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APPENDIX A

DATA FOR IEEE 33-BUS RADIAL DISTRIBUTION SYSTEM

IEEE 33-bus radial distribution system [126] has been considered as first test system for the work carried out in this thesis. Line data and load details of the system are presented in Table A.1. Single-line diagram of the system is shown in Figure A.1.

Table A.1: 33-bus radial distribution system data

Line Number	From	To	Resistance (ohms)	Reactance (ohms)	P _{load} (kW)	Q _{load} (kVAr)	I _{max} (A)
1	1	2	100	60	0.0922	0.0470	400
2	2	3	90	40	0.493	0.2511	400
3	3	4	120	80	0.366	0.1864	400
4	4	5	60	30	0.3811	0.1941	400
5	5	6	60	20	0.819	0.707	400
6	6	7	200	100	0.1872	0.6188	300
7	7	8	200	100	0.7114	0.2351	300
8	8	9	60	20	1.03	0.74	200
9	9	10	60	20	1.044	0.74	200
10	10	11	45	30	0.1966	0.065	200
11	11	12	60	35	0.3744	0.1238	200
12	12	13	60	35	1.468	1.155	200
13	13	14	120	80	0.5416	0.7129	200
14	14	15	60	10	0.591	0.526	200
15	15	16	60	20	0.7463	0.545	200
16	16	17	60	20	1.289	1.721	200
17	17	18	90	40	0.732	0.574	200
18	2	19	90	40	0.164	0.1565	200
19	19	20	90	40	1.5042	1.3554	200
20	20	21	90	40	0.4095	0.4784	200
21	21	22	90	40	0.7089	0.9373	200
22	3	23	90	50	0.4512	0.3083	200
23	23	24	420	200	0.898	0.7091	200
24	24	25	420	200	0.896	0.7011	200
25	6	26	60	25	0.203	0.1034	300
26	26	27	60	25	0.2842	0.1447	300
27	27	28	60	20	1.059	0.9337	300
28	28	29	120	70	0.8042	0.7006	200
29	29	30	200	600	0.5075	0.2585	200
30	30	31	150	70	0.9744	0.963	200
31	31	32	210	100	0.3105	0.3619	200
32	32	33	60	40	0.341	0.5302	200
33	21	8	–	–	2	2	200
34	9	15	–	–	2	2	200

35	12	22	–	–	2	2	200
36	18	33	–	–	0.5	0.5	200
37	25	29	–	–	0.5	0.5	200

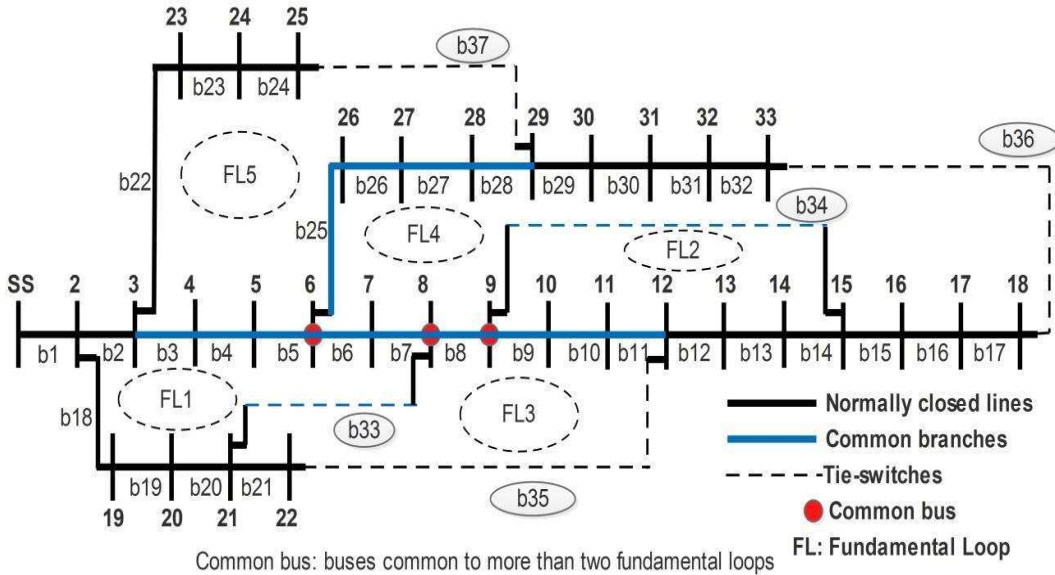


Figure A.1: Single-line diagram of 33-bus radial distribution system

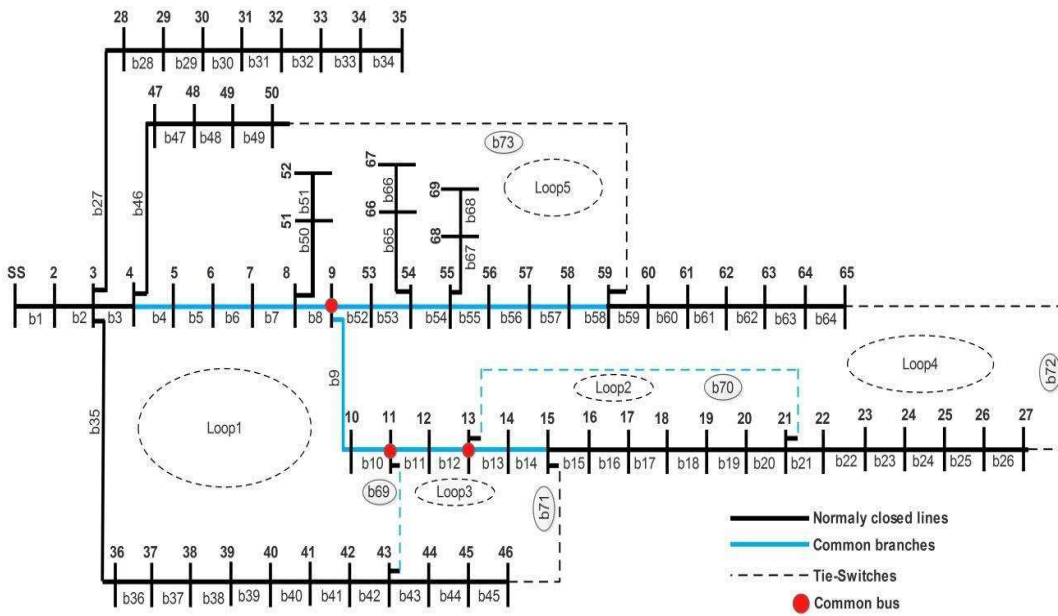


Figure B.1: Single-line diagram of 69-bus radial distribution system

APPENDIX B

DATA FOR IEEE 69-BUS RADIAL DISTRIBUTION SYSTEM

IEEE 69-bus radial distribution system [58] has been considered as second test system for the work carried out in this thesis. Line data and load details of the system are presented in Table B.1. Single-line diagram of the system is shown in Figure B.1.

Table B.1: 69-bus radial distribution system data

Line Number	From	To	Resistance (ohms)	Reactance (ohms)	P _{load} (kW)	Q _{load} (kVAr)	I _{max} (A)
1	1	2	0.0005	0.0012	0	0	400
2	2	3	0.0005	0.0012	0	0	400
3	3	4	0.0015	0.0036	0	0	400
4	4	5	0.0251	0.0294	0	0	400
5	5	6	0.3660	0.1863	2.6	2.2	400
6	6	7	0.3810	0.1941	40.4	30	400
7	7	8	0.0922	0.0470	75	54	400
8	8	9	0.0493	0.0251	30	22	400
9	9	10	0.8190	0.2707	28	19	400
10	10	11	0.1872	0.0619	145	104	200
11	11	12	0.7114	0.2351	145	104	200
12	12	13	1.0300	0.3400	8	5	200
13	13	14	1.0440	0.3450	8	5.5	200
14	14	15	1.0580	0.3496	0	0	200
15	15	16	0.1966	0.0650	45.5	30	200
16	16	17	0.3744	0.1238	60	35	200
17	17	18	0.0047	0.0016	60	35	200
18	18	19	0.3276	0.1083	0	0	200
19	19	20	0.2106	0.0690	1	0.6	200
20	20	21	0.3416	0.1129	114	81	200
21	21	22	0.0140	0.0046	5	3.5	200
22	22	23	0.1591	0.0526	0	0	200
23	23	24	0.3463	0.1145	28	20	200
24	24	25	0.7488	0.2475	0	0	200
25	25	26	0.3089	0.1021	14	10	200
26	26	27	0.1732	0.0572	14	10	200
27	3	28	0.0044	0.0108	26	18.6	200
28	28	29	0.0640	0.1565	26	18.6	200
29	29	30	0.3978	0.1315	0	0	200
30	30	31	0.0702	0.0232	0	0	200
31	31	32	0.3510	0.1160	0	0	200

32	32	33	0.8390	0.2816	14	10	200
33	33	34	1.7080	0.5646	19.5	14	200
34	34	35	1.4740	0.4873	6	4	200
35	3	36	0.0044	0.0108	26	18.55	200
36	36	37	0.0640	0.1565	26	18.55	200
37	37	38	0.1053	0.1230	0	0	200
38	38	39	0.0304	0.0355	24	17	200
39	39	40	0.0018	0.0021	24	17	200
40	40	41	0.7283	0.8509	1.2	1	200
41	41	42	0.3100	0.3623	0	0	200
42	42	43	0.0410	0.0478	6	4.3	200
43	43	44	0.0092	0.0116	0	0	200
44	44	45	0.1089	0.1373	39.22	26.3	200
45	45	46	0.0009	0.0012	39.22	26.3	200
46	4	47	0.0034	0.0084	0	0	300
47	47	48	0.0851	0.2083	79	56.4	300
48	48	49	0.2898	0.7091	384.7	274.5	300
49	49	50	0.0822	0.2011	384.7	274.5	300
50	8	51	0.0928	0.0473	40.5	28.3	200
51	51	52	0.3319	0.1114	3.6	2.7	200
52	9	53	0.1740	0.0886	4.35	3.5	300
53	53	54	0.2030	0.1034	26.4	19	300
54	54	55	0.2842	0.1447	24	17.2	300
55	55	56	0.2813	0.1433	0	0	300
56	56	57	1.5900	0.5337	0	0	300
57	57	58	0.7837	0.2630	0	0	300
58	58	59	0.3042	0.1006	100	72	300
59	59	60	0.3861	0.1172	0	0	300
60	60	61	0.5075	0.2585	1244	888	300
61	61	62	0.0974	0.0496	32	23	300
62	62	63	0.1450	0.0738	0	0	300
63	63	64	0.7105	0.3619	227	162	300
64	64	65	1.0410	0.5302	59	42	300
65	11	66	0.2012	0.0611	18	13	200
66	66	67	0.0047	0.0014	18	13	200
67	12	68	0.7394	0.2444	28	20	200
68	68	69	0.0047	0.0016	28	20	200
69	11	43	0.5000	0.5000	–	–	200
70	13	21	0.5000	0.5000	–	–	200
71	15	46	1.0000	0.5000	–	–	200
72	50	59	2.0000	1.0000	–	–	200
73	27	65	1.0000	0.5000	–	–	200

LIST OF PUBLICATIONS

IN REFERRED AND PEER-REVIEWED JOURNALS

- 1 **Akhilesh Kumar Barnwal**, Lokesh Kumar Yadav, and M. K. Verma, "A Multi-Objective Approach for Voltage Stability Enhancement and Loss Reduction under PQV and P Buses through Reconfiguration and Distributed Generation Allocation," in IEEE Access, vol. 10, pp. 16609-16623, 2022, doi: 10.1109/ACCESS.2022.3146333 (Impact Factor: 3.476) **(Published)**
- 2 **Akhilesh Kumar Barnwal**, and M. K. Verma, " A modified GWO Based Approach for Optimal Placement of Multi-Distributed Generations " in journal of Electrical Systems, vol. 17 (4), 2021 pp: 515-528. **(Published)**
- 3 **Akhilesh Kumar Barnwal**, and M. K. Verma, "A Novel Approach for Voltage Stability Enhancement and Loss Reduction under PQV and P/Q Buses through Reconfiguration and Distributed Generation Allocation" (Electric Power Systems Research) [Elsevier]. **(Communicated)**

BOOK CHAPTER

- 4 **Akhilesh Kumar Barnwal**, Shailendra Singh, and M. K. Verma, "Optimal Location and Size of Multi-Distributed Generation with Minimization of Network Losses" Sustainable Technology and Advanced Computing in Electrical Engineering, pp 61-72, Part of the Lecture Notes in Electrical Engineering book series (LNEE, vol. 939) [Springer]. **(Published)**

IN CONFERENCES

- 5 Arpit Srivastava, **Akhilesh Kumar Barnwal**, M. K. Verma "PSO based Optimal Placement of Distributed Generation for Loss Minimization and Voltage Profile Improvement under Contingencies" 2022 IEEE 9th Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON), Prayagraj, India, 2022, pp. 1-6, doi: 10.1109/UPCON56432.2022.9986365. **(Published)**
- 6 **Akhilesh Kumar Barnwal**, Arpit Srivastava, M. K. Verma "Optimal Distributed Generation and Network Reconfiguration Strategy to Enhance System Performance Under Time Varying Voltage Dependent Loads" 2022 22nd National Power System Conference (NPSC), New Delhi, India, 2022, pp. 6-11, doi: 10.1109/NPSC57038.2022.10068892. **(Published)**
- 7 Lokesh Kumar Yadav, **Akhilesh Kumar Barnwal**, M. K. Verma "Optimal Reconfiguration of Radial Distribution Networks using PSO-CRO Approach for Loss Minimization and Voltage Stability Enhancement under Voltage Dependent Loads" 2023 IEEE International Conference on Energy Technologies for Future Grids (ETFG), Wollongong, Australia, Dec. 3-6, 2023. **(Accepted)**

