CBCS SCHEME

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17EE71

Seventh Semester B.E. Degree Examination, Jan./Feb.2021
Power System Analysis - II

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Develop the relation between I_{BUS}, V_{BUS} and Y_{BUS} by assuming no mutual coupling between transmission lines of a 3-bus system. **(07 Marks)**

b. Derive the power flow equations and what are the specified practical limits of variables. **(06 Marks)**

c. Find the Y_{BUS} by direct inspection method for a system with the following data:

Element No.	1	2	3
Bus code (i – k)	1 – 2	2 – 3	3 – 1
Line impedence (pu)	j0.04	j0.02	j0.05
Half-line charging admittance (pu)	j0.02	j0.01	j0.04

(07 Marks)

OR

2 a. Define the following terms with an example:
(i) Oriented graph (ii) Tree and (iii) Co-tree **(05 Marks)**

b. Write the algorithm of Gauss-Siedel load flow solution for a power system with a slack bus and (n-1) number of PQ buses. **(08 Marks)**

c. The positive sequence reactances in pu are given for the network shown in Fig. Q2 (c). Take node-G as the reference bus. Form Y_{BUS} by singular transformation.

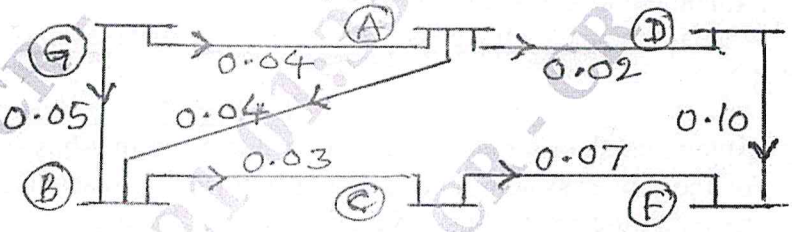

Fig. Q2 (c)

(07 Marks)

Module-2

3 a. Write the iterative algorithm for NR method of load flow analysis of power system having both PQ and PV buses. **(08 Marks)**

b. Explain the decoupled Newton method for load flow solution. **(06 Marks)**

c. Compare the Newton Raphson and Fast decoupled load flow methods with different parameters. **(06 Marks)**

OR

4 a. What are the simplifications and assumptions made in Fast Decoupled Load Flow method? **(06 Marks)**

b. Explain how the voltage profile is controlled by synchronous generators and VAR generators. **(07 Marks)**

c. Derive the Jacobian matrix elements equations from the load flow equations. **(07 Marks)**

Module-3

5 a. Explain the following terms in the optimal operation of generators :
(i) Input Output curve (ii) Heat rate curve (iii) Incremental fuel cost curve. **(06 Marks)**

b. Explain the optimal generation scheduling considering transmission losses. **(09 Marks)**

c. What are the needs and importance of unit commitment? **(05 Marks)**

OR

6 a. With the assumptions made, derive the formula of transmission loss and hence B- coefficients for a two-plants system. **(08 Marks)**

b. With random unit performance record obtain the probability of a unit being in up or down states for system reliability. **(05 Marks)**

c. A constant load of 300 MW is supplied by two 200 MW generators for which the incremental fuel costs are: $\frac{dC_1}{dP_{G_1}} = 0.1P_{G_1} + 20$ and $\frac{dC_2}{dP_{G_2}} = 0.12P_{G_2} + 15$

Determine:
(i) The most economical division of load between the generators
(ii) The saving in Rs./day there by obtained compared to equal load sharing between machines. **(07 Marks)**

Module-4

7 a. Explain the optimal power flow solution without inequality constraints. **(08 Marks)**

b. Explain the solution technique for hydrothermal scheduling problem. **(07 Marks)**

c. Briefly, explain the functions of system security analysis. **(05 Marks)**

OR

8 a. State the mathematical formulation of hydrothermal system with assumptions and constraints. **(10 Marks)**

b. Explain the loss of load probability. **(04 Marks)**

c. What are the inequality constaints on control variables in optimal power flow? **(06 Marks)**

Module-5

9 a. Explain the algorithm for short circuit studies of an n-bus system. **(10 Marks)**

b. For the power system shown in Fig. Q9 (b) the reactances are given in pu. A solid three phase fault occurs on bus-3. Calculate (i) Fault current (ii) all bus voltages (iii) Fault current in the lines. **(10 Marks)**

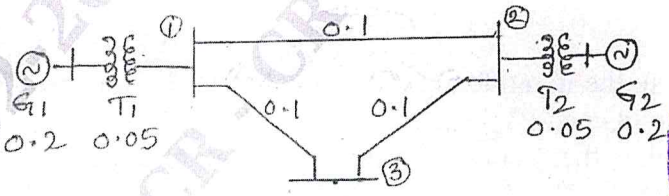

Fig. Q9 (b)

OR

10 a. Explain with relevant diagrams, the point by point method of solving the swing equation. **(10 Marks)**

b. Derive the generalize algorithm for finding the elements of Z_{BUS} when a branch is,
(i) Added between an old bus and reference bus
(ii) Added between two old buses. **(10 Marks)**

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