

UNIVERSITI TEKNOLOGI MARA

AN OPTIMAL UNDER FREQUENCY  
LOAD SHEDDING SCHEME FOR  
ISLANDED DISTRIBUTION  
NETWORK

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## ABSTRACT

Shutting down the Distributed Generation (DG) is no longer appropriate practice when losing main power supply. Alternatively, intentional islanding is implemented to allow DG to continuously supply power to the critical load. However, there are several technical issues need to be considered for islanding operation. The most challenging issue is to sustain the stability of frequency. Deviation of frequency for an island would occur resulting from active power imbalance following islanding. Load shedding is one of important measures in distribution system that can sustain the operation of the DG in islanded system during the occurrence of under-frequency. Technique most commonly applied is Under Frequency Load Shedding (UFLS). In this study, a new technique of UFLS for islanding operation is proposed. It considers the combination of optimal and fixed priority of load. Inclusive with the design of UFLS is a new module referred as Load Shedding Module (LSM). Two new algorithms i.e., Load Classification based Fuzzy Logic (LCFL) and Binary Evolutionary Programming (BEP) are introduced in the module. The LCFL is designed to classify the load based on its priority i.e., Vital, Semi Vital and Non-Vital. Classification is taken place considering Load Stability Index (LSI) and Load Regulation Factor (LRF). Semi vital and non-vital of load are then optimally selected to be shed by the BEP based on the amount of power imbalance resulting from islanding whilst the vital load is given fixed priority. Thus, the combination of priority provides flexibility for the technique in achieving an optimal load shedding. The performance of the proposed UFLS technique is evaluated on two scenarios i.e event and response based through simulation studies on the 11kV Malaysia distribution network. The validation of the proposed technique on different case studies for both scenarios proves that with the application of optimal load shedding, the technique comparatively displays an outstanding performance than an adaptive technique. The technique manages to restore the frequency to nominal without having any overshoot. However, the implementation of this technique is feasible for a smart grid distribution system possessing effective communication means, comprehensive monitoring tools and advanced sensors for transferring measurement data and executes load shedding.

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