

CHAPTER 7

7.SIMULATION AND RESULTS:-

7.1 TABULAR FORMS

57 BUS SYSTEM

CASE (i):-

BASE CASE

Real power loss = 26.91kW,

Vmin = 0.9885 p.u.

React. power loss = 80.54 kVar

Runs	Opt.	nodes	Ploss(kw)	Qloss (kVar)	Vmin (p.u.)	Opt.	Size (MVA)
1	13	29	4.44	13.92	0.9966	1.1077	0.1847
2	11	26	3.77	15.44	0.9957	1.0192	0.2720
3	15	26	3.70	12.03	0.9961	0.3944	0.0220
4	11	26	3.93	20.05	0.9955	1.4265	0.0745
5	14	26	5.42	17.34	0.9973	0.1950	0.6166
6	14	23	4.01	13.05	0.9968	0.4332	0.1412
7	6	25	4.26	23.58	0.9961	0.3675	1.6084
8	9	24	3.57	11.35	0.9955	1.5318	0.1187
9	13	25	3.97	13.08	0.9960	1.1895	0.4990
10	10	25	3.87	13.54	0.9955	0.8476	0.6585
11	5	29	4.06	12.98	0.9948	0.7189	0.3141
12	12	26	4.42	14.82	0.9954	0.6089	0.5886
13	5	30	11.37	36.93	0.9911	3.6422	0.3696
14	14	25	3.83	12.73	0.9954	0.3143	0.2143
15	9	24	3.86	12.21	0.9961	1.7455	0.0507
16	8	27	5.03	16.05	0.9938	0.5388	0.4797

17	9	27	3.61	11.50	0.9951	1.1193	0.2110
18	5	24	4.67	15.41	0.9942	1.3604	1.1496
19	7	28	4.66	16.83	0.9939	2.7855	0.0508
20	12	27	4.19	14.13	0.9954	0.8999	0.3546
21	8	26	3.84	12.71	0.9953	1.1557	0.4974
22	14	27	3.76	12.11	0.9958	0.2421	0.3259
23	6	30	12.13	34.72	0.9927	3.9621	0.3378
24	8	27	3.92	12.95	0.9952	0.4662	0.6678
25	9	26	3.71	11.93	0.9956	0.7933	0.4399
26	6	24	4.65	15.61	0.9945	0.0773	1.3892
27	6	24	4.47	15.22	0.9956	0.8893	1.4517
28	6	29	3.86	12.55	0.9967	0.7138	0.3926
29	10	27	4.35	14.53	0.9960	0.1181	0.8254

Optimal position

8	9	24	3.57	11.35	0.9955	1.5318	0.1187
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After Placing Capacitor

Ploss(kW)	Qloss(kVar)	Vmin(p.u.)	Opt.	size(MVA)
4.44	13.92	0.9966	1.1077	0.1847
3.77	15.44	0.9957	1.0192	0.2720
3.70	12.03	0.9961	0.3944	0.0220
3.93	20.05	0.9955	1.4265	0.0745
5.42	17.34	0.9973	0.1950	0.6166
4.01	13.05	0.9968	0.4332	0.1412

4.26	23.58	0.9961	0.3675	1.6084
3.57	11.35	0.9955	1.5318	0.1187
3.97	13.08	0.9960	1.1895	0.4990
3.87	13.54	0.9955	0.8476	0.6585
4.06	12.98	0.9948	0.7189	0.3141
4.42	14.82	0.9954	0.6089	0.5886
11.37	36.93	0.9911	3.6422	0.3696
3.83	12.73	0.9954	0.3143	0.2143
3.86	12.21	0.9961	1.7455	0.0507
5.03	16.05	0.9938	0.5388	0.4797
3.61	11.50	0.9951	1.1193	0.2110
4.67	15.41	0.9942	1.3604	1.1496
4.66	16.83	0.9939	2.7855	0.0508
4.19	14.13	0.9954	0.8999	0.3546
3.84	12.71	0.9953	1.1557	0.4974
3.76	12.11	0.9958	0.2421	0.3259
12.13	34.72	0.9927	3.9621	0.3378
3.92	12.95	0.9952	0.4662	0.6678
3.71	11.93	0.9956	0.7933	0.4399
4.65	15.61	0.9945	0.0773	1.3892
4.47	15.22	0.9956	0.8893	1.4517
3.86	12.55	0.9967	0.7138	0.3926
4.35	14.53	0.9960	0.1181	0.8254

Input data:

Line no	S bus	R bus	R(pu)	X(pu)	P(kw)	Q(kvar)	S(vA)
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1	1	2	0.0083	0.0280	101.16	48.78	112.3069
2	2	3	0.0298	0.0850	97.14	3.98	97.2215
3	3	4	0.0112	0.0366	73.54	0.97	73.5464
4	4	5	0.0625	0.1320	15.73	-7.23	17.3120
5	4	6	0.0430	0.1480	16.57	-8.86	18.7900
6	6	7	0.0200	0.1020	-12.38	1.25	12.4429
7	6	8	0.0339	0.1730	-43.65	-6.25	44.0952
8	8	9	0.0099	0.0505	205.30	42.81	209.7160
9	9	10	0.0369	0.1679	6.03	-21.97	22.7830
10	9	11	0.0258	0.8480	22.60	15.38	27.3369
11	9	12	0.0648	0.2950	-1.33	-19.06	19.1063
12	9	13	0.0481	0.1580	10.87	4.57	11.7916
13	13	14	0.0132	0.0434	40.25	34.15	52.7853
14	13	15	0.0269	0.0869	-95.03	-7.96	95.3628
15	1	15	0.0178	0.0910	137.58	34.77	141.9056
16	1	16	0.0454	0.2060	72.83	-0.89	72.8354
17	1	17	0.0238	0.1080	137.09	0.26	137.0903
18	3	15	0.0160	0.0530	19.86	-13.94	24.2640
19	4	18	0.0000	0.5550	32.27	2.84	32.3950
20	4	18	0.0000	0.4300	32.27	2.84	32.3950
21	5	6	0.0302	0.0641	2.55	-9.17	9.5177
22	7	8	0.0139	0.0712	-49.65	-8.65	50.3979
23	10	12	0.0277	0.1262	-20.99	-15.78	26.2600
24	11	13	0.0223	0.0732	-3.45	-8.83	9.4801
25	12	13	0.0178	0.0580	27.16	72.77	77.6733
26	12	16	0.0180	0.0813	-27.30	4.72	27.7059

27	12	17	0.0397	0.1790	-89.50	26.60	93.3692
28	14	15	0.0171	0.0547	-12.61	1.27	12.6740
29	18	19	0.4610	0.6850	13.07	8.56	15.6264
30	19	20	0.2830	0.4340	9.03	6.82	11.3161
31	21	20	0.0000	0.7767	-6.65	-4.33	7.9355
32	21	22	0.7360	0.1170	6.65	4.33	7.9363
33	22	23	0.0099	0.0152	12.07	4.85	13.0091
34	23	24	0.1660	0.2560	5.30	2.51	5.8679
35	24	25	0.0000	1.1820	4.50	5.33	6.9767
36	24	25	0.0000	1.2300	4.50	5.33	6.9767
37	24	26	0.0000	0.0473	-4.51	-2.71	5.2575
38	26	27	0.1650	0.2540	-4.54	-2.76	5.3121
39	27	28	0.0618	0.0954	-13.86	-3.29	1.2451
40	28	29	0.0418	0.0578	-18.46	-5.82	19.3560
41	7	29	0.0000	0.0648	37.23	12.38	39.2344
42	25	30	0.1350	0.2020	3.36	1.37	3.6230
43	30	31	0.3260	0.4970	-0.38	-0.64	0.7489
44	31	32	0.5070	0.7550	-6.18	-3.54	7.1241
45	32	33	0.0392	0.0360	3.82	1.76	4.2032
46	34	32	0.0000	0.9530	11.75	7.30	13.8341
47	34	35	0.0520	0.0780	-17.85	-10.43	20.6738
48	35	36	0.0430	0.0537	-19.61	-11.17	22.5681
49	36	37	0.0290	0.0366	-23.23	-4.13	23.5939
50	37	38	0.0651	0.1099	3.41	-7.37	8.1197
51	37	39	0.0239	0.0379	1.25	0.08	1.2574
52	36	40	0.0300	0.0466	-5.43	-0.54	5.4606

53	22	38	0.0192	0.0295	19.05	19.04	26.9337
54	11	41	0.0000	0.7490	16.54	14.07	21.7149
55	41	42	0.2070	0.3520	-4.77	-4.34	6.4503
56	41	43	0.0000	0.4120	-6.23	5.08	8.0411
57	38	44	0.0289	0.0585	20.77	-0.80	20.7855
58	15	45	0.0000	0.1042	41.95	27.19	49.9910
59	14	46	0.0000	0.0735	41.42	26.52	49.1826
60	46	47	0.0230	0.0680	9.30	11.54	14.8216
61	47	48	0.0182	0.0233	-10.76	-5.85	12.2470
62	48	49	0.0834	0.1290	17.86	22.40	28.6486
63	49	50	0.0801	0.1280	-3.13	11.20	11.6291
64	50	51	0.1386	0.2200	21.85	-4.71	22.3519
65	10	51	0.0000	0.0712	70.19	46.08	83.9643
66	13	49	0.0000	0.1910	-4.33	-5.32	6.8594
67	29	52	0.1442	0.1870	-9.37	-7.69	12.1216
68	52	53	0.0762	0.0984	-29.74	-18.17	34.8513
69	53	54	0.1878	0.2320	-33.84	-21.81	40.2594
70	54	55	0.1732	0.2265	6.77	6.46	9.3576
71	11	43	0.0000	0.1530	-18.23	3.22	18.5122
72	44	45	0.0624	0.1249	1.25	0.06	1.2514
73	40	56	0.0000	1.1950	-0.98	-2.79	2.9571
74	56	41	0.5530	0.5940	-8.84	-8.82	12.4875
75	56	42	0.2125	0.3540	3.39	-7.40	8.1400
76	39	57	0.0000	1.3550	-3.43	-9.40	10.0047
77	57	56	0.1740	0.2600	-17.32	-0.65	17.3323
78	38	49	0.1150	0.1770	-19.48	-16.69	25.6520

79	38	48	0.0312	0.0482	41.79	30.11	51.5074
80	9	55	0.0000	0.1205	820.09	274.53	864.8204

CASE (ii)**BASE CASE**

Real power loss = 26.91 kW,

V_{min} = 0.9885 p.u.

React. power loss = 80.54 kVar

Runs	Opt.	nodes	Ploss (kW)	Qloss (kVar)	Vmin (p.u.)	Opt.	Size (MVA)
1	6	25	4.16	20.68	0.9957	0.7095	1.4118
2	11	23	4.00	21.18	0.9954	1.4970	0.1344
3	10	27	4.03	13.43	0.9954	0.1084	0.7576
4	5	24	4.89	16.13	0.9938	1.1315	1.0948
5	10	26	3.98	13.17	0.9952	0.1014	0.7431
6	8	25	3.98	15.75	0.9956	1.1935	0.9328
7	5	25	4.19	22.23	0.9954	0.0558	1.5268
8	8	29	3.70	11.95	0.9959	0.9124	0.2796
9	15	26	4.26	13.98	0.9961	0.0616	0.7597
10	12	27	4.04	13.48	0.9952	0.3435	0.6185
11	14	27	3.70	11.93	0.9959	0.3104	0.1845
12	6	24	4.40	15.02	0.9953	0.5381	1.4679
13	14	29	4.15	13.21	0.9948	0.0538	0.2892

14	7	25	4.05	18.63	0.9951	0.5381	1.2515
15	10	26	3.89	12.80	0.9952	0.6019	0.4922
16	10	24	4.16	13.97	0.9951	0.8619	0.7055
17	12	26	4.66	15.02	0.9941	0.0503	0.6286
18	13	28	3.91	12.51	0.9948	1.1963	0.1837
19	7	28	4.21	14.14	0.9941	1.4548	0.3562
20	10	29	3.68	11.84	0.9960	0.2929	0.3205
21	13	23	3.97	12.96	0.9948	1.0347	1.0946
22	7	28	4.05	13.52	0.9953	1.1045	0.5813
23	13	24	3.91	12.58	0.9955	1.0695	0.5809
24	13	24	3.93	12.61	0.9954	1.1282	0.4951
25	15	24	3.70	12.00	0.9959	0.3846	0.0281
26	13	26	3.92	12.56	0.9958	0.9713	0.3780
27	12	24	4.02	13.28	0.9950	0.6501	0.8813
28	15	30	5.49	17.03	0.9939	0.2791	0.1380
29	11	24	3.91	18.77	0.9961	1.3201	0.3485

Optimal position

20	10	29	3.68	11.84	0.9960	0.2929	0.3205
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After placing capacitor

Ploss(kW)	Qloss(kVar)	Vmin(p.u.)	Opt.	size(MVA)
4.16	20.68	0.9957	0.7095	1.4118
4.00	21.18	0.9954	1.4970	0.1344
4.03	13.43	0.9954	0.1084	0.7576

4.89	16.13	0.9938	1.1315	1.0948
3.98	13.17	0.9952	0.1014	0.7431
3.98	15.75	0.9956	1.1935	0.9328
4.19	22.23	0.9954	0.0558	1.5268
3.70	11.95	0.9959	0.9124	0.2796
4.26	13.98	0.9961	0.0616	0.7597
4.04	13.48	0.9952	0.3435	0.6185
3.70	11.93	0.9959	0.3104	0.1845
4.40	15.02	0.9953	0.5381	1.4679
4.15	13.21	0.9948	0.0538	0.2892
4.05	18.63	0.9951	0.5381	1.2515
3.89	12.80	0.9952	0.6019	0.4922
4.16	13.97	0.9951	0.8619	0.7055
4.66	15.02	0.9941	0.0503	0.6286
3.91	12.51	0.9948	1.1963	0.1837
4.21	14.14	0.9941	1.4548	0.3562
3.68	11.84	0.9960	0.2929	0.3205
3.97	12.96	0.9948	1.0347	1.0946
4.05	13.52	0.9953	1.1045	0.5813
3.91	12.58	0.9955	1.0695	0.5809
3.93	12.61	0.9954	1.1282	0.4951
3.70	12.00	0.9959	0.3846	0.0281
3.92	12.56	0.9958	0.9713	0.3780
4.02	13.28	0.9950	0.6501	0.8813
5.49	17.03	0.9939	0.2791	0.1380
3.91	18.77	0.9961	1.3201	0.3485

CASE(iii):-**BASE CASE**

Real power loss = 26.91 kW,

Vmin = 0.9885 p.u.

React. power loss = 80.54 kVar

Runs	Opt.	nodes	Ploss (kW)	Qloss (kVar)	Vmin (p.u.)	Opt.	Size (MVA)
1	7	27	3.98	13.11	0.9947	0.7672	0.5663
2	11	24	3.84	17.38	0.9959	1.2047	0.4197
3	8	27	3.90	12.88	0.9952	0.5832	0.6338
4	14	26	13.57	42.04	0.9997	0.2031	0.9094
5	10	27	3.92	12.94	0.9952	0.9775	0.2947
6	5	25	4.19	23.04	0.9956	0.1496	1.5865
7	13	24	3.99	12.75	0.9949	1.1566	0.3581
8	9	29	4.98	15.52	0.9939	0.1801	0.2593
9	7	28	3.94	13.16	0.9947	1.0869	0.5085
10	7	29	4.19	13.34	0.9947	0.4868	0.2803
11	6	28	4.17	13.79	0.9953	0.8243	0.6852
12	13	25	3.98	14.61	0.9951	0.6442	0.8178
13	5	29	4.17	13.52	0.9969	0.1466	0.4507
14	9	24	4.12	13.76	0.9955	0.4397	1.2173
15	10	26	3.98	13.22	0.9953	1.3791	0.1029
16	10	29	4.04	13.04	0.9963	1.0213	0.1863
17	13	25	3.96	17.60	0.9953	0.3334	1.1909
18	12	30	4.47	15.27	0.9949	1.4824	0.1047
19	13	27	4.00	13.31	0.9952	0.0565	0.7605

20	15	25	3.88	16.92	0.9954	0.1422	1.0053
21	11	26	3.72	13.31	0.9959	0.7099	0.4527
22	14	25	3.90	13.07	0.9953	0.2930	0.2676
23	13	28	3.91	12.85	0.9955	0.3937	0.5783
24	10	26	4.20	14.02	0.9958	1.5205	0.1053
25	13	28	4.39	14.71	0.9960	0.1702	0.8026
26	8	29	3.81	12.25	0.9954	0.0984	0.3565
27	9	25	3.68	13.39	0.9956	0.8317	0.7696
28	9	25	3.93	14.26	0.9950	0.6556	0.7900
29	13	29	4.22	13.36	0.9961	1.4445	0.0663

Optimal position

27	9	25	3.68	13.39	0.9956	0.8317	0.7696
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After placing capacitor

Ploss(kW)	Qloss(kVar)	Vmin(p.u.)	Opt.	size(MVA)
3.98	13.11	0.9947	0.7672	0.5663
3.84	17.38	0.9959	1.2047	0.4197
3.90	12.88	0.9952	0.5832	0.6338
13.57	42.04	0.9997	0.2031	0.9094
3.92	12.94	0.9952	0.9775	0.2947
4.19	23.04	0.9956	0.1496	1.5865
3.99	12.75	0.9949	1.1566	0.3581
4.98	15.52	0.9939	0.1801	0.2593
3.94	13.16	0.9947	1.0869	0.5085
4.19	13.34	0.9947	0.4868	0.2803

4.17	13.79	0.9953	0.8243	0.6852
3.98	14.61	0.9951	0.6442	0.8178
4.17	13.52	0.9969	0.1466	0.4507
4.12	13.76	0.9955	0.4397	1.2173
3.98	13.22	0.9953	1.3791	0.1029
4.04	13.04	0.9963	1.0213	0.1863
3.96	17.60	0.9953	0.3334	1.1909
4.47	15.27	0.9949	1.4824	0.1047
4.00	13.31	0.9952	0.0565	0.7605
3.88	16.92	0.9954	0.1422	1.0053
3.72	13.31	0.9959	0.7099	0.4527
3.90	13.07	0.9953	0.2930	0.2676
3.91	12.85	0.9955	0.3937	0.5783
4.20	14.02	0.9958	1.5205	0.1053
4.39	14.71	0.9960	0.1702	0.8026
3.81	12.25	0.9954	0.0984	0.3565
3.68	13.39	0.9956	0.8317	0.7696
3.93	14.26	0.9950	0.6556	0.7900
4.22	13.36	0.9961	1.4445	0.0663

CASE(iv):-

BASE CASE

Real power loss = 26.91 kW,

Vmin = 0.9885 p.u.

React. power loss = 80.54 kVar

Runs	Opt.	nodes	Ploss (kW)	Qloss (kVar)	Vmin (p.u.)	Opt.	Size (MVA)
1	14	23	10.15	33.32	0.9977	0.1767	3.3752
2	9	28	3.81	12.13	0.9946	1.0811	0.1821
3	11	26	3.84	12.55	0.9957	0.3591	0.6044
4	8	29	4.01	12.94	0.9952	1.1313	0.2169
5	8	28	4.01	13.52	0.9958	1.5824	0.4320
6	11	30	4.15	24.17	0.9960	1.6850	0.0223
7	8	26	3.85	12.69	0.9956	0.8264	0.6142
8	9	26	3.64	11.72	0.9953	0.7352	0.4330
9	9	29	3.69	11.68	0.9963	0.6446	0.2695
10	14	27	5.38	17.51	0.9970	0.0951	0.8022
11	12	25	4.05	16.25	0.9961	0.7368	0.9851
12	10	29	3.82	12.29	0.9961	0.8135	0.2206
13	11	28	3.83	15.09	0.9961	0.9397	0.3673
14	13	28	4.13	13.56	0.9946	0.2182	0.6264
15	14	25	4.19	20.14	0.9964	0.1303	1.2350
16	6	25	4.31	20.53	0.9961	1.2574	1.3602
17	7	27	4.33	15.31	0.9943	2.4915	0.1729
18	6	28	4.26	13.97	0.9952	1.0359	0.6526
19	8	30	5.03	18.65	0.9960	3.4259	0.0359
20	15	24	4.59	15.87	0.9961	0.0105	1.6355
21	9	24	3.63	11.62	0.9950	1.1496	0.3937
22	11	30	4.22	23.26	0.9959	1.6045	0.2562
23	11	27	3.75	13.47	0.9957	0.7202	0.4305
24	6	28	4.20	14.10	0.9956	0.4654	0.7740

25	15	30	4.02	12.79	0.9952	0.3472	0.1074
26	8	25	4.00	16.68	0.9961	1.2355	1.0399
27	10	27	3.93	12.98	0.9952	0.9796	0.3052
28	10	24	4.09	13.67	0.9952	1.2634	0.3212
29	13	27	3.99	13.09	0.9948	0.1908	0.6506

After placing capacitor

Ploss(kW)	Qloss(kVar)	Vmin(p.u.)	Opt.	size(MVA)
10.15	33.32	0.9977	0.1767	3.3752
3.81	12.13	0.9946	1.0811	0.1821
3.84	12.55	0.9957	0.3591	0.6044
4.01	12.94	0.9952	1.1313	0.2169
4.01	13.52	0.9958	1.5824	0.4320
4.15	24.17	0.9960	1.6850	0.0223
3.85	12.69	0.9956	0.8264	0.6142
3.64	11.72	0.9953	0.7352	0.4330
3.69	11.68	0.9963	0.6446	0.2695
5.38	17.51	0.9970	0.0951	0.8022
4.05	16.25	0.9961	0.7368	0.9851
3.82	12.29	0.9961	0.8135	0.2206
3.83	15.09	0.9961	0.9397	0.3673
4.13	13.56	0.9946	0.2182	0.6264
4.19	20.14	0.9964	0.1303	1.2350
4.31	20.53	0.9961	1.2574	1.3602
4.33	15.31	0.9943	2.4915	0.1729

4.26	13.97	0.9952	1.0359	0.6526
5.03	18.65	0.9960	3.4259	0.0359
4.59	15.87	0.9961	0.0105	1.6355
3.63	11.62	0.9950	1.1496	0.3937
4.22	23.26	0.9959	1.6045	0.2562
3.75	13.47	0.9957	0.7202	0.4305
4.20	14.10	0.9956	0.4654	0.7740
4.02	12.79	0.9952	0.3472	0.1074
4.00	16.68	0.9961	1.2355	1.0399
3.93	12.98	0.9952	0.9796	0.3052
4.09	13.67	0.9952	1.2634	0.3212
3.99	13.09	0.9948	0.1908	0.6506

ANALYSIS:-

Out of all the Four cases 3rd case is most optimal case because losses are less and cost is optimal. During all the four cases input data remains same but nodes, losses in optput changes.

33 BUS SYSTEM

BASE CASE

Real power loss = 202.67 kW,

Vmin = 0.9131 p.u.

React. power loss = 135.15 kVar

Runs	Opt.	nodes	Ploss(kW)	Qloss(kVar)	Vmin(p.u.)	Opt.	size(MVA)
1	6	25	50.60	41.03	0.9716	3.1266	0.9677
2	11	23	68.21	50.01	0.9521	1.5009	1.9930
3	10	27	48.28	36.79	0.9731	1.2655	1.6375

4	5	24	86.04	71.75	0.9476	2.9137	1.0850
5	10	26	48.23	36.44	0.9705	1.0279	1.8966
6	8	25	55.86	41.90	0.9601	2.2662	0.8572
7	5	25	86.18	71.75	0.9464	2.9121	0.8079
8	8	29	37.71	26.65	0.9703	1.2126	1.4767
9	15	26	56.80	44.09	0.9793	0.1810	3.1789
10	12	27	46.10	35.38	0.9687	0.8723	1.7363
11	14	27	44.64	34.62	0.9796	0.7671	2.3751
12	6	24	49.93	40.47	0.9667	2.8811	0.7663
13	14	29	33.11	23.94	0.9808	0.9250	1.6284
14	7	25	50.15	42.12	0.9660	2.6186	0.8542
15	10	26	48.43	36.63	0.9715	1.0654	1.9192
16	10	24	65.76	48.13	0.9522	1.6002	1.6121
17	12	26	50.03	39.14	0.9767	0.5118	2.7242
18	13	28	41.47	30.58	0.9818	1.1963	1.6182
19	7	28	47.86	37.77	0.9779	2.3155	0.9765
20	10	29	37.40	27.50	0.9786	0.7626	1.8783
21	13	23	75.84	55.31	0.9445	1.0417	2.0407
22	7	28	46.82	32.92	0.9681	1.309	1.5871
23	13	24	73.39	52.54	0.9445	1.1797	1.4712
24	13	24	73.58	53.20	0.9483	1.4409	1.5740
25	15	24	77.52	56.69	0.9441	1.1827	1.4436
26	13	26	47.65	36.02	0.9669	0.9479	1.7679
27	12	24	70.27	50.06	0.9547	1.8013	1.4500
28	15	30	32.47	23.85	0.9806	0.8511	1.6559
29	11	24	66.13	47.71	0.9526	1.5212	1.4415

Optimal position

28	15	30	32.47	23.85	0.9806	0.8511	1.6559
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After CAPACITOR placement

Ploss(kW)	Qloss(kVar)	Vmin(p.u.)	Opt.	size(MVA)
34.88	24.38	0.9806	1.1140	1.4019
50.02	38.26	0.9791	0.9641	2.4390
45.87	35.53	0.9759	0.6730	2.5248
47.81	36.22	0.9719	0.9852	1.8838
44.81	34.51	0.9716	0.7509	2.2105
77.57	57.80	0.9487	1.3850	1.6745
50.25	40.56	0.9618	2.5435	0.9335
61.41	45.28	0.9556	1.8737	1.3335
76.04	53.93	0.9466	1.4034	1.1005
67.93	48.77	0.9493	1.5539	1.1444
47.58	38.09	0.9562	1.7470	1.4138
47.69	36.32	0.9668	0.8260	1.8750
45.73	36.98	0.9573	1.5486	1.595
79.10	58.05	0.9474	1.4469	1.1503
62.90	45.54	0.9514	1.6545	1.2146
51.43	39.03	0.9725	1.1548	1.7144
49.91	37.60	0.9684	1.1198	1.5219
86.46	71.78	0.9505	3.2288	1.0063
47.00	35.16	0.9699	1.9431	1.3748
44.90	34.83	0.9734	0.8671	1.9817
54.32	40.49	0.9685	1.2892	1.5500

45.73	35.29	0.9703	0.9593	1.7463
40.49	31.69	0.9591	1.4602	1.1365

7.2 GRAPHHS

57 BUS SYSTEM

A) Voltage magnitude

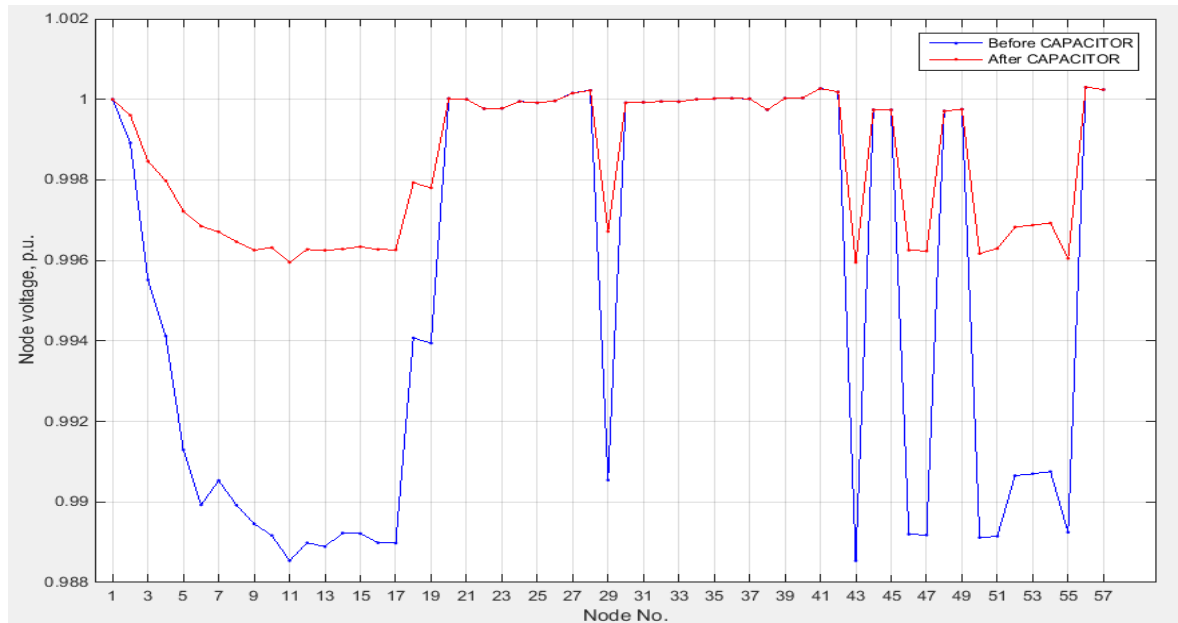
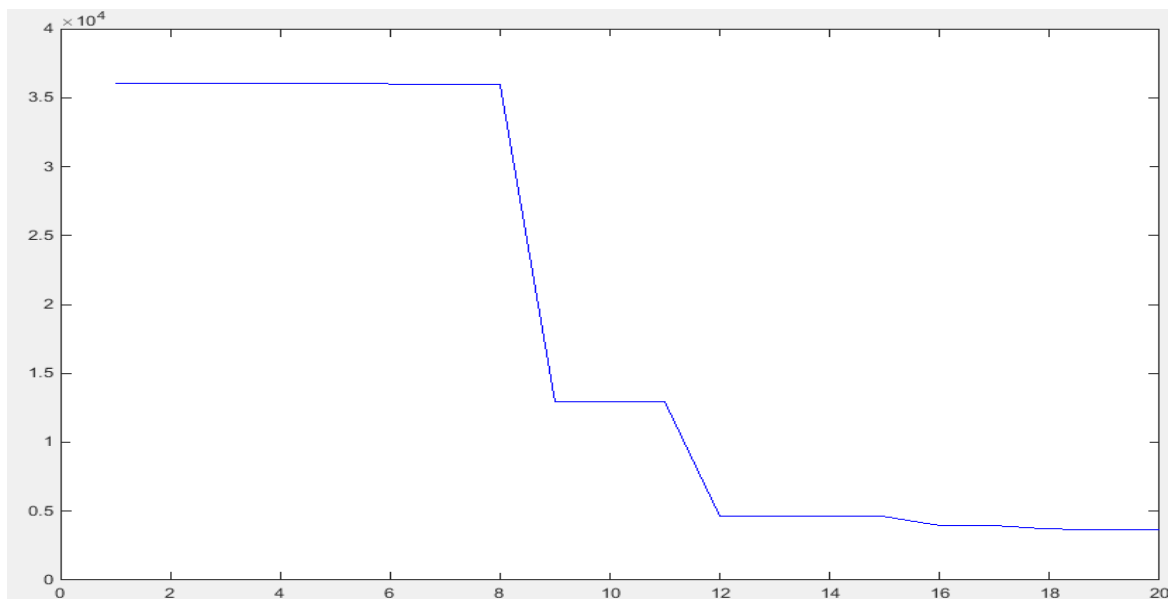


Fig: 7.1

B) Convergence Curve

Fig:7.2



X-axis:- No.of iterations

Y-Axis:- Total cost

33 BUS SYSTEM

A) Voltage magnitude

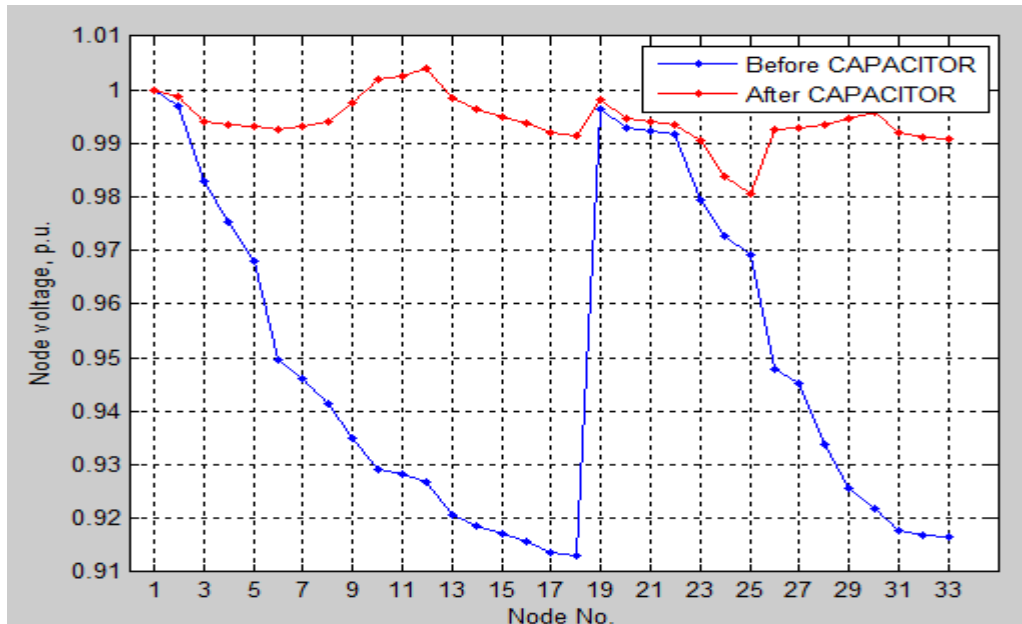


Fig:7.3

B) Convergence graph

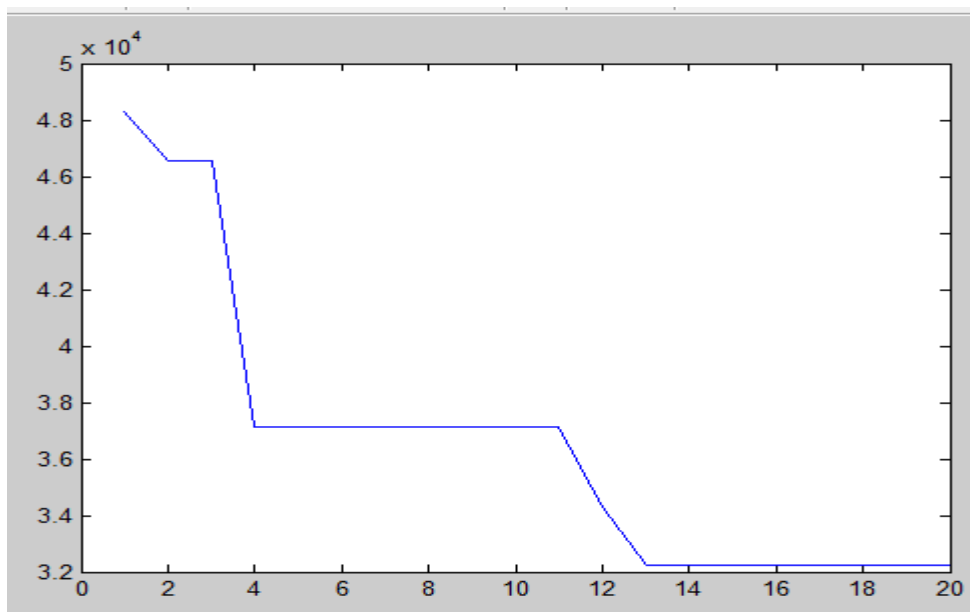


Fig:7.4

X-axis:- No.of iterations

Y-Axis:- Total cost

