COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturer : Prof. Ahmed Anas Elwogoud

Course : Power System I **Marks: 40**

Course Code: EE 342 **Time : 2 hours**

Date : 16/ 1/ 2016 **Starting Time: 14:00**

Final Exam

Answer the following questions:

1. ***Define*** the power flow problem, ***discuss*** the different buses types in power system, and ***state*** the main steps used to solve power flow problem using Newton-Raphson method.

(A.31) [4 marks]

2. For the power system shown in the figure 1, ***find the bus admittance matrix***. Line impedances are marked in per unit on a 100MVA base. ***Obtain the power flow solution*** by Gauss-Seidel method ***including line flows and line losses***.

(A.31-B.2) [12 marks]

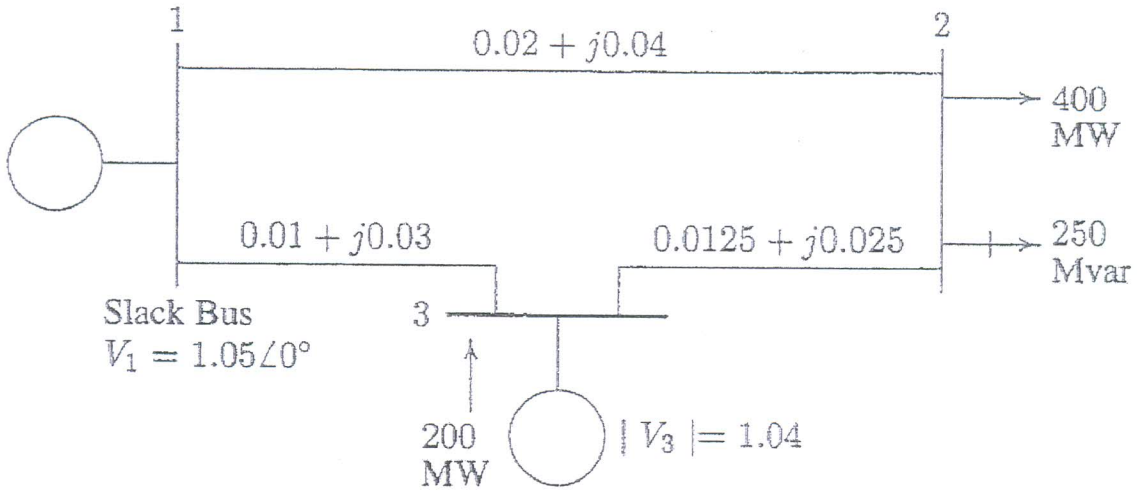

Figure 1

Members of course Examination Committee:	Signature:	Date:
Lecturer: Prof. Ahmed Anas Elwogoud	Ahmed	13/1/2016
Course Coordinator : Prof. Amany Hanafy		13/1/2016
Head of Department : Prof. Hamdy Ashour	Hamdy	13/1/2016

3. A) ***State*** the means used to control the electrical power system ***in each stage***.
B) ***Use*** the concept of power angle characteristics to ***compare*** between active and reactive power control in electrical power system. *(A.23)* [4 marks]

4. Two buses a & b are connected to each other through parallel reactances x_1=0.25 p.u. and x_2=0.2 p.u., If V_b=1.02 $\angle 0^\circ$ and bus b is a load bus supplying current equal $0.8\angle -30^\circ$ p.u. ***Find the complex power into bus b through each line***. If a regulating transformer is connected at bus b in the line of higher reactance to give an increase in the voltage phase angle of 30° ($a=1\angle 30^\circ$), ***Find the new complex power into bus b through each line***.
(A.1-A.5-A.26-B.1) [8 marks]

5. ***Define*** the optimal dispatch of power generation problem, ***state*** its ***objective function*** and ***the various constraints*** used for formulation of such optimization problem. *(A.31)* [4 marks]

6. The fuel-cost functions in $/h for three thermal plants are given by;

$$C_1 = 350 + 7.20P_1 + 0.0040\,P_1^2$$
$$C_2 = 500 + 7.30P_2 + 0.0025\,P_2^2$$
$$C_3 = 600 + 6.74P_3 + 0.0030\,P_3^2$$

where P_1, P_2, and P_3 are in MW. ***Neglecting line losses*** and consider the following generator limits (in MW);

$$122 < P_1 < 400$$
$$260 < P_2 < 600$$
$$50 < P_3 < 445$$

Determine the optimal scheduling of generation for 1335 MW total demand load.
(A.26-B.10-B.11) [8 marks]

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GOOD LUCK