



Voltage Levels	
	500. kV
	220. kV
	110. kV
	66. kV

DIGIBILENT

APPENDIX (B)

System Data:

B.1 Bus Data:

Bus No.	Bus Name	Bus Type	Voltage (KV)	Pg. (MW)	Qg. (MVA _r)	Injected power MVA _r
1	MWP500	Slack	500	0	0	-125
2	ATB5	Load	500	0	0	-125
3	MRK5	Load	500	0	0	-250
4	KAB5	Load	500	0	0	0
5	WHL2	Load	220	0	0	-30
6	WWA2	Load	220	0	0	-40
7	DEB2-B1	Load	220	0	0	0
8	DEB2-B2	Load	220	0	0	0
9	DON2	Load	220	0	0	0
10	MWT2	Load	220	0	0	0
11	MWP2	Load	220	0	0	0
12	ATB2	Load	220	0	0	0
13	SHN2	Load	220	0	0	0
14	MRK2	Load	220	0	0	0
15	GAM2	Load	220	0	0	0
16	KAB2	Load	220	0	0	0
17	FRZ2	Load	220	0	0	0
18	GER2	Regulated	220	186	0	0
19	IBA2	Load	220	0	0	0
20	MHD2	Load	220	0	0	0
21	KLX2	Load	220	0	0	0
22	JAS2	Load	220	0	0	0
23	GAD2	Load	220	0	0	0
24	SOB2	Load	220	0	0	0
25	NHAS2	Load	220	0	0	0
26	MAR2	Load	220	0	0	0

27	MSH2	Load	220	0	0	0
28	RBK2	Regulated	220	85	0	0
29	SNJ2	Load	220	0	0	0
30	SNG2	Load	220	0	0	0
31	ROS2	Regulated	220	148	0	-15
32	RNK2	Load	220	0	0	0
33	HWT2	Load	220	0	0	0
34	OBD2	Load	220	0	0	0
35	UMR2	Load	220	0	0	0
36	TND2	Load	220	0	0	0
37	DBT2	Load	220	0	0	0
38	ZBD2	Load	220	0	0	0
39	FUL2	Load	220	0	0	-15
40	BBN2	Load	220	0	0	0
41	GDF2	Load	220	0	0	-30
42	GRB2	Load	220	0	0	0
43	SHK2	Load	220	0	0	0
44	NHLF2	Load	220	0	0	0
45	ARO2	Load	220	0	0	0
46	KSL2	Load	220	0	0	0
47	HUD	Load	220	0	0	0
48	UTP2	Load	220	0	0	0
49	SHD2	Regulated	220	38	0	-30
50	KHE1	Load	110	0	0	0
51	IZB1	Load	110	0	0	0
52	IBA1	Load	110	0	0	0
53	KHN1	Regulated	110	76	0	0
54	KUK1	Load	110	0	0	0
55	IZG1	Load	110	0	0	0
56	MHD1	Load	110	0	0	15
57	FAR1	Load	110	0	0	0
58	AFR1	Load	110	0	0	0
59	KLX1	Load	110	0	0	0
60	LOM1	Load	110	0	0	0
61	SHG1	Load	110	0	0	0
62	MUG	Load	110	0	0	0

63	BNT1	Load	110	0	0	0
64	OMD1	Load	110	0	0	0
65	GAM1	Load	110	0	0	0
66	JAS1	Load	110	0	0	0
67	BAG1	Load	110	0	0	0
68	SOB1-B2	Load	110	0	0	0
69	GAD1-B2	Load	110	0	0	0
70	NHAS1	Load	110	0	0	0
71	OHAS1	Load	110	0	0	0
72	GND1	Load	110	0	0	0
73	MAR1-B1	Load	110	0	0	0
74	MAN1	Load	110	0	0	0
75	ORBK1	Load	110	0	0	0
76	SNJ1	Load	110	0	0	0
77	HAG1	Load	110	0	0	0
78	SNP1	Regulated	110	7	0	0
79	MIN1	Load	110	0	0	0
80	FAO1	Load	110	0	0	0
81	GDF1	Load	110	0	0	0
82	GRB66	Regulated	66	2	0	0

B.2 Transmission Lines Data:

from	To	U KV	R1 Ω/km	X1 Ω/km	B/2 $\mu\text{S}/\text{km}$
BAG1	GAD B2	110	1.044000	1.2630000	8.107400000
WHL2	WWA2	220	13.73500	61.910000	840.9090900
MWP2	MWT2	220	2.625700	13.923660	97.93388000
DON2	DEB2 B1	220	10.59287	56.170140	394.6281000
ATB 2	SHN2	220	4.690000	21.140000	1148.760331
MWT2	DEB2 B1	220	10.57158	56.057320	394.6281000
MWP2	DEB2 B2	220	13.21260	70.061570	491.7355400
DON2	WWA2	220	5.561010	22.327020	1361.570250
DON2	DEB2 B2	220	10.59287	56.170140	394.6281000
ATB5	MWB500	500	6.627500	65.329250	972.0000000

MWB500	MRK5	500	4.844000	47.748000	2844.000000
KAB5	MRK5	500	1.030500	10.156750	151.2000000
SHN2	FRZ2	220	3.852500	15.467480	944.2148800
GER2	FRZ2	220	0.167510	0.6725200	41.11570000
KAB2	IBA2	220	1.004980	4.5300000	245.8677700
IBA1	IZB1	110	0.368500	1.4795000	90.08264000
KUK1	KHE1	110	0.107210	0.4304000	26.28099000
KHN1	IBA1	110	0.402000	1.6140000	98.34711000
IZG1	MHD1	110	0.268000	1.0760000	65.61983500
KUK1	KHN1	110	0.086390	0.6795000	26.85850000
KHN1	IZG1	110	0.402000	1.6140000	98.34710000
MRK2	MHD2	220	0.703500	2.8245000	192.3014000
KLX1	AFR1	110	0.368500	1.4795000	90.08644000
AFR1	FAR1	110	0.469000	1.8830000	114.8760000
KLX1	KUK1	110	0.635100	2.7667000	86.77685000
KLX1	LOM1	110	0.100500	0.4035000	24.62800000
LOM1	SHG1	110	0.261300	1.8491000	63.96690000
SHG1	MUG	110	0.368510	1.4795000	90.08260000
MUG	BNT1	110	0.511104	0.5111040	31.15728000
OMD1	BNT1	110	0.197650	0.7935500	48.42970000
MHD1	OMD1	110	0.311550	1.2555000	76.28000000
GAM1	BNT1	110	0.552750	2.2192500	135.5370000
KLX2	SOB2	220	0.379900	2.0150000	56.61151000
SOB2	GAD2	220	1.254000	6.6494800	186.9834000
SOB1 B2	BAG1	110	6.264000	7.5844000	48.59500000
KLX1	SOB1 B2	110	3.480000	4.2100000	27.02400000
SHG1	JAS1	110	1.306500	5.2455000	319.8347000
GAD2	JAS2	220	1.205900	4.8419800	295.4545000
GAD2	NHAS2	220	3.268000	17.328990	487.6033000
GAD B2	OHAS1	110	26.79600	32.417000	208.2644000
OHAS1	NHAS1	110	0.167500	0.6725060	40.99173000
OHAS1	GND1	110	0.502500	2.0175060	123.1405000
OHAS1	MAR1 B1	110	19.14000	23.154990	148.7603000
JAS2	RBK2	220	4.94793	19.865600	1212.809000
MSH2	RBK2	220	3.59118	14.418408	808.1652000
NHAS2	MAR2	220	2.09000	11.082480	311.9834000

MAN1	MAR1 B1	110	6.85650	18.871705	198.3470000
MAR2	SNJ2	110	3.19198	16.926012	475.2066000
MAR1 B1	HAG1	110	12.1800	14.735000	94.21488000
HAG1	SNP1	110	20.8800	25.259990	161.9835000
ORBK1	SNJ1	110	33.4080	40.415990	259.5041300
SNP1	MIN1	110	24.0120	29.049000	186.7768600
MAR1 B1	FAO1	110	24.7080	29.891005	191.7355000
SNJ2	SNG2	220	1.90000	10.074990	283.0578000
SNG2	ROS2	220	6.76400	35.867013	1008.264400
ROS2	RNK2	220	4.69001	18.830020	1148.760331
SNG2	HWT2	220	3.01498	12.104900	737.6033000
ABK2	TND2	220	3.71852	14.929510	911.1570000
UMR2	OBD2	220	8.44198	33.893987	516.5289200
SNJ1	SNB1	110	3.47990	4.2100000	27.02420000
OBD2	DBT2	220	5.96298	23.941010	365.7020000
OBT2	ZBD2	220	4.42202	17.753990	270.6612000
ZBD2	FUL2	220	7.97298	32.010980	487.6033100
FUL2	BBN2	220	5.29302	21.250988	324.3802000
TND2	UMR2	220	2.62304	10.531356	642.5619000
RBK2	RNK2	220	5.460488	21.923500	1336.776800
HWT2	GDF2	220	3.350000	13.450000	820.2479400
GRB2	KSL2	220	3.182490	12.777500	778.9256000
GDF2	SHK2	220	0.276220	1.1089000	67.56100000
SHK2	GRB2	220	2.344980	9.4150100	574.3800000
GRB2	NHLF2	220	1.637130	6.5730100	400.8264500
KSL2	ARO2	220	1.465940	5.8857000	359.5041000
MRK2	HUD	220	0.301480	1.2104800	73.76733000
HUD	GAM2	220	0.937990	3.7660000	229.3388000
KAB2	FRZ2	220	1.273017	5.1109900	311.9835000
SHK2	UTP2	220	0.937990	3.7660000	229.3388400
GER2	IBA2	220	2.010000	8.0700200	491.7355000
IBA2	KLX2	220	0.468990	1.8830020	114.8760300
GDF2	SHD2	220	6.499000	26.093020	1592.975200
GDF1	FAO1	110	53.24400	60.740990	430.5785100
JAS2	GAM2	220	0.937990	4.2279800	229..3388000

B.3 Load Data:

Bus No.	Bus Name	P (MW)	Q (MVA _r)
5	WHL2	14.360	11.483
7	DEB2-B1	33.456	23.961
9	DON2	50.320	46.148
10	MWT2	29.808	20.496
12	ATB2	101.338	70.734
13	SHN2	33.264	20.615
17	FRZ2	13.574	8.661
20	MHD2	60.883	37.732
23	GAD2	14.112	8.746
27	MSH2	6.989	25.534
28	RBK2	46.704	32.357
29	SNJ2	16.464	8.842
30	SNG2	12.029	5.585
31	ROS2	8.333	5.760
32	RNK2	0.403	22.385
33	HWT2	1.546	0.958
34	OBD2	19.757	31.778
35	UMR2	3.629	25.117
36	TND2	1.008	5.560
37	DBT2	6.250	3.939
38	ZBD2	3.360	23.764
39	FUL2	6.720	4.568
40	BBN2	3.360	2.503
43	SHK2	0.672	12.515
44	NHLF2	12.029	8.021
46	KSL2	16.666	10.678
50	KHE1	81.917	53.127
51	IZB1	68.006	39.992
52	IBA1	41.328	17.854
54	KUK1	44.621	20.718
55	IZG1	74.189	46.562

56	MHD1	12.634	8.128
57	FAR1	50.266	33.255
58	AFR1	17.203	8.477
59	KLX1	40.387	18.165
60	LOM1	85.344	58.018
61	SHG1	64.915	40.060
62	MUG	75.466	42.566
63	BNT1	59.069	30.588
64	OMD1	81.312	54.430
67	BAG1	36.490	24.236
70	NHAS1	24.730	12.738
71	OHAS1	11.088	5.864
72	GND1	27.821	14.253
73	MAR1-B1	56.717	26.986
74	MAN1	10.886	4.058
75	ORBK1	0.336	1.476
77	HAG1	7.594	4.037
78	SNP1	4.704	2.238
79	MIN1	14.381	9.552
80	FAO1	11.021	6.539
81	GDF1	18.614	12.315
82	GRB66	15.254	8.604

B.4 Transformer Data:

Name	KV (Primary)	KV (Secondary)	MV A	R (Ω)	X (Ω)	Frequency (HZ)	Tap ratio
TR NHAS	220	110	300	0	0.1534	50	0.905
TR KLX	110	220	300	0	0.1788	50	0.922
TR IBA	110	220	450	0	0.2895	50	0.905
TR ATB	220	500	600	0	0.2360	50	0.905

TR KAB	220	500	600	0	0.3360	50	0.915
TR MRK	500	220	900	0	0.5040	50	0.911
TR GDF	220	110	200	0	0.2400	50	0.975
TR GRB	220	66	200	0	0.2506	50	0.905
TR MAR	220	110	200	0	0.1409	50	0.918
TR GAD	110	220	150	0	0.2010	50	0.905
TR SNJ	220	110	110	0	0.1567	50	0.945
TR MHD	110	220	450	0	0.3801	50	0.975
TR GAM	220	110	300	0	0.2574	50	0.925
TR MWP	500	220	900	0	0.2194	50	0.967
TR JAS	220	110	150	0	0.1300	50	0.913

