CBCS SCHEME

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17EE71

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
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. Define primitive network. Formulate Y_{BUS} by singular transformation. **(10 Marks)**

b. Obtain the voltage at bus 2 for the simple system shown in Fig.Q1(b). Using Gauss-Seidel method, if $V_1 = 1\angle 0°$.

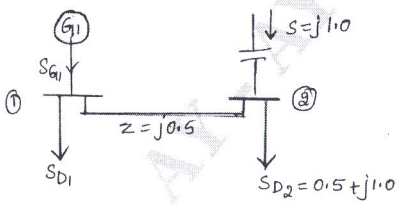

Fig.Q1(b) **(10 Marks)**

OR

2 a. With generalized algorithmic steps, explain Gauss-Seidel method for system having PQ buses. **(10 Marks)**

b. Determine Y_{BUS} by singular transformation for the system with line data given in Table Q2(b). Choose node ① as reference.

Element number	Line		'R' in P.U	'X' in P.U
	From BUS	To BUS		
1	1	2	0.05	0.15
2	1	3	0.10	0.30
3	2	3	0.15	0.45
4	2	4	0.10	0.30
5	3	4	0.05	0.15

Table Q2(b) **(10 Marks)**

Module-2

3 a. What is load flow analysis? Explain how buses are classified. **(10 Marks)**

b. Obtain the voltage at all buses for the three bus system shown in Fig.Q3(b) at the end of first iteration by Newton Raphson method. The data is given in table 3.1 and 3.2.

SB	EB	'R' in PU	'X' in PU
1	2	0.0	0.1
1	3	0.0	0.2
2	3	0.0	0.2

Table 3.1 Linedata

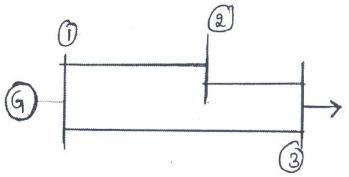

Fig.Q3(b)

BUS No.	P_G	Q_G	P_L	Q_L	V_{SP}
1. (slack)	–	–	–	–	1.0
2. (PV)	5.3217	–	–	–	1.1
3. (PQ)	–	–	3.6392	0.5339	–

Table Q3.2Busdata **(10 Marks)**

OR

4 a. Explain the algorithm for fast decoupled load flow analysis clearly stating all the assumptions made. **(10 Marks)**

b. Compare Gauss Seidel and Newton-Raphson methods in respect to
i) Time per iteration ii) Total solution time. **(10 Marks)**

Module-3

5 a. Explain the following performance curves :
i) Heat rate curve
ii) Incremental fuel rate curve
iii) Incremental cost curve
iv) Input output curve. **(10 Marks)**

b. The fuel cost functions in \$/h for three thermal plants are given by :

$$F_1 = 350 + 7.2P_{G_1} + 0.004P_{G_1}^2$$

$$F_2 = 500 + 7.3P_{G_2} + 0.0025P_{G_2}^2$$

$$F_3 = 600 + 6.74P_{G_3} + 0.003P_{G_3}^2$$

$P_{G_1}, P_{G_2}, P_{G_3}$ are in MW. Find the optimal schedule and compare the cost of this to the case when the generators share load equally if $P_D = 450$MW. **(10 Marks)**

OR

6 a. Derive the coordination equations for economic load dispatch in a thermal power system with the consideration of transmission losses. **(10 Marks)**

b. Describe dynamic programming method for optimal unit commitment. **(10 Marks)**

Module-4

7 a. Discuss the optimal scheduling of hydrothermal system. **(10 Marks)**

b. Explain power system security assessment and modelling for contingency analysis. **(10 Marks)**

OR

8 a. With the help of bath tub curve, explain different failures in a system. **(10 Marks)**

b. Write a flow chart for the optimal load flow solution. **(10 Marks)**

Module-5

9 a. Explain with necessary equations, the solution of swing equation by point by point method. **(10 Marks)**

b. Form Z_{BUS} using step by step building algorithm of the system shown in Fig.Q9(b). The series impedances of the lines are given in Fig.Q9(b). Take elements in the order
i) 0 – 1 ii) 0 – 2 iii) 1 – 2.

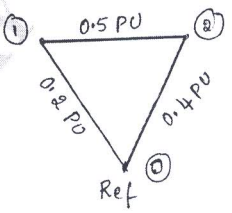

Fig.Q9(b) **(10 Marks)**

OR

10 a. With necessary equations and flowcharts, describe the solution of swing equations using modified Euler's method in multi-machine stability analysis. **(10 Marks)**

b. Explain step-by-step algorithm for the formation of BUS impedance matrix when a branch is added. **(10 Marks)**