CBCS SCHEME

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15EE71

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Power System Analysis – II

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With usual notations, prove that $Y_{bus} = A^T Y A$ using singular transformation. **(06 Marks)**

b. For the power system shown in Fig.Q1(b), obtain Y_{bus} using singular transformation. **(10 Marks)**

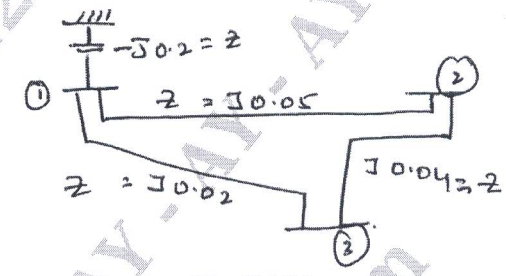

Fig.Q1(b)

OR

2 a. What is load flow analysis? Explain how buses are classified to carly out load flow analysis in power system. **(06 Marks)**

b. For the sample system of Fig.Q2(b), the generations are connected to all the 4-buses, while loads are at buses 2 and 3. Values of real and reactive powers are listed in Table Q2(b). All buses other than the slack bus are PQ type. **(10 Marks)**

Bus	$P(p_u)$	$Q(p_u)$	$V(p_u)$	Type of bus
1	–	–	$1.04\angle 0$	Ref
2	0.5	– 0.2	–	PQ
3	– 1.0	0.5	–	PQ
4	0.3	– 0.1	–	PQ

Table Q2(b)

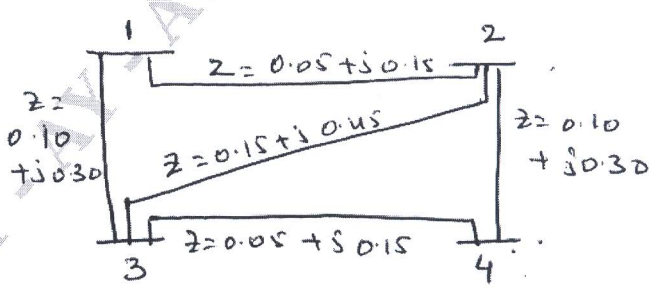

Fig.Q2(b)

Module-2

3 a. Draw the flow-chart of Newton-Raphson method of load flow analysis in polar co-ordinates. **(08 Marks)**

b. Derive expression for all elements of Jacobbian matrices on polar form. **(08 Marks)**

OR

4 a. Starting all assumptions, deduce the FDLF model and give the flow-chart. **(10 Marks)**

b. Compare Gauss-Seidal and Newton–Raphson methods of load flow analysis. **(06 Marks)**

Module-3

5 a. Deduce the condition for optimal load disipatch considering transmission losses in a system. **(06 Marks)**

b. The operating cost of C_1 and C_2 in Rs/hr of two generator units each of 100M watt rating of a Thermal plant are,

$C_1 = 0.2P_1^2 + 40P_1 + 120$ Rs/hr

$C_2 = 0.25P_2^2 + 30P_2 + 150$ Rs/hr.

i) Find optimal generation of 2-units for a total demand of 180MW and the corresponding total cost.

ii) Saving in Rs/hr in this case, as compare to equal sharing between the two machines. **(10 Marks)**

OR

6 a. With a usual notation, derive the generalized transmission loss formula and B–coefficients. **(08 Marks)**

b. Calculate the loss co-efficient in p.u and MW^{-1} on a base of SOMUA for the network of Fig.Q6(b) below.

$I_a = 1.2 - j0.4$; $I_b = 0.4 - j0.2$; $I_c = 0.8 - j0.1$;

$I_d = 0.8 - j0.2$; $I_e = 1.2 - j0.3$

$Z_a = 0.02 + j0.08$; $Z_b = 0.08 + j0.32$; $Z_c = 0.02 + j0.08$;

$Z_d = 0.03 + j0.12$; $Z_e = 0.03 + j0.12$,

$V_{ref} = 1 \angle 0$. **(08 Marks)**

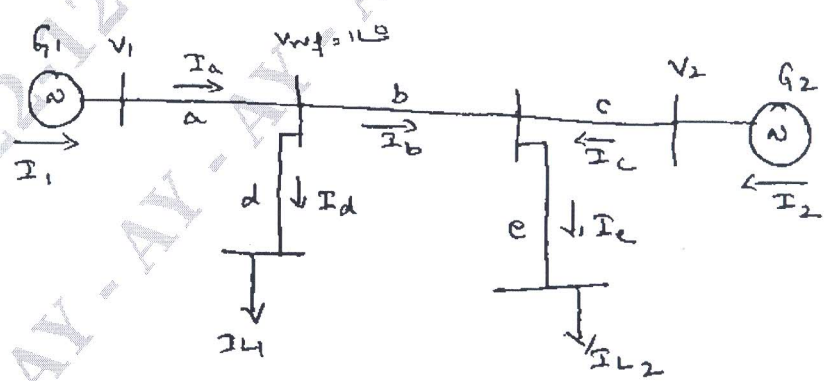

Fig.Q6(b)

Module-4

7 a. Discuss the problem formulation and solution procedure of optimal scheduling for hydro thermal plant. **(10 Marks)**

b. Draw the flow chart of optimal load flow solution. **(06 Marks)**

OR

8 a. Explain power system static security level classification. **(08 Marks)**

b. Define :

i) power system reliability

ii) power system security. **(08 Marks)**

Module-5

9 a. Derive the generalized algorithm for finding the elements of bus – impedance matrix Z_{bus} when a branch in added to the partial network. **(08 Marks)**

b. For the three-bus network shown in Fig.Q9(b) build Z_{bus}. **(08 Marks)**

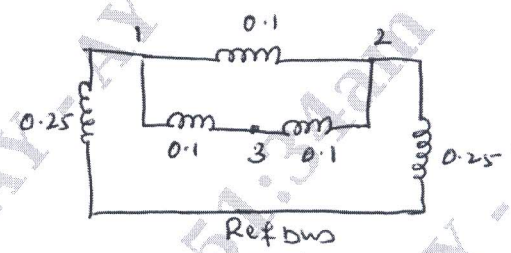

Fig. Q9(b)

OR

10 a. Explain the numerical solution of swing equation. **(08 Marks)**

b. Explain clearly the steps involved in solving power system stability solution of swing equation using Range-Kutta method. **(08 Marks)**

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