Exam.Code:1017
Sub. Code: 7779

1128

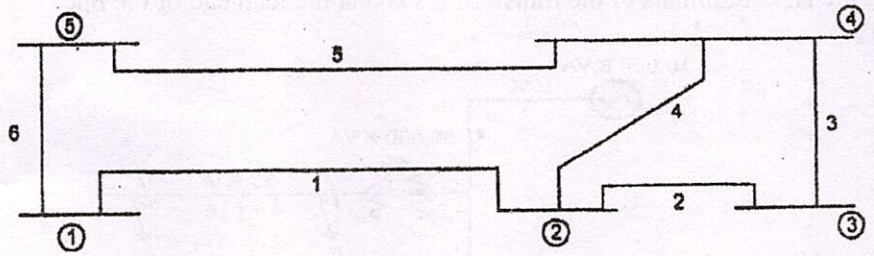
M. E. Electrical Engineering (Power Systems)
First Semester
EE-8101: Advanced Power System Analysis

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt any five questions. Assume any missing data.

x-x-x

Q I. a) For the network shown in figure below, form the oriented graph and bus incidence matrix, A. **[5]**

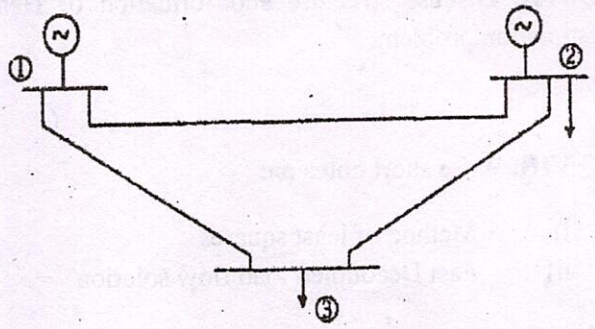


b) Find the Y_{BUS} using the bus incidence matrix if each of the elements has the admittance value of j 1.4 in the network shown in Q.I (a). **[5]**

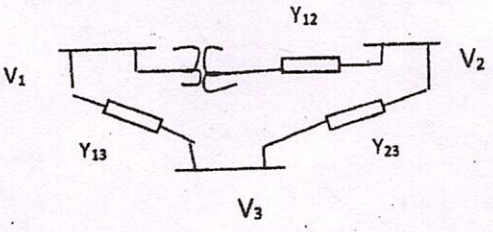
Q II. A 3-bus, three line system has been shown in the figure below. The data of the line are as given in the Table. The voltage at bus 2 is maintained at 1.03 p.u. and maximum and minimum reactive power limits at bus 2 are 35 and 0 MW respectively. Taking bus 1 as slack bus obtain the load flow solution using N-R method. **[10]**

Bus no.	Voltage	P_d (MW)	Q_d (MVAR)	P_g (MW)	Q_g (MVAR)
1	1.05	-	-	-	-
2	1.03	20	-	50	20
3	---	0	0	60	25

Line	Impedance(p.u.)
1-2	0.08+j0.024
1-3	0.02+j0.06
2-3	0.02+j0.018



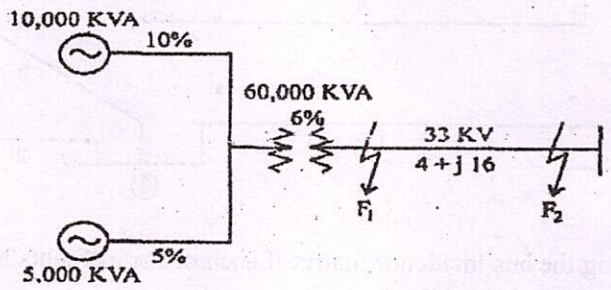
Q III. The admittance values in each of three lines shown below have value of -j1 p.u. Find Y_{bus} if a phase shifting transformer is connected between buses 1 and 2. Assume $a = 1\angle 5^o$ **[5]**



P.T.O.

b) Deduce the equations for DC load flow problem. Hence extend the formulation to obtain the solution for AC-DC load flow. [5]

Q IV A 33 KV line has a resistance of 4 ohm and reactance of 16 ohm respectively. The line is connected to generating station bus bars through a 6000 KVA step up transformer which has a reactance of 6%. The station has two generators rated 10,000 KVA with 10% reactance and 5000 KVA with 5% reactance. Calculate the fault current when a short circuit KVA when a 3-phase fault occurs at the H.V. terminals of the transformers and at the load end of the line. [10]



Q V. Deduce the sequence equivalent circuit for a system when two of its phases A & C get open circuited at any point on the lines. [10]

Q VI. Use Lagrangian function to develop an optimal power flow optimization problem in any electrical power system having hybrid generation systems. Hence draw the incremental cost curves. How are Kuhn-Tucker's conditions applied to the problem? [10]

Q VII. Discuss structure and formation of Hessian matrix as used in the power system state estimation problem. [10]

Q VIII. Write short notes on:

i) Method of least squares
ii) Fast Decoupled load flow solution [5*2=10]

x-x-x