

Seventh Semester B.E Degree Examination, Dec. 07 / Jan. 08
Computer Techniques in Power System

Max. Marks:100

3 hrs.

Note : Answer any FIVE full questions.

- a. What is primitive network? Explain with circuit and equations the significance of it in both impedance and admittance forms. (06 Marks)
- b. Derive an expression for formation of bus admittance matrix by singular transformation. (06 Marks)
- c. The bus incidence matrix of 8 - elements, 5-node system is given below. Obtain the element-node incidence matrix and the oriented graph. The columns represent elements. (08 Marks)

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & -1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & -1 & -1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & -1 & 1 & 0 \end{bmatrix}$$

- a. Explain node eliminations method by matrix algebra. (08 Marks)
- b. Find the bus impedance matrix for the system whose reactance diagram is shown in fig. All AE the impedances are given on the diagram in p.u. (12 Marks)

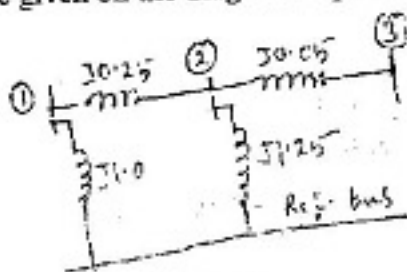


Fig.2(b)

- a. Develop a mathematical model of speed governing system of steam turbine used in load frequency control problems. Show the corresponding block diagrams. (10 Marks)
- b. Two generators rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. Assuming the generators are operating at 50Hz at no load, how would a load of 600 MW be shared between them? What will be the system frequency at this load? Assume free governor operation. (07 Marks)
- c. Repeat the problem of part (b) and comment on the result if both the governors have a droop of 4%. (03 Marks)
- a. Explain how the buses are classified in carrying out the load flow analysis in power system. (06 Marks)
- b. Explain the concept of bus power in load flow analysis. (04 Marks)
- c. The following is the system data for a load flow solutions. The line admittances are

Bus code	Admittance
1 - 2	$2 - j 6.0$ p.u.
1 - 3	$1 - j 4.0$ p.u.
2 - 3	$0.666 - j 2.664$ p.u.
2 - 4	$1 - j 4.0$ p.u.
3 - 4	$2 - j 8.0$ p.u.

The schedule of active and reactive powers

Bus Code	P	Q	V	Remarks
1	-	-	1.06	Slack
2	0.5	0.2	1+j0.0	PQ
3	0.4	0.3	1+j0.0	PQ
4	0.3	0.1	1+j0.0	PQ

Determine the voltage at the end of first iteration using Gauss – Seidel method. Take $\alpha = 1.6$. (10 Marks)

- 5 a. Explain the load flow solution procedure of Gauss – Seidel iterative method for a system having both PV and PQ buses. Hence arrive at the corresponding generalized algorithmic equation for the unknown involved. (10 Marks)
- b. Explain fast decoupled load flow solution method for solving the non linear load flow equations. (10 Marks)

- 6 a. What is the basic criterion for economical division of load between units with in a plant? (04 Marks)
- b. What are B co-efficients? Obtain the general loss co-efficient formula with usual notations. (06 Marks)
- c. A two bus system is shown in fig.6(c). If a load of 125 MW is transmitted from plant 1 to the load, a loss of 15.625 MW is incurred. Determine the generation schedule and the load demand if the cost of received power is Rs 24/MW - hr. Solve the problem using co-ordination equations and the penalty factor method approach. The incremental production cost of the plants are :

$$\frac{df_1}{dP_1} = 0.025P_1 + 15$$

$$\frac{dF_2}{dP_2} = 0.05P_2 + 20.$$

(10 Marks)

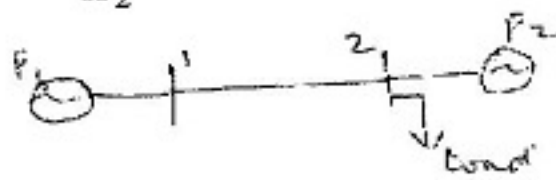


Fig.6(c)

- 7 a. With the help of flow chart, explain the modified Euler method for transient stability studies. (10 Marks)
- b. Derive the swing equation for a two machine system. (05 Marks)
- c. Explain Runge-kutta method for the solution of swing equation. (05 Marks)

8 Write explanatory notes on any four of the following :

- a. Representation of fixed tap setting transformer.
- b. Rule of inspection for Y_{bus} formation.
- c. Mines-predictor's method for stability studies.
- d. Representation of synchronous machine for transient stability studies.
- e. Area control error.

(20 Marks)