TANTA UNIVERSITY
Faculity Of Engineering
Electrical Power and Machines Engineering Department
لائحة قديمة

Course: Applications of Power Electronics **Time : 3 hours**
Year : 4th year(Power&Machines). **Date : 12/1/2011**

Answer All The Questions

Clarify your answer with the suitable sketches as you can

The first question *(15 mark)*

a) Mention the firing circuit requirements.

b) For the protection component to improve the performance of SCR, if the minimum gate voltage &currant are 1.5V & 100 mA , R_2=20 Ω &the firing circuit voltage is 8 V. Find R_1 to ensure turn-on of SCR

c)Design firing circuit using Op-Amp.for 1- ϕ full converter.

The second question *(20 mark)*

*Compare between ac and dc switches?
* sketch the different forms of ac switches?
* what are the types of ac power supplies ? Explain the switched-mode type.
* The dc output voltage of the switched mode bridge power supply is v_0= 24V at a resistive load of R=0.4Ω .The turns ratio of the transformer a= N_S/N_p=0.5. Determine the

a) Average input current I_S
b) Average transistor current I_a
c) Peak transistor current I_p
d) rms transistor current I_R
e) open circuit transistor voltage , V_{0C}

بقية الأسئلة فى الصفحة الثانية

The third question *(20 mark).*

The speed of a 20-hp 300-v 900-rpm separately excited dc motor is controlled by a 3-Φ full converter. The field circuit is also controlled by 3-Φ full converter.The ac input to the armature and field converters is 3-Φ ,y-connected, 220-v, 50 HZ.The armature resistance is R_a=0.25 Ω, the field circuit resistance is R_f=145 Ω,and the motor voltage constant is K_V=1.2 V/A- rad/s.The no-load losses can be considered negligible , the armature and field currents are continous and ripple free

a) If the field converter is operated at the maximum field current and the developed torque is T_d= 116 N.m at 900 rpm, determine the delay angle of the armature converter α_a.

b) If the field circuit converter is set for the maximum field current , the developed torque is T_d= 116 N.m, and the delay angle of armature converter is α_a= 0 ,determine the speed of the motor .

c) For the same load demand as in part b , determine the delay angle of the field converter if the speed has to be increased to 1800rpm.

The fourth question*(20 mark).*

1-Mention the possible control modes of a dc chopper drive.***[4 mark]***

2-A dc chopper is used in rheostatic braking of a dc series motor. The armature resistance,R_a=0.03 Ω and the field resistance, R_f=0.05 Ω.The braking **resistor,** R_b **=5** Ω.The back emf constant, K_v =14 mV/A-rad/s.The average armature current is maintained constant at I_a=250A. The armature current is continous and has negligible ripple. If the duty cycle of the chopper is 60%, determine the (i) average voltage across the chopper, V_{ch} **(ii) power dissipated in the resistor,** P_b **(iii)equivalent load resistance of the motor acting as a generator,** R_{eq} **(iv) motor speed and(e) peak chopper voltage** V_p ***[16 mark]***

The fifth question *[10 mark]*

Explain the various possible arrangement of UPS system

Good Luck.

توجيهية
لائحة جديدة

TANTA UNIVERSITY — Course: Special Electrical machines EP4103
Faculty of Engineering — Fourth Year: Curriculum 1997
Department of Electrical Power and Machines Engineering.

JANUARY Final EXAMINATION. 2010-2011

QUESTION 1

a) Explain the principle of reluctance-motor operation showing:
   i) how it starts, accelerate, and synchronizes
   ii) suitable diagrams to illustrate the rotor positions at no load, partially loaded and maximum load for a two pole machine.

b) A reluctance motor operating at 220V, 50 Hz, has a torque angle of 15° . The motor is supplied by an isolated generator. Heavy demands on the generator cause a 5% drop in both voltage and generator speed. Assuming a constant torque load on the motor shaft, determine the new torque angle.

QUESTION 2

a) Explain the principle of operation of a stepper-motor with 8 teeth to be energized on the stator and 6 teeth on the rotor showing:
   i) suitable diagram of a simple circuit arrangement for sequencing currents to the stator coils
   ii) how half-stepping and microstepping are accomplished

b) Determine the pulse rate requited to obtain 3600 r/min from a stepper motor with a resolution of 600 steps/rev.

QUESTION 3

a) Explain why the torque developed by a universal motor varies as the square of the armature current.
b) Using suitable diagram, show how the direction of rotation of a universal motor is reversed.
c) How may the speed of a universal motor be adjusted?

QUESTION 4

a) Explain the principle of operation of three-phase unipolar-driven brushless DC motor showing:
   i) diagram of a motor cross-section with circuit arrangement for sequencing currents
   ii) the switching-sequence table for CW and CCW directions.

b) Discuss the advantages and disadvantages of brushless DC motors as compared to conventional DC motors.

QUESTION 5

a) (i) Added with illustrations, suggest a closed loop control system that employs synchro transmitter(s) and transformer(s) to control the rotor position of an electric motor.
   (ii) Write the voltage equations that govern the operation of each type of synchros.

b) Please note that you do not have to use all the given data. The equivalent-circuit parameters in ohms per phase referred to the stator for a two-phase 1.5-hp 220-V four pole 60-Hz squirrel-cage induction motor are given below. The rotational losses is 200-W
   $R_1 = 3.2$ $R_2 = 2.4$ $X_1 = X_2 = 3.2$ $X_\varphi = 100$
   The voltage applied to phase m is $230 \angle 0^\circ$ and the voltage applied to phase a is $210 \angle 80^\circ$. At a slip of 0.04 the forward and backward impedances are respectively 41.9 + j27.2 ohms and 1.2 + j 3.2 ohms. What is the air-gap torque?

END OF THE EXAM QUESTIONS.

LUCK ◄GOOD► BYE

توك قديم

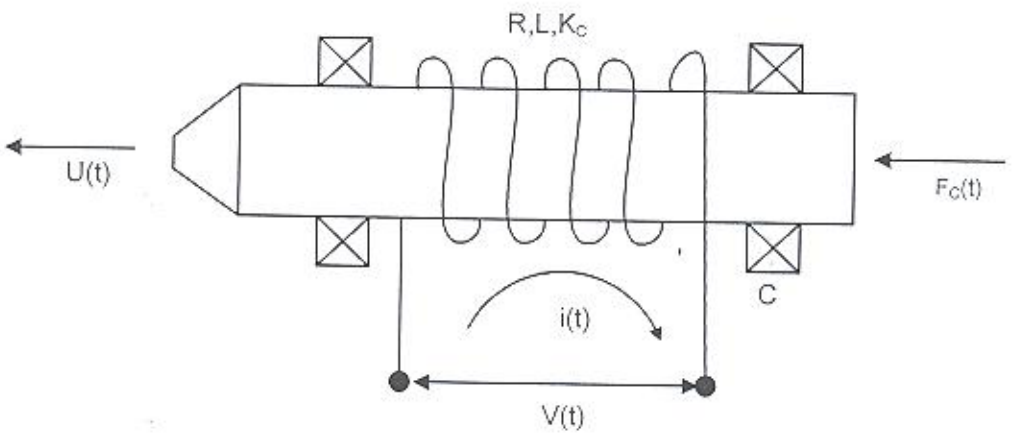
Tanta University
Faculty of Engineering
Department of Mechanical Power Engineering
Year: Fourth Subject: Automatic Control
Name: Z.M. Omara

Date: -1-2010
Time allowed: 3 Hours
Full Marks : 90
Final Exam: pages 2
Academic Number: MEP4121

Question No 1

(marks 20)

A solenoid valve is shown in the figure below / the coil has an electrical resistance of 4Ω , an inductance of 0.6H and produces an electromagnetic force FC(t) of KC times the current i(t) . The valve has a mass of 0.125 Kg and the linear bearing produces a resistive force of C times the velocity u(t) . The values of KC and C are 0.4 N/A and 0.25 Ns/m respectively. Develop the differential equations relating the voltage v(t) and current i(t) for the electrical circuit and also for the current i(t) and velocity u(t) for the mechanical elements .hence deduce the overall differential equation relating the input voltage v(t) to the output velocity u(t).



Question No 2

(marks 15)

unit gain second order system is subjected to unit step input and in the transient response the first over shoot occurring after 30 ms and the response of the system settle down within ±2 % of final value after 50 ms .

Find:

1- The time constant.
2- The response of the system at t=30 ms.
3 The delay time.
4- The system transfer function.

Question No 3

(marks 10)

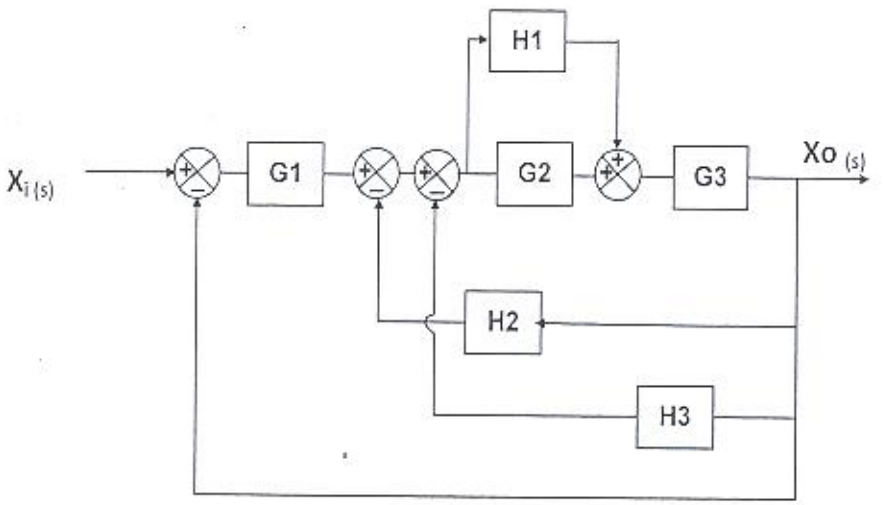
Check the stability of the system

(a) The characteristic equation = S^2+S+1

(b) The characteristic equation = $S^5+2S^4+12S^2+S+3$

Question No 4 **(marks 20)**

Simplify the block diagram shown below and obtain the closed loop transfer function $\frac{Xo(s)}{Xi(s)}$



Question No 5 **(marks 25)**

A control system has the following open loop control system

$$(G)(H)=\frac{K}{s(S+3)(S+5)}$$

a- Sketch the root locus diagram by obtaining asymptotes, break away point and imaginary axis crossover point, what the value of k for marginal stability?

b- Locate a point on the locus that corresponds to closed loop damping ratio 0.5 what the value of k for this condition? , what are the roots of the characteristic equation (closed- loop poles) for this value of k?

Tanta University

Department: Electrical Power and Machines Engineering
Total Marks: **85 Marks**

Faculty of Engineering

Course Title: Power System Protection	Course Code: EP4102	Year: 4th
Date: Jan. 2011 (First term)	Allowed time: 3 hrs	

Answer the following questions

Problem number (1) **(20 Marks)**

a) Define unit and non-unit protection. Give an example for each type.

b) In the part of the network shown in Fig. 1:

i. Specify the protective zones.

ii. Which circuit breakers should open for a fault at: F1, F2 and F3?

iii. Specify where is the fault if the following breakers open:

Case	Breakers
1	B24a and B42a
2	B3 and B5
3	B3, B31, B32, B13 and B23
4	B1, B12a, B12b and B13

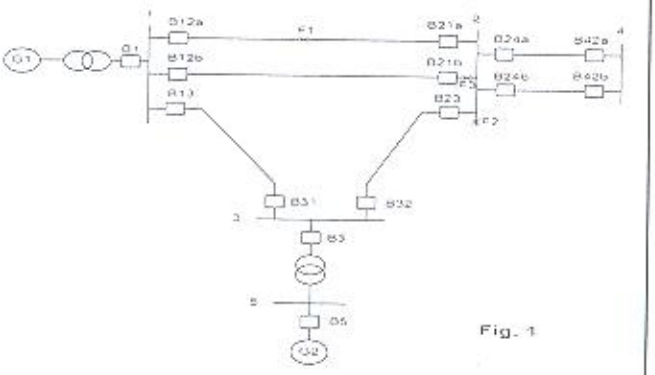


Fig. 1

Problem number (2) **(24 Marks)**

a) Classify the protective relays according to its design. And discuss them briefly.

b) Define the current transformation error and ratio correction factor.

c) Three ideal CTs with turns ratios of 600 : 5 are connected in a wye and a delta configuration as shown in Fig. 2(a) and (b) respectively. For the primary currents shown in each case, what are the currents I_1, I_2, I_3 and I_0?

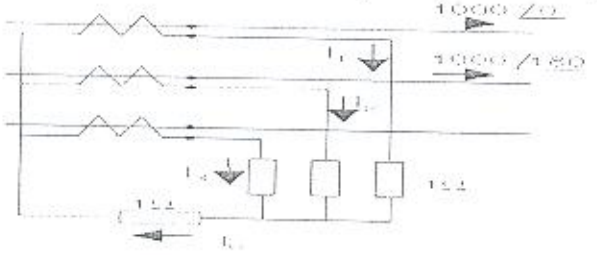


Fig. 2 (a)

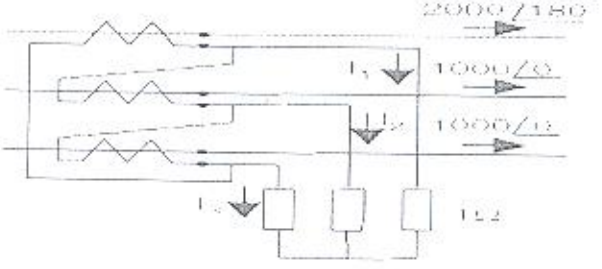


Fig. 2 (b)

Problem number (3) **(20 Marks)**

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?

b) For the system given in Fig. 3 determine the CT ratios R_1, R_2 and R_5 relaying points, if the maximum load delivered from the supply is 25 MVA. Available CT turns ratios are 300/5, 400/5, 500/5, 600/5, 1000/5, 2000/5 and 3000/5. If the relays are of the type inverse overcurrent relay, determine the **plug** and **time setting** of these relays for correct coordination. Assume that R_5 is not required to coordinate with any down stream devices. The characteristic of the inverse overcurrent relay is given in Fig. 5.

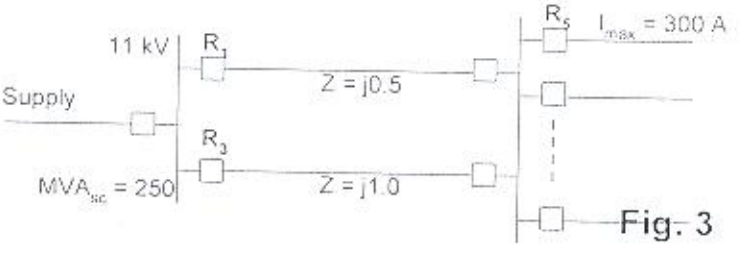


Fig. 3

Problem number (4) (21 Marks)

a) What is the meaning of "Pilot Protection"? How can be achieved in power system?

b) 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

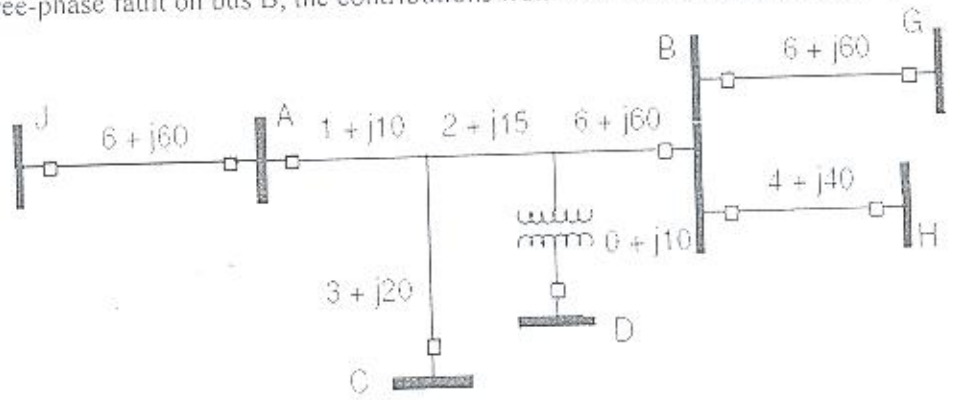


Fig. 4 →

You may assume that the fault current contributions from each of these sources remain unchanged as the fault is moved throughout the system shown. Determine the zones 1, 2 and 3 settings for the distance relays at buses A and B.

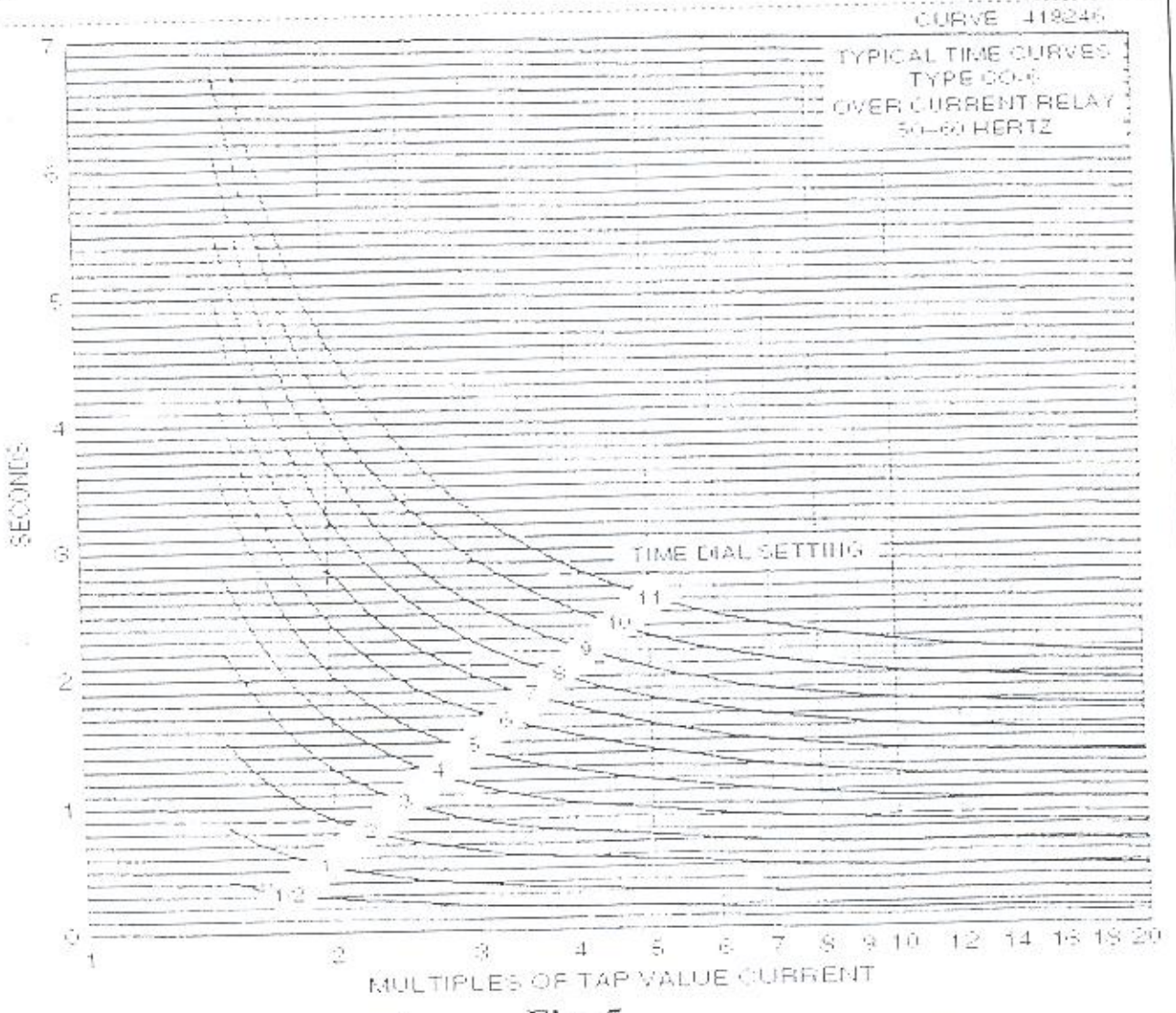


Fig. 5.

Good Luck

Tanta University — Department: Electronics and Electrical Communication Eng. — Faculty of Engineering

Total Marks: 70 Marks

Course Title: Electrical Communications	Course Code: EEC4106	Year: 4th year
Date: 24/1/2011 (First term)	Allowed time: 3 hrs	No. of Pages: (1)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches, equations)

Question 1

(A) Find Fourier series for the periodic signal shown in Figure 1, and sketch its amplitude and phase spectrum.

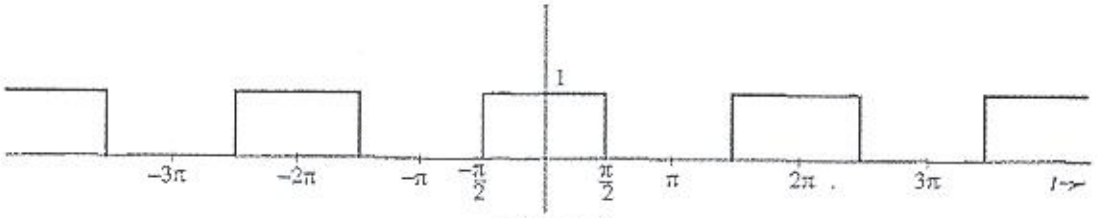


Figure 1

(B) Find the power for the signal shown in Figure 1.

(C) Find the Fourier transform for the following functions:-

(i) $A\,rect(t)$ (ii) e^{-t} (iii) $\sin(t)$

Question 2

(A) Explain one method to generate AM wave and one method to demodulate it.

(B) Consider the message signal $m(t)=20\cos(2\pi t)$, and the carrier wave $c(t)=50\cos(100\pi t)$. Find the modulator sensitivity and sketch the AM wave for 75% modulation.

Question 3

(A) Show, with aid of sketch; how the modulation index affects the process of AM modulation.

(B) The power content of the carrier for an AM wave is 5 kW. Determine the power content of each of the sidebands and the total power transmitted when the carrier is modulated 75%.

Question 4

(A) Compare between NBFM and WBFM.

(B) A receiver picked up the signal $v(t)=10\cos[2\pi(4\times10^6)t+0.8\sin(2\pi\times600)t]$ and the modulating signal amplitude is 4 Volt.

(i) Define the modulation type; calculate the bandwidth of the modulated signal, and carrier power.

(ii) Draw the frequency spectrum of the modulated signal and calculate the frequency deviation.

Best Wishes of Success

جامعة طنطا
كلية الهندسة
الفرقة الرابعة (قوى كهربية)

المادة/ دراسات الجدوى للمشروعات
(EE41H4)
لائحة قديمة

بسم الله الرحمن الرحيم
التاريخ :٢٠١١/١/٢٦
الزمن : ساعتان

أجب عن الأسئلة الآتية:- (٤٠ درجة)

السؤال الاول:-

١- ما هو المشروع ؟- اكتب نبذة مختصرة عن المراحل التى يمر بها المشروع المقترح للاستثمار.
٢- الجدوى الفنية هى إحدى مكونات دراسة الجدوى الاقتصادية - تكلم باختصارعن الجدوى الفنية.
٣- تكلم بالتفصيل عن عناصر التصنيع.

السؤال الثانى:-

١- ما المخزون؟ - لماذا نحتفظ بالمخزون.
٢- ما هى العوامل التى يترتب عليها نقصان أو زيادة العرض؟
٣- لماذا نقوم باعداد دراسات الجدوى الاقتصادية؟ مع شرح تفصيلى لأنواع دراسات الجدوى الاقتصادية.

السؤال الثالث:-

١- ما اهمية المفاضلة بين المشروعات مع شرح لمراحل المفاضلة بين المشروعات.
٢- اذكر اسس ومبادئ عملية تقييم المشروعات.
٣- اذكر اهم نقاط الاختلاف بين معايير الربحية التجارية ومعايير الربحية القومية.

السؤال الرابع:-

١- تكلم بالتفصيل عن اهم البيانات الثانوية اللازمة لاجراء دراسة الجدوى التسويقية.
٢- تكلم بالتفصيل عن البيئة التسويقية.
- اكتب نبذة مختصرة عن التقرير الخاص بك.

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

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 60 Marks

Faculty of Engineering

Course Title: Electrical Testing and Measurements (1) | Course Code: EP4104 | Year: 4th (OLD CURRICULUM)
Date: Jan. 15th 2011 (First term) | Allowed time: 3 hrs | No. of Pages: (1)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches if possible)

Question number (1) **(22 Marks)**

a) **Define** the voltage regulation of a three-phase synchronous generator and **explain** how it can be determined **experimentally**. (4 Marks)

b) **Explain** how the equivalent circuit parameters of a three-phase synchronous generator can be determined **experimentally**. (4 Marks)

c) **Write down** the conditions for connecting two synchronous generators in parallel. **Explain what happens** if one of these conditions is not achieved. **Show how** each one can be achieved **experimentally.** (6 Marks)

d) **Explain** what happens to a synchronous machine (motor and generator) as its field current is varied. **Show** how the synchronous machine V-curves can be obtained **experimentally. Illustrate** your answer with suitable sketches. (8 Marks)

Question number (2) **(20 Marks)**

a) **Show why** the starting current of three phase induction motor is higher than the rated current. **Explain** the different techniques used to decrease this current. (4 Marks)

b) **What** is a star-delta switch? **Can** it be used for any type of induction motors? **Draw** the connection diagram of this switch. (6 Marks)

c) **What** are the different techniques used to control the speed of the three phase induction motor? **Explain** the limitations of using each one **experimentally.** (6 Marks)

d) **Sketch and explain** the shape of an induction motor torque-speed characteristics curve. **Show how** the different speed control techniques affect the torque-speed characteristics of the three phase induction motor. (4 Marks)

Question number (3) **(18 Marks)**

a) **Explain** how the direct and quadrature axis inductances of a salient pole synchronous machine can be determined **experimentally.** (6 Marks)

b) **Show** how a three phase induction machine can be operated as a generator. **What** are the main factors which affect the output voltage? **Explain** how its operating characteristics can be obtained **experimentally.** (6 Marks)

c) **Explain** how the equivalent circuit parameters of a single phase induction motor can be determined **experimentally. Draw** the equivalent circuit in each test **with appropriate measuring instruments.** (6 Marks)

WISH YOU ALL THE BEST

Dr. Said M. Allam