



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Computer Control Engineering

Lecturer : Prof. Ahmed Anas Elwogoud

Course : Power System I

Marks: 40

Course Code: EE 342

Time : 2 hours

Date : 13/ 1/ 2015

Starting Time: 9:00

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]

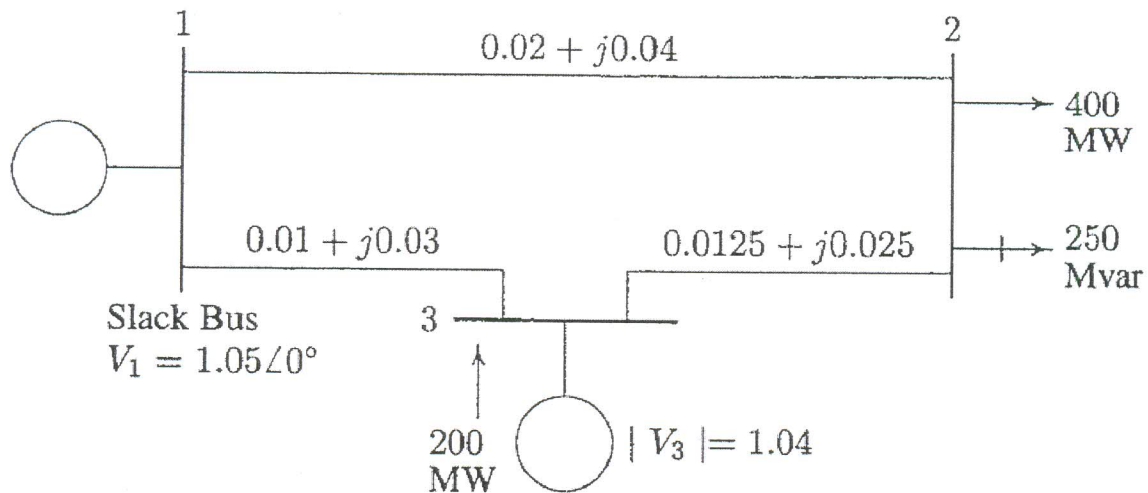


Figure 1

Members of course Examination Committee:	Signature:	Date:
Lecturer: Prof. Ahmed Anas Elwogoud	<i>Ahmed Elwogoud</i>	6/1/2015
Course Coordinator : Prof. Amany Hanafy	<i>Amany Hanafy</i>	6/1/2015
Head of Department : Prof. Hamdy Ashour	<i>Hamdy Ashour</i>	6/1/2015

3. What are the control variables of load flow in any electrical power system. State the most important devices used to control such variables. (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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