Kafrelsheikh University
Faculty of Engineering
Department : Electrical Power & Machines
Year: third electrical power students
Subject: Electrical Power Systems Analysis I
Name:

Date: 29 /5/2016
Time allowed: 3 Hours
Full Mark : 90
Period : 10 – 1
Final Exam: Two pages
Academic Number:

Notes: The exam constitutes four problems; solve all of them.
Assume any missing data; manage your time.

P-1 (20 marks)

Use NR method to solve the power flow problem of the system of Fig-1, where Bus#1 is the swing bus. Results of iteration #1 are: $V_2^{(1)} = 0.98$ p.u./ -0.02 rad and $V_3^{(1)} = 1.01$ p.u. /0.01 rad.

a) Calculate the voltages at the end of the 2nd iteration at busses # 2 and 3.

b) Calculate the value of the real power generated from generator at bus#1 without solving the load flow problem.

c) Without repeating load flow solution, obtain the output of power generation units after connecting the transmission line between buses 1 and (Note that: line reactance =j0.3)

P-2 (20 marks)

a) Obtain the size of all Jacobean sub-matrices for a power system whose contains: 50- generation units distributed at 20 buses, 30 fixed capacitor installed equally to form capacitor banks for possibly controlling the voltages at 10 load buses, 20 synchronous compensators at 20 buses, the number of un-controlled voltages buses is 200. The transmission system has 10 regulating transformers.

b) The bus impedance matrix for a 3-bus power system is

Z_{bus} =

j0.12	j0.08	j0.04
j0.08	j0.12	j0.06
j0.04	j0.06	j0.08

p.u.

An element of j0.1 p.u. is added between bus#3 and the reference. Find the new Z_{bus}.

c) Obtain Y bus matrix for the power system shown in Fig-2.

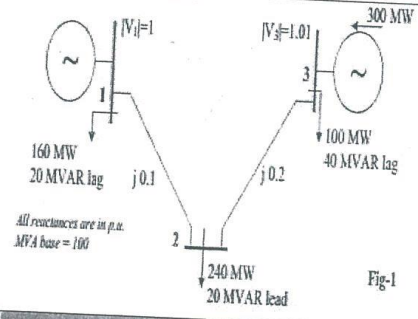

Fig-1

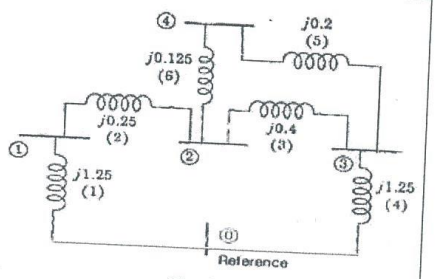

Fig-2

P-3 (20 marks)

A Choose the correct answer:

1. For a bolted single-line-to-ground fault the sequence networks are connected:
A. In parallel B. In a star configuration C. In series

2. A balanced three phase fault is the most common type of transmission line fault. True or false?
A. True B. False