Chapter 6

CONCLUSION & RECOMMENDATION

Load shedding schemes have been deployed almost universally in the power systems to provide the fastest possible remedial action in the event of severe generation – demand mismatch. The under frequency load shedding scheme must be modified to adapt the changes in the power system such as commissioning of large generators, increase in demand and changing the operating conditions. This dissertation discussed about designing of new under frequency load shedding scheme align with the development of Sri Lankan power system.

In Chapter 4, whole Sri Lankan power system has been modeled using the PSS®E software and Existing Load Shedding scheme was simulated using this model. Then improve the Load shedding scheme settings step by step to reduce the rejecting loads from the Load shedding scheme while maintaining the stability of the system. After analyzing simulation 1 to 8, Proposed Load Shedding scheme is shown in Table 6.1.

Table 6.1: Proposed New Load Shedding Scheme

Stage	Load to be Tripped (%)	Remarks	Tripping Criteria
I	5	5% Load on only freq. based	48.75 Hz + t=100 ms
II	5	5% Load on only freq. based	48.50 Hz + t=**150 ms**
III	**5**	**5%** Load on only freq. based	48.25 Hz + t=**150 ms**
IV	**6**	**6%** Load on only freq. based	48.00 Hz + t=**150 ms**
V	10	**8%** Load on only freq. based	47.50 Hz + t=**150 ms** OR
		2% Load on only freq. based + df/dt based	49 Hz AND df/ft = 0.85 Hz/Sec
VI	10	10% Load on df/dt based	49 Hz AND df/ft = 0.85 Hz/Sec

Load reduction from Load Shedding tripping after implementing the above scheme and be found on Table 6.2.

Table 6.2: Saved Load from Proposed New Load Shedding Scheme

Criteria Load Shedding operation	Load Rejection / MW		Saved Load / MW
	Existing Scheme	Proposed Scheme	
up to Stage 3	251.12	121.14	**129.98 (51.76%)**
up to Stage 4	204.74	167.81	**36.93 (18.04%)**
df/dt	181.81	139.52	**42.29 (23.26%)**

Further, due to present network configuration after certain power System failures some part of the system isolates from the main system and operates in islanding mode. This islanding operation fails at all the times due to unbalance of the generation and load. This dissertation also discussed in what way to overcome above situation by rearranging 33 kV Load Shedding Feeders in the Sri Lankan network.

In Chapter 5, it was identified possible islanding operations and analyzed the stability of them with proposed load shedding scheme. Finally rearrange the 33 kV load shedding feeders in the Sri Lankan network to facilitate islanding operation by analyzing the stability of the islands using simulation.

Finally it can be identified that Islanding Operation is possible with Samanalawewa and Kukule Frequency controlling machines after the Load Shedding Feeders of the following Grid Substation are arranged such a way that it will shed equal or more than Table 6.4 proposed MW values in each Load Shedding stage.

Load reduction with proposed Load Shedding feeder arrangement of each island can be found on Table 6.3.

Table 6.3: Saved Load from proposed feeder arrangement in each island

Island	Effected Loads / MW		Saved Load / MW
	Existing Scheme	Proposed Scheme	
Samanalawewa	229.95	65.75	**164.2 (71%)**
Kukule	126.54	50.00	**76.54 (60%)**

Table 6.4: Proposed Load Shedded capacity of each GSS in the islands

Grid Substation	Proposed Load Shedding Amount / MW
Balangoda GSS	**13.5**
Stage 1	4.5
Stage 2	5
Stage 3	4
Deniyaya GSS	**7.5**
Stage 3	7.5
Embilipitiya GSS	**8**
Stage 1	1
Stage 2	7
Galle GSS	**16.5**
Stage 1	5
Stage 2	3
Stage 3	8.5
Matara GSS	**20.25**
Stage 1	14.5
Stage 4	5.75
Ambalangoda GSS	**4**
Stage 1	4
Horana GSS	**20**
Stage 1	14
Stage 2	6
Mathugama GSS	**26**
Stage 1	14
Stage 2	4
Stage 3	8

Finally it is recommended to analyze and revise the under frequency Load Shedding scheme at least once in two years under consideration of continuous changes of the characteristics of the Sri Lankan power system.