Name:	Prabhakar Tiwari
Supervisor:	Prof. Ibraheem, Department of Electrical Engineering, Faculty of Engineering & Technology, Jamia Millia Islamia, New Delhi-110025
Co-Supervisor	Prof. N K Sharma, Department of Electrical & Electronics, Engineering, Krishna Institute of Engineering & Technology Ghaziabad, UP-201206
Department:	Department of Electrical Engineering, Faculty of Engineering and Technology, Jamia Millia Islamia, New Delhi-110025
Title of Project:	Role of Tariff In a Sustainable Power System

---

ABSTRACT

Tariff plays key role in modern price based era of the power system. It is a decisive factor in the normalcy of the operation and control of the system, healthy growth of the system and hence sustainability of the power system.

Tariff in the restructured and deregulated environment of power system is much more than that of a mechanism of calculation of price of electricity. It is more than that it perceivably seen in the first sight to calculate the total price of a commodity. Electricity is a different type of commodity in which the customer remains connected with the system throughout the time of utilization. It has direct concern with the dimensions of the power system. The one of the very important example of the impact may be cited is unscheduled interchange tariff of Availability Based Tariff in the Indian power system. This is unique type of the spot pricing technical tariff adopted by India.

Average sharing based pricing is a socially justified, politically acceptable and a simple way of the bulk power pricing. The power systems in which existing tariff is postage stamp or zonal based, the average tracing based pricing is most suitable compared to

marginal pricing. The large difference in the locational value of the marginal pricing makes it prohibited and politically less acceptable.

Tracing of the active and reactive power flow in the transmission lines and loads is prerequisite in the actual use-of-system based tariff designing as mentioned above. A novel average participation based tracing algorithm is designed in this thesis which is applicable to active as well as reactive power tracing. Based on the active and reactive power tracing results the value of ARR is calculated.

Graph theory approach had been identified as the thrust area to develop some innovative concept in the field. Following contributions may be summarized as major contribution of the thesis:

- A novel matrix based algorithm for active and reactive power tracing has been developed.
- A new topological matrix termed as Path Factor Incidence Matrix is defined for development of the algorithm.
- The proposed algorithm is graph theory based.
- It does not require inversion of matrices for calculation.
- The developed algorithm has been tested for Model I (4-bus power system) and Model II (14-bus IEEE power system).
- It has been found that the proposed algorithm consumes much less time as compared to prototype method (Bailak"s method).
- Transmission line ARR is calculated using results of active and reactive power tracing.
- Similar to the Laplacian matrix, two new multiplication matrices were defined and named as INP_1 and INP_2. INP_1 is the matrix obtained by multiplication of the f-cut-set matrix and its transpose whereas INP_2 is the matrix obtained by multiplication of the f-tie-set matrix and its transpose.