Dr Sri Niwas Singh

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Prof S. N. Singh obtained his M. Tech. and Ph. D. in Electrical Engineering from Indian Institute of Technology Kanpur, in 1989 and 1995. Presently, he is **Vice-Chancellor**, Madan Mohan Malviya University of Technology Gorakhpur and leave from Professor (HAG), Department of Electrical Engineering, Indian Institute of Technology Kanpur, India. Before joining IIT Kanpur as Associate Professor, Dr Singh worked with UP State Electricity Board as Assistant Engineer from 1988 to 1996, with Rookree University (now IIT Rookree) as Assistant Professor from 1996 to 2000 and with Asian Institute of Technology, Bangkok, Thailand as Assistant Professor from 2001 to 2002. Dr Singh received several awards including Young Engineer Award 2000 of Indian National Academy of Engineering (INAE), Khosla Research Award of IIT Roorkee, and Young Engineer Award of CBIP New Delhi (India), 1996. Prof Singh is receipt of Humboldt Fellowship of Germany (2005, 2007) and Otto-monsted Fellowship of Denmark (2009-10). Prof Singh became first Asian to receive 2013 IEEE Educational Activity Board Meritorious Achievement Award in Continuing Education. He is also recipients of **INAE Outstanding Teacher Award 2016 and IEEE R10 region (Asia-Pacific) Outstanding Volunteer Award 2016**.

His research interests include power system restructuring, FACTS, power system optimization & control, security analysis, wind power, etc. Prof Singh has published more than 440 papers in International/national journals/conferences and supervised 29 PhD (11 PhD under progress). He has also written two books one on Electric Power Generation, Transmission and Distribution and second is Basic Electrical Engineering, published by PHI, India. Prof Singh has completed three dozen of projects in India and abroad.

Prof Singh was Chairman, IEEE UP Section for 2013 & 2014, and presently, he is IEEE Region 10 (Asia-Pacific) Conference and Technical Seminar Coordinator 2015-18. Prof Singh is also India Council Chairman-Elect 2017 of IEEE, the largest professional body in engineering.

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List of the lecture topics with the titles and short abstracts (max. 600 characters each) *

1. **Role of Forecasting in Power System Operation**

Abstract: Due to rapid industrialization and increased standard in the life style, the electric power requirement is increasing day-by-day. In the presence of renewable energy sources along with the volatile nature of demand and supply in electricity market environment, it has become a challenging task for the power utilities to perform proper scheduling of the generating units to serve the load demand at minimum operating cost.

Forecasts are carried for various lengths of forecast horizons based on the requirements. A short term forecast is useful in dealing with the operational problems like frequency and power balance, voltage and reactive power support, and power quality issues. On the other hand, a long term forecast is useful for planning and operational problems like, economic scheduling, unit commitment and spinning reserve allocation. Power System forecasting include load, price, RES output, ancillary services. Various forecasting models based on Adaptive Wavelet Neural Network (AWNN) for hourly prediction, as well as day-ahead power forecast will be discussed.

2. **Intelligent System Applications in Solving Engineering Problems**

Abstract: Due to increased complexity of the systems, cost reduction and detail modeling of the systems, the requirements of optimization have been increased. The conventional methods, which guarantee to provide the optimal solution, fail to solve many practical problems due to several requirements of these methods. Moreover, these optimizations are generally single path search and stuck with the local optima.

Intelligent based optimization methods such as genetic algorithm (GA), particle warm optimization (PSO), bacteria foraging, ant colony, neural networks, etc. are multi-path search and provide solution near to the global optima. They do not require derivatives of objective function and constraints. This presentation briefly covers some of the important techniques of optimization along with scope and future challenges.

3. **Smart Multi-Terminal DC μ-Grid Control and Operation**

Abstract: The microgrids can be classified as ac microgrid, and dc microgrid. The dc microgrid (DCMG) has several advantages over ac microgrid such as higher quality of power supply, higher reliability and uninterruptible supply, no reactive power, requirements and each small generators connected to the DCMG can be easily operated as only dc voltage is required to be controlled. However, if loads are of ac types and/or no DC source of supply, the dc to ac conversion system will incur loss

and efficiency may be poor. Therefore, the choice of ac or dc microgrid system is based in the requirements at distribution level.

4. Applications of Optimization Techniques in Power Systems

Abstract: The most familiar conventional optimization techniques fall in two categories viz. calculus based method and enumerative schemes. Though well developed, these techniques possess significant drawbacks. Calculus based optimization generally relies on continuity assumptions and existence of derivatives. Enumerative techniques rely on special convergence properties and auxiliary function evaluation.

Various optimization methods including conventional and non-conventional methods such as genetic algorithm (GA), particle warm optimization (PSO), bacteria foraging, ant colony, neural networks, etc. are will discussed along with application of these.

5. Challenges in Smart Grid Implementation

Abstract: Due to the increased interconnections and loading of the network with liberization and environmental pressure, the power systems have become complex and facing many challenges in their optimal, secure and efficient operation. Smart grid initiatives seem to provide remedial measured to these problems by computational intelligence, automation, advanced measurements, and application of information and communication technology (ICT). Several countries have already taken the first step in the direction of smart grid by unbundling the power system to bring competition with the introduction of renewable energy sources. Future power system structure, operation, control and management will be quite different from the existing one as it will foresee large market players with direct involvement of consumers, more renewable energy sources and trading of electricity.

Increased integration of new and renewable energy sources in the existing grid is one of the major concerns in the recent years which will have a significant influence on the operation and control of power systems. New grid codes are being set up by several countries to specify the relevant requirements to integrate these generations in the existing electric power system. The main objective of this talk is to discuss the key issue in the smart grid implementation. The talk provides a platform to an in-depth discussion on the various challenges and their possible remedies in smart grid initiatives which will benefit participants from academic and R&D institutions, engineers of utilities and policy makers.