Ω, and the motor voltage constant is K_v=0.71 V/A-rad/s. The viscous friction and no-load losses are neglibible. The armature and field current are continuous and ripple-free. If the delay angle of the armature converter is $\alpha_a=45^\circ$ and the armature current of the motor is I_a=55 A, determine the (a) torque developed by the motor, T_d; (b) speed, ω; and (c) input power factor of the drive, PF.

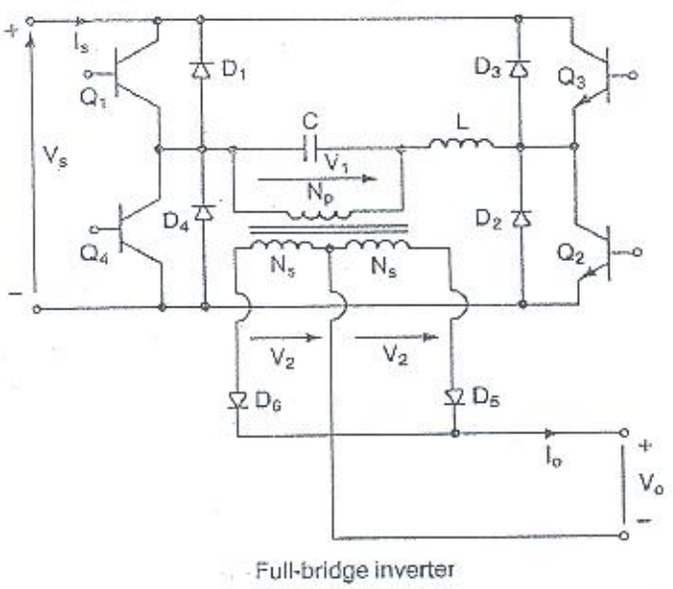
3-2) A dc chopper is used in rheostatic braking of a dc series motor as shown in Fig.(4). The armature resistance, R_a=0.03 Ω and the field resistance, R_f=0.05 Ω. The braking resstor, R_b=5Ω. The back emf constant, K_v=14 mV/A-rad/s. The average armature current is maintained constant at I_a=250 A. The armature current is continuous and has negligible ripple. If the duty cycle of the chopper is 60%, determine the (a) average voltage across the chopper, V_{ch}; (b) power dissipated in the resistor, P_b; (c) equivalent load resistance of the motor acting as a generator, R_{eq}; (d) motor speed; and (e) peak chopper voltage, V_p.

4-1) What are the various possible arrangements of UPS?
- Draw and explain the operation of two arrangements of UPS.

4-2) Draw and explain the scheme of brushless excitation system of an alternator.



Figure(1) Three-phase diode and thyristor ac switch.



Full-bridge inverter

Figure (2) Configurations for resonant DC power supplies.

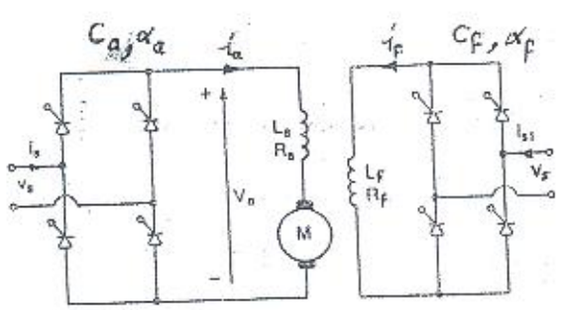


Figure (3) Full-converter

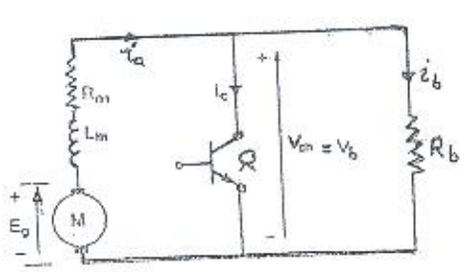


Figure (4) Rheostatic braking of a dc series motor

Tanta University	Fourth Year
Faculty of Engineering	Final-Term Examination 2008-2009
Electrical Power and Machines Engineering Dep.	Power System Protection
Student name:	Allowable Time: 3 hours

Answer the following questions:

First Question:

1-a What is protective relaying? Explain the various functions of protective relaying? (3 points)

1-b Why the protective zones are arranged in overlap fashion? With the help of simple diagram, show how the zones are overlapped. (3 points)

1-c Discuss the basic action of a backup protection. (3 points)

1-d Describe the construction and working of a Buchholz relay and its use. (4 points)

1-e In the part of the network shown in Fig. 1, the minimum and maximum operating times for each relay are 0.6 and 2.0 cycles, and each circuit breaker has the minimum and maximum operating time of 2.0 and 5.0 cycles. Assume that a safety margin of 3.0 cycles between any primary protection and backup protection is desirable. P_2 is the local backup for P_1, and P_3 is the remote backup. Draw a timing diagram to indicate the various times at which the associated relays and breakers must operate to provide a coordinated backup coverage for fault F. (5 points)

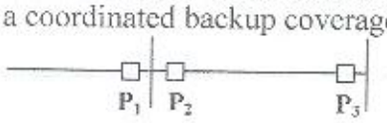


Fig. 1

Second Question:

2-a Explain the following terms related to protective relays:
i) Pickup ii) Dropout or Reset iii) Time delay iv) Trip circuit
(4 points)

2-b How are relay time, breaker time and fault clearing time related? (4 points)

2-c Describe with neat sketch the operation of solenoid and plunger type relay. (4 points)

2-d Consider the transmission line connected to a generator as shown in Fig. 2. The impedance data for the generator and the line are given in the Figure. A relay located at terminal A detects all faults on the transmission line. Assume a pre-fault voltage of 1.0 pu, and allow for a possible steady-state overvoltage of 1.2 pu during normal operation. Determine the pickup settings for an overcurrent relay used as fault detectors for this circuit. Allow a sufficient margin between the normal conditions and the pickup settings to accommodate any inaccuracies in relay performance.

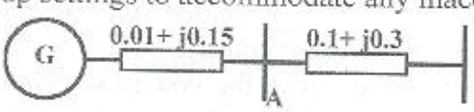


Fig. 2 (6 points)

Third Question:

3-a If the fault current consists of AC and DC components, what is the percentage overreach of a practical instantaneous overcurrent relay in terms of relay operating time and power system constants? (5 points)

3-b Define the terms 'Plug Setting' and 'Time Setting' as used in the context of an IDMT relay. (5 points)

3-c Choose time settings for the normal IDMT relays at R_1 and R_2 shown in Fig. 3.

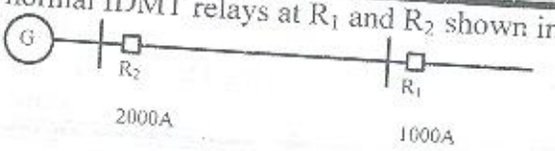


Fig. 3.

Phase fault currents are shown.
Load current, through R_2 = 200A, and through R_1 = 75A.
CT ratio at R_2 = 200/5 and at R_1 = 100/5. Plug setting are in steps of 25% to 200%.
The time-current characteristic of the relay is given in the following table: (8 points)

Plug Setting Multiplier	2	3	5	10	15	20
Time for TS of 1 (sec)	10	6	4.1	3	2.5	2.2

Fourth Question:

4-a What are the main features of directional relays? And where are these relays used? (5 points)

4-b Describe the principle of a directional overcurrent relay. How does it help in discrimination in protection of parallel feeders? (5 points)

4-c Simple time graded overcurrent relays are applied to a 5 bus ring main (single feed point). Circuit breakers are connected at each side of each bus. Choose time delays for each ovecurrent relay and indicate which relays need to be directional. (8 points)

Fifth Question:

5-a Explain what is meant by distance protection. What arrangement is made to make the relay measure positive sequence impedance only for L-L and 3-phase fault? (6 points)

5-b Explain why first zone of distance relay cover only 80% of the protected line section. How can the remainder part of line protected. (6 points)

5-c Consider the multi-terminal line in the system shown in Fig. 4. Each of the buses C, D, G, H and J has a source of power behind it. For a three-phase fault on bus B, the contributions from each of the sources are as follows:

Source	Current
J	600
C	200
D	300
G	800
H	400

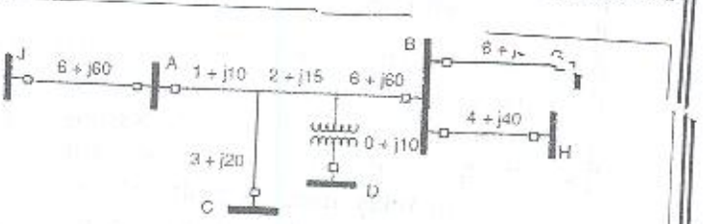


Fig. 4

You may assume that the fault current contributions from each of these sources remain unchanged as the fault is moved around throughout the system shown. Determine the zones 1, 2 and 3 settings for the distance relay at bus A. Remember to take into account the effect of the infeed for determining the zone 2 and 3 settings, while no infeeds are to be considered for the zone 1 settings. (6 points)

Good Luck

Dr. Mohammed Abo-Elazm Alaam, et al

University of Tanta

Faculty of Engineering

Department of Electrical Power and Machines

Fourth Year (Old curriculum)

Electrical testing and measurements

First Term: Final Examination — **20 January. 2009**

Time: Three Hours — الأسئلة مكتوبة في أربعة أعمدة على وجهي ورقة الأسئلة

Draw only =Just draw ارسم بدون تعليق

illustrations = رسومات بيانية أو هندسية أو متجهات طورية أو خلافها أو جميعها.

Enumerate عدد دون شرح تفصيلي

يجب أن تفرق في إجابتك بين الدائرة المكافئة ، التي تحتوي على عناصر تمثل تصرف الآلة و ينبغي أن لا تحتوي على أجهزة قياس ، وبين دائرة التوصيل التي تحتوي على رمز الآلة و على أجهزة قياس . أي خلط بين الدائرتين يضيع الدرجة .

يجب أن تدعم إجابتك بالحجج المشفوعة بالمعادلات أو المتجهات الطورية phasors أو المنحنيات أو جميعها حسب الحاجة ما لم ينص على غير ذلك (حسب المفردات الواردة أعلاه) . ولا تجب فقط ب "نعم" أو "لا" .

يجب أن تكتب مدلول كل رمز تستخدمه في الشرح والمعادلات . وإذا وجدت دائرة توصيل أو دائرة مكافئة تتحدث عنها المعادلات فلا بد أن يسمى ما يقرؤه كل جهاز و تسمى جميع عناصر الدائرة والتيارات و الجهود voltages بما يتوافق مع المعادلات ، و إلا تفقد درجات.

ارسم بعناية مستخدما أدوات الرسم

Attempt ALL questions:

Question 1.

(a) By giving reason(s) مع ذكر الأسباب لتدعيم الإجابة, mention what will happen in the machine laboratory in each of the following cases:

1. The field circuit is opened while a dc motor is running. (1.5 point
2. The field circuit is opened while an isolated synchronous generator is supplying a load. (1.5 points)
3. The field circuit is opened while a salient pole synchronous motor is supplying a load. (1.5 points)
4. A wound rotor induction motor is switched on while its slip rings are opened-circuited. (1.5 points)

(b) Draw only diagrams to show how the direction of rotation of the induction motors can be reversed. (1.5 points)

(c) A dc shunt motor is operated from a constant supply voltage. How can the speed be raised? (1.5 points)

(d) Aided with illustration(s) and equation(s) explain the function of the star/delta switch and draw its connection diagram.. (4.5 points)

Question 2.

(a) For the speed control of a three-phase induction motor, draw only graphs to compare the speed changes under different loading conditions for a change in (i) the applied voltage and (ii) the rotor circuit resistance. Do any of these methods depend on the change of the rotating field speed? (6 points)

(b) Using a variable frequency source to control the speed of a three-phase induction motor, if the voltage is kept constant, what will be its effect on the machine flux? (1.5 points)

(c) An Induction motor is driving a load having a constant torque. The voltage applied to the motor is slowly reduced to a different value of voltage. Draw only diagram(s) to show what is expected to happen. (3 points)

(d) With constant voltage and frequency supply, draw only plot(s) to show how the starting torque of an induction motor can be increased in the laboratory. (3 points)

(e) Identify the data given on the nameplate of an induction motor. بين المعلومات المدونة ومدلولاتها (1.5 points)

Question 3.

(a) Regarding the single-phase motor:

1. Is it a self-started motor? If the answer is 'no', show, with illustrations, one only واحدة فقط of its starting methods. (3 points)
2. Draw the electrical circuit connection (1.5 points) and the equivalent circuit (1.5 points) diagrams of a test to determine the magnetizing reactance of a single-phase induction motor knowing the winding resistances and leakage reacrances. Write the necessary equations and define all their symbols. (3 points)

Question 4.

Regarding a salient pole synchronous machine

(a) If the machine is operated as an alternator loaded such that the terminal voltage is greater than the induced emf.

(i) Draw the phasor diagram and define each phasor. (1.5 points)

(ii) Define the voltage regulation and efficiency in terms of the equivalent-circuit resistance and reactance. (1.5 points)

(iii) Explain in details, test(s) to determine the equivalent-circuit parameters of the machine (1.5 points). Draw the connection diagram (1.5 points)and write the necessary equation(s). (1.5 points) Sketch current and voltage wave forms. (1.5 points)

(iv) How is the synchronous impedance affected by frequency? (1.5 points)

(b) If the machine is operated as motor:

(i) Can it develop a torque when its field winding is opened? Give reason(s). (1.5 points)

(ii) Plot the predicted output power as a function of the torque angle. (1.5 points)

(iii) If the field winding of this machine is excited, draw the expected variation(s) of armature current with excitation for thee different loads on a single plot. (1.5 points)

(iv) Draw only the electrical connection diagram of a test to determine the previous plot. (3 points)

(v) Suppose that, for a given excitation and load, the motor draws a unity pf current. The load is then increased with the same excitation. Aided with the plot and a phasor diagram, discuss the change in the power factor and armature current (if any). (3 points)

(vi) Is it a self-started motor? If your answer is 'no', show, with illustrations, one only واحدة فقط of its starting methods. (1.5 points)

END OF EXAM. **LUCK◄ GOOD ►BYE**

اقلب الصفحة من فضلك