Faculty of Engineering

Dept.: Electric Power and Machines Department
Courses Code: ..... **Title:** Electric Drive 1 **Final Exam**
Instructors: Prof. Amr M. Amin, Assoc. Prof. Mohamed EL-Korfally
Assis. Prof. Fathy M. Bassiouny
Total mark: 90 marks **Time allowed: 3 hrs. Jan. 2016**

Instructions: ***Answer the following Questions (Suggest any assumptions you may need)***
Please make the answer of each question in separate pages

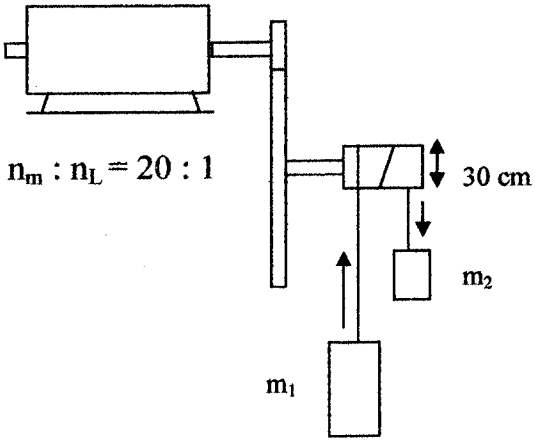
Question 1 [15 Marks]

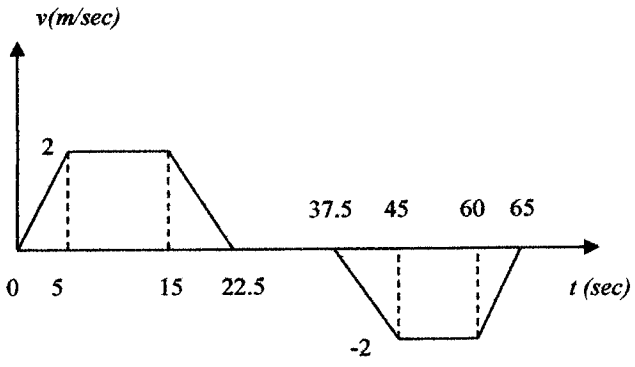
A. Explain the main factors which may be taken into account to select the suitable driver (power modulator with controller).
B. What is meant by fly-wheeling moment, electric elevators and RMS driving torque?
C. What is the difference between multi motor drives, line drives and special form of drives?

Question 2 [20 Marks]

An electric motor drives a lift as shown in figure. The lift mass m_1=1000 kg and the balancing mass m_2=600 kg. The equivalent fly-wheel moment of the motor, the transmission gear, and the drum is 30 N.m^2 (referred to the motor side). The gear efficiency is 80% and the motor efficiency is 85%.

i. Calculate the load torque at constant speed.
ii. Calculate the moment of inertia of the system referred to motor side.
iii. If the drive system follows the speed time curve as shown in figure, plot the speed, torque and power duty cycles. Also find the rms torque and power rating.





Question 3 [20 Marks]

240V, 72A, 600rpm, dc shunt motor has a field resistance of 120 Ω and an armature winding resistance of 0.2Ω. While the motor was running at its rated speed, flux, and load a counter current breaking is applied with an external resistance to limit the initial breaking current to twice its rated value. If J=4.2 Kg.m^2, compute after a time of 0.23 sec.

1- The motor speed?
2- The braking current and torque?
3- The braking time?
4- If the motor wasn't disconnected from the source at zero speed what would be the final speed in case of an active load torque, sketch the speed torque characteristics and state the mode of operation.

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Question 4 [20 Marks]

A. What is meant by dynamic breaking of dc series motor? Why the terminals of the field windings are reversed during this type of braking?

B. 220V dc series motor has an armature resistance of 0.05 Ω and a field resistance of 0.05Ω. The following magnetization curve was taken when running as a motor from a variable terminal voltage and rotating at a constant speed of 1400 rpm.

Terminal voltage	**83**	**156**	**204**	**228**	**255**	**V**
Field current	**15**	**30**	**45**	**60**	**75**	**A**

i- If the motor is running in the dynamic breaking mode lowering an overhauling load of 90.8Nm, compute the speed of the drive system if the breaking resistance is 2.4Ω.

ii- What is the speed at zero torque if the motor is supplied from the 220V source and its armature is shunted by a 7.33Ω resistance,?

Question 5 [15 Marks]

A small electric vehicle is driven by a 3-phase induction motor, s_{cr}=0.2, Tmax=2T_N, f=50 Hz, P=2 (Neglect Tfriction). The route three parts:

Part 1: T_L = TN (opposite to wr)

Part 2: T_L = 0.3TN (opposite to wr)

Part 3: T_L = 0.3TN (the same direction of wr).

a- Calculate s and the speed of each stage.

b- State the machine mode in each part.

c- Draw the power flow diagram of part 3.

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Best Wishes and Good Luck

كلية الهندسة بحلوان	Dept/Division : POWER ENG. & ELEC. MACHINES Academic level: B.Sc. Jan. 2016 Course code & title: PWR3413 Electric power systems analysis Time allowed: 3 hrs. Total mark: 120	جامعة حلوان

Answer the following questions

Question No. (1) [24 Marks]

Figure (1) shows a one-line diagram of a simple three-bus power system with generators at buses 1 and 3. The magnitude of voltage at bus 1 is adjusted to 1.05 pu. Voltage magnitude at bus 3 is fixed at 1.04 pu with a real power generations of 200 MW. A load consisting of 400 MW and 250 MVAR is taken from bus 2. Lines impedance are marked in per unit on a 100 MVA base, the line charging susceptances are neglected.

a) Form the bus admittance matrix [Ybus].

b) Determine the voltages at the buses 2 and 3 after the first iteration using Gauss-Seidel method (assume $\alpha = 1.6$).

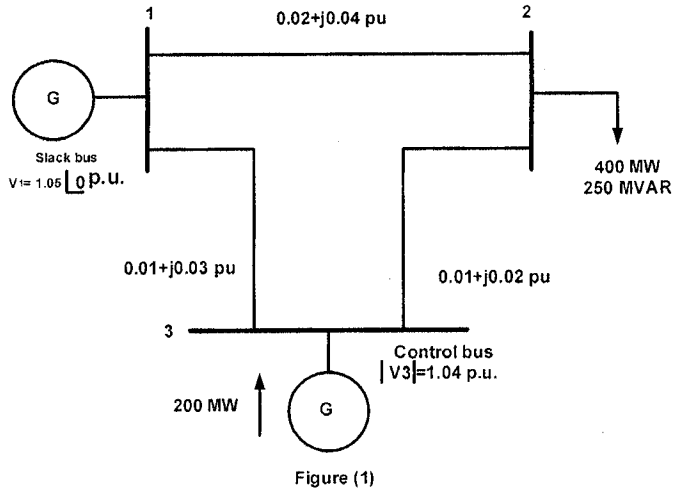

Figure (1)

Question No. (2) [24 Marks]

In the power system of problem (1):

a) Using the Fast Decupled load flow method (iterative solution), determine the phasor values of the voltage at the buses 2 and 3(after one iteration).

b) Calculate the power flow in the line 1-2.

Question No. (3) [24 Marks]

A two-bus power system is shown in Fig (2). The incremental fuel costs of two the generators are given as:

$IC_1 = 0.4P_{g1} + 40$ \$/MWhr $IC_2 = 0.5P_{g2} + 50$ \$/MWhr

$P_{losses} = 0.00008\,P_{g1}^2 + 0.0001\,P_{g2}^2$ MW

Determine the optimal dispatch by iterative technique using gradient method.

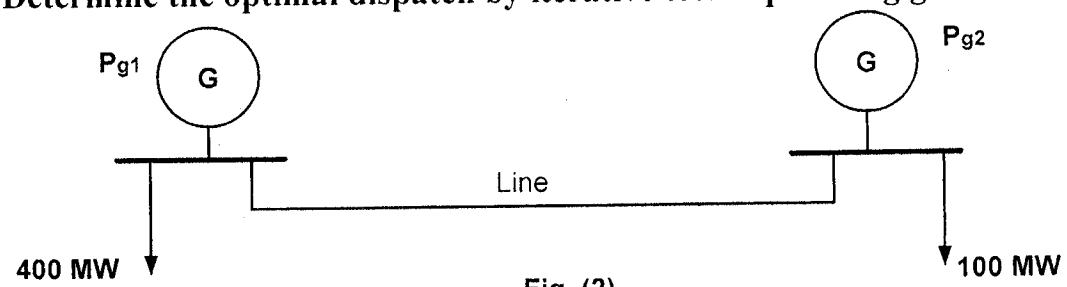

Fig. (2)

Question No. (4) [24 Marks]

a) List the methods of improving the transient stability limit of power systems.

b) A 220 MVA, 24 KV and 60 Hz synchronous machine is connected to an infinite bus through transformer and double circuit transmission line. The infinite bus voltage V=1 pu. The direct axis transient reactance of the machine is 0.3 pu, the transformer reactance is 0.2 pu, and the reactance of each transmission line is 0.3 pu, all to a base of the rating of the synchronous machine. Initially, the machine is delivering 0.8 pu real power and reactive power is 0.074 pu with a terminal voltage 0f 1.0 pu. The inertia constant H=5 MJ/MVA. All resistances are neglected.
A temporary three-phase fault occurs at the sending end of one of the lines. When the fault is cleared, both lines are intact. Determine the critical clearing angle and the critical fault clearing time.

Question No. (5) [24 Marks]

An alternator rated at 100 MVA supplies 100 MW to an infinite bus through a line of reactance 0.08 p.u. on 100 MVA base. The machine has a transient reactance of 0.2 p.u. and its inertia constant is H=4.0 p.u. on the 100 MVA base. Taking the infinite bus voltage as a reference $V=1\angle 0$ p.u., the current supplied by the alternator is (1.0 – j 0.6375) p.u.
Design a flow chart for the solution steps using Modified Euler's method with a time increment of 0.02 sec. (*Don't use calculator*, the torque angle and speed of the alternator for 2 sec period of time when there is a three phase fault at the machine terminals and the fault is cleared after 0.05 sec).

GOOD LUCK

كلية الهندسة بحلوان

Dept: Electrical Power and Machines Dept.
Academic level: Fourth (B.Sc.) **Semester: First 2015/16**
Course code & title: PWR 3412 **High Voltage Engineering**
Instructors: Prof. Dr. El-Sayed M. El-Refaie & A. Prof. Dr. Mohamed Kamal
Total mark: 60 mark **Time allowed: 3 hrs**

Answer the following questions:

Q1 (Mark 12)

a- A voltage doubler circuit has $C_1 = 0.01\mu F$, $C_2 = 0.02\mu F$ is supplied from 100kV, 50Hz testing transformer. If the average DC output current is to be $4mA$,
- Calculate the mean output voltage.
- Calculate the period of conduction of diodes.
- Draw the waveform of the voltage on both of the capacitors.

b- Explain the principle of operation and construction of an electrostatic generator

Q2 (Mark 12)

a- High voltage transformer having a peak output voltage of 50 kV, 50Hz is used to test the insulation of 220 kV XLPE insulated power cable. The average current required is 20mA. Design a suitable voltage multiplier circuit including the number of stages and rating of capacitors then find the following:
- The total ripple and voltage drop
- Voltage of each capacitor

b- Explain the effect of nearby earthed objects on the measurement of high voltage by using the sphere gap arrangement.

Q3 (Mark 10)

Discuss the following:
a- The primary and secondary ionization processes in gases
b-Townsend's criterion for breakdown

Q4 (Mark 12)

a) What are the applications of corona? Explain in details only one of these applications.

b) Discuss in detail the classification of partial discharge.

Q5 (Mark 14)

. Write notes about the following:

a) Practical notes on grounding by driven rods.

b) Rod electrodes in parallel.

c) The types of earth electrodes.

d) Solidly grounded systems

With the best wishes

مقرر اختيارى ٢ رابعة قوى ٢٠١٦/١/٢١

مقرر اختيارى (3) : الاسكادا – بكالوريوس هندسه القوى والالآت كهربيه – للعام الدراسى 2016/2015
امتحان نهايه الدور الاول يناير 2016 – الامتحان صفحه واحده - اربعه اسئله

كلية الهندسة بحلوان

Department : Electrical Power & Machines Engineering
Academic Level: Fourth **Semester:** First 2015/2016 Exam: January 2016
Course Code: POW 3415 - **Course Title:** Supervisory and Control Systems
Instructor Prof. Alaa Abdel Razek
Total Mark: 70 Marks **Time allowed:** 3hrs.

جامعة حلوان

Exam Instruction: Answer the following questions (Four Questions)

Question No.1: [Mark 20]

1-1 List the main components of data communication.
1-2 Give an advantage for each type of network topology.
1-3 Define transmission mode and explain operation of its types.
1-4 Name the factors that affect the performance of a SCADA network.
1-5 Name the factors that affect the security of a SCADA network.

Question No.2: [Mark 20]

2-1 List at least 10 functions for distribution automation system.
2-2 List the target of distribution automation system.
2-3 Show general flowchart for electricity distribution network SCADA.
2-4 which types of building should be managed and monitoring by BMS.
2-5 List 10 facilities that Building Management System shall monitor and manage.

Question No.3: (Mark 15)

3-1 Drive the system accuracy and find its value with a flow process if the transducer transfer function is 10mV/(m /s) +/- 1.5% and the signal conditioning system transfer function is 2mA/mV +/- 0.05%.

3-2 Define with illustration example:
(a) Accuracy; (b) Precision (b) Standard Deviation σ; (c) Coefficient Variation CV; (d) Standardized Score [z-score].

Question No.4: (Mark 15)

The Egyptian Electricity have the following MW data (data source: Annual Report 2011/2012):

Company / Plant Type	Cairo	East Delta	Middle Delta	West Delta	Upper Egypt	Hydro	Private Sector	Renewable
Steam	3495	2206	420	2547	1968	0	2048	0
C. Cycle	2115	1200	4356	906	1500	0	0	0
Gas	585	1994	0	247	0	0	0	0
Hydro	0	0	0	0	0	2800	0	0
Renewable	0	0	0	0	0	0	0	687
Total	6195	5400	4776	3700	3468	2800	2048	687

Show the suitable presentation with bar graph and pie chart:
A. Installed Capacity by MW [Bar Graph], B. Installed Capacity by Companies [pie chart] and C. Installed Capacity by Type [pie chart]

End of Exam & Good Luck