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CERTIFICATE

I, TARUN KUMAR NIRMAL, Roll No. 2K17/PSY/18 student of M. Tech. (POWER SYSTEM), hereby declare that the dissertation/project titled “RADIAL FEEDER DISTRIBUTION SYSTEM PROTECTION & COORDINATION USING GUI ETAP” under the supervision of Prof. J.N. RAI of Electrical Engineering Department Delhi Technological University in partial fulfillment of the requirement for the award of the degree of Master of Technology has not been submitted elsewhere for the award of any Degree.

Place: Delhi

Date: . . .2019

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CANDIDATE'S DECLARATION

I, Tarun Kumar Nirmal, Roll No. 2K17/PSY/18 student of M.Tech. (Power System), hereby declare that the project Dissertation titled "RADIAL FEEDER DISTRIBUTION SYSTEM PROTECTION & COORDINATION USING GUI ETAP" which is submitted by me to the Department of Electrical Engineering Department, Delhi Technological University, Delhi in partial fulfillment of the requirement for the award of the degree of Master of Technology, is original and not copied from any source without proper citation. This work has not previously formed the basis for the award of any Degree, Diploma Associate ship, Fellowship or other similar title or recognition.

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ABSTRACT

Growing population, heavily variable load, energy efficiency, supply security, environmental concern, are the main reason of highly dense and complex power system for which highly reliable protective devices is needed called digital\electromagnetic relays and fuses. This thesis discusses about relay coordination of radial distribution system and conditions of miss-coordination using ETAP (Star Protection Coordination). Four radial feeder sections is sketch with suitable values which is coordinated in this thesis. Power system elements is protected with fuses and different types of relays; these are coordinated up to sequence of three which is indicated by number 1, 2, 3 and other relay sequence is also shown with ascending time values. Relay timing can be adjusted by varying current time curve characteristics of any relay type except over\under voltage relay and fuse.

ETAP graphical user interface is designed in such a way that each feeder is protected and coordinated. Relay setting, time dial, CT's Ratio, and curve characteristics can be adjusted that tends to different time delay. Using ETAP different types of fault could be analyzed like 3phase, line to ground, line t line, line to line to ground with $\frac{1}{2}$ cycles KA or 30 cycle KA. In this thesis every bus, transmission line is introduced to fault and are analyzed. Propose model use a generator with 6 MW and 11KV and a utility grid.

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NOMENCLATURE

- PT = Potential Transformer
- CT = Current Transformer
- VT = Voltage Transformer
- MV = Medium Voltage
- HV = High Voltage
- LT = Low Tension
- HT = High Tension
- MD = Manufacturing Default
- OCR= Overcurrent Relay
- SC = Short Circuit
- DR = Differential Relay
- OCMR = Overcurrent Motor Relay
- ANSI = American National Standard Institute
- IEC = International Electrotechnical Commission
- n= turns ratio
- α = phase angle between fluxes I electromagnetic relay
- TMS = Time multiplying Setting
- DMF = Delay Multiplying Factor
- TD = Time delay
- LL = line to line
- LG = Line to ground
- LLG = Double line to ground
- LLL= Triple line
- LLLG = Triple line to ground
- T = Electromagnetic torque
- CB = Circuit Breaker
- kA= Kilo-Ampere
- KVA_r = Kilo-Volt Ampere Reactive
- KV = Kilo-Volt
- LV= Low Voltage

- HRC = high rupturing capacity cartilage fuse
- ADS = Automatic Disconnect Switch
- NO = Normally open
- NC = Normally Closed
- Φ = angle cross-ponds to the perfect sinusoidal.
- λ = Lambda
- ω = Angular frequency
- MMF- Magneto motive force