

Curriculum Vitae of Prof. Dr. Janardan Nanda , B.E.E (Hons) , Ph.D , FNA , FNAE ,FTWAS , FIEEE .

1. **Name of the nominee:** Prof. Dr. JANARDAN NANDA
2. **Date of birth of the nominee:** August 15, 1937
3. **Contact address of the nominee:**
Department of Electrical Engineering
Indian Institute of Technology - Delhi
Hauz Khas, New Delhi 110016, India
Tel.: +91 (11) 2659-1043 (office), +91 (11) 2261-2383 (residence)
Mobile: +91 9899667249
Fax: +91 (11) 2658-1606
E-mail: janardannanda@yahoo.co.in
4. **Engineering discipline:** Electrical Engineering
5. **Field of specialization of the nominee:** Electrical Power System Engineering
6. **Education:**
Ph.D., Moscow Power Institute, Moscow, Russia (former U.S.S.R.), 1964
B.E.E.(Hons.), C.E.T. Bengal, Jadavpur University, Calcutta, India, 1958
7. **Professional history:**
1998-present: I.I.T. Delhi, NTPC Chair Professor/Emeritus
Professor/Emeritus Fellow/INSA Senior Scientist/INSA
Honorary Scientist
1979-1998: I.I.T. Delhi, Professor/ Head Electrical Engg. Department (1984 – 1987) / Dean of Under Graduate Studies (1987 – 1990) and Member, Board of Governors (1994 – 96) .
Professor , Auckland University , New Zealand (1991- 92)
Professor , Monash University / Melbourne University , Australia (1992 – 1993) , Member of Board of Governors of I.I.T Delhi (1994 – 1996)
1973-1979: I.I.T. Delhi , Professor
Professor , **West Virginia University , USA ,(1978 – 1979)**
1965 – 1973 I . I . T Delhi , Assistant Professor
Imperial College of Science and Technology , London , Visiting Fellow (i969 – 1970)

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8 Awards and Honours:

- **Felicitation by NTPC (National Thermal Power Corporation , the highest Generating body in the country) on National Engineers Day , 15th Sept.2011**
- **Distinguished Service Award** by I.I.T Delhi , 25th January , 2011
- **Academic Excellence Award** at 16th NPSC (National Power System Conference) , Osmania University , Hyderabad , 15 – 17 , Dec.2010
- **Jadavpur University Alumni Award “ PRABIN”**, 2009 , Calcutta .
- **Life Time Achievement Award** in System Engineering, 2009, International Conference in System Engineering, DEI (Deemed University), Dayalbagh, Agra
- **Prof. S. N. Mitra Memorial Award**, 2008, by the Indian National Academy of

Engineering

- **Life Time Achievement Award** in Power System Engineering, 2006, by National Power System Conference, I.I.T Roorkee
- **Syed Husain Zaheer Medal** in Engineering and Technology, 2004, by the Indian National Science Academy
- **P. C. Mahalanobis Award** in Engineering and Technology, 2002, by the Indian National Science Academy
- **System Society of India** Prize for **the best Technical Paper** in 1987 .
- **System Society of India** Prize for the **best Technical Paper** in 1988
- **System Society of India** Prize for **the best Technical Paper** in 1992
- **Pandit Madan Mohan Malviya Gold Medal** for 1977-78 and Best Technical Paper for 1978-79 of The Institution of Engineers (India)
- **Co – Chief Editor** , Int. Journal on Management Science and Engineering Management , Liverpool , England

9. Fellowships:

- Fellow, The Institute of Electrical and Electronics Engineers, Inc. (IEEE) , 2006
- Fellow, Indian National Science Academy (INSA) , 1987
- Fellow, Third World Academy of Sciences (Italy) , 2004
- Fellow, Indian National Academy of Engineering , 1988
- Fellow, The Institution of Engineers (India) , 1984

Significant Contributions to Science and Technology by Prof. J. Nanda

Prof. Nanda's significant contributions are in analysis, stability, control, and optimization of large scale electric power systems. He has innovated many powerful load flow algorithms which are widely referred by researchers and power utilities.

His contributions to selection of optimum gains for the Automatic Voltage Regulator for stability improvement of large alternators using D-Decomposition technique are original. He has also contributed significantly to the design of variable structure power system stabilizers with desired eigen values in the sliding mode and to adaptive power system stabilizers based on pole-shifting technique for improvement of system stability.

Prof. Nanda has innovated a powerful and more exact model for transmission loss formulation through a set of new A coefficients in place of inexact B coefficients used in practice. He has discovered a classical model based on coordination equations for optimum reactive power dispatch. This model has been successfully applied to the northern regional grid of India resulting in significant reduction in system transmission loss. He has made a maiden attempt to apply linear and nonlinear goal programming and Fletcher's quadratic programming techniques to solve economic emission load dispatch and optimal power flow problems.

Many of his works in the area of automatic generation control (AGC) for both thermal and hydrothermal systems qualify as pioneering. He has been the first to propose a continuous-discrete mode (system in continuous and controller in discrete mode) strategy for AGC of thermal and hydro-thermal systems. He has applied modern computational techniques (fuzzy logic, artificial neural networks, genetic algorithm etc) to power system studies and is the first to apply "Bacterial Foraging Technique" a more powerful technique than the GA for AGC of multi-area power systems.

Nominee's research interests in recent years focus to throw new insight to DESIGN OF GOVERNORS PRIMARY CONTROL LOOPS with much larger value of Speed Regulation Parameter 'R' (larger governor droop) than is used in practice so as to significantly reduce the cost of Governors and facilitate their easier realization without jeopardizing system dynamic response or in some cases even improving system performance. Further, using Soft Computing techniques the nominee wants to explore optimum values of Governor secondary controller parameters, Governor primary controller parameters and frequency bias parameters so as to achieve best dynamic response of the system. Sensitivity analysis is also carried out to explore the robustness of the optimized parameters to changes in system loading conditions to small step-load perturbations occurring at varying places in the system, and to changes in system parameters like inertia constants, reheat coefficient and reheat time constant etc.

The nominee is currently conducting research on AGC of IGCC Plants in isolated and with Thermal and Hydro plants, Smart Grid systems and Smart Micro Grid systems with renewable energy sources.

The nominee is a pioneer in India to introduce computer application in Power Systems and provide Indigenous and Maiden computer programs (Load Flow, Stability etc.) to Indian Power Utilities such as BHEL, NTPC etc during 1970s. He has trained many professional engineers from ABB (Ind.), NTPC, BHEL, CEA etc. in developing computer programs for system studies. Professor Nanda served as a consultant to ABB (Ind.), CEA, BHEL and NTPC. On behalf of the Government of India, he has served as the CHAIRMAN of several Technical Evaluation Committees for the procurement of 500 MW units for the Super-Thermal power stations in the country.

Prof. Nanda has around 260 research publications out of which around 100 are in international journals of repute. He has supervised 24 doctoral level and 150 master's level students.

He has served as visiting professor in U.S.A., Canada, U.K., Germany, France, Australia, Japan, New Zealand, Singapore, Hong Kong, South Korea, Mauritius, Tripoli, Algeria, and Papua New Guinea and has contributed richly in delivering a large number of state – of – art lectures and initiating collaborative research and laboratory set-ups .b

Prof. Nanda was appointed by Mrs. Indira Gandhi, the then Prime Minister of India as a Member of a 3 Man Enquiry Committee to enquire into the prolonged blackout in Delhi and other states in the northern region of India that occurred at 8.04 pm on July 19, 1984. He played a key role in going round several power stations / substations of the northern regional grid, discussing with field engineers and submitting a report in a stipulated one month period to the Government of India highlighting the cause of blackout and advising measures to mitigate such blackouts in future.

On behalf of the Government of India, Prof. Nanda has served as chairman of all Technical Evaluation Committees for the procurement of 500 MW units for the superthermal power stations in the country.

Prof. Nanda has trained a large number of practicing engineers in India for computer application in power systems engineering. He has been a Consultant to ABB, Siemens, and many Indian power industries and utilities. He has served as an Advisor for Energy System Planning in the subcontinent on behalf of the Government of India. He has been Assessor for national coordination of testing and calibration facilities, Department of Science and Technology (DST), Government of India, during 1986-1990. He has contributed significantly as an Advisor to Energy Auditing/Energy Conservation Programme of New Delhi Municipal Corporation, Government of Delhi. He has served as a Member of the All India Board of Undergraduate and Postgraduate Studies in Engineering and Technology of the All India Council for Technical Education (AICTE) and as a Member Of the National Board of Accreditation (NBA) and as Chairman, Engineering Accreditation Committee for UG / PG programs in the country. He has served as Chairman, Programme Advisory Committee, on electrical, electronics, and computer engineering on behalf of DST. He has served as a member of Engineering Sciences Research Committee of the Council of Scientific and Industrial Research, Government of India.

He is the only person in the area of electrical power system engineering in India who is a Fellow of the Indian National Science Academy, a Fellow of the Third World Academy of Sciences (Italy) and a Fellow of the Institute of Electrical and Electronic Engineers, Inc.(IEEE), USA. He has many national awards/medals to his credit and is considered to be among the top electrical power systems research engineers worldwide.

The following are Prof. Nanda's unique achievements:

1. He is the sole Electrical Power System Engineer in the country who is a Fellow of the Indian National Science Academy (FNA) [FNA in 1987]
2. He is the only Electrical Power Engineer in the country who is a Fellow of the Third World Academy of Sciences (FTWAS) [FTWAS in 2004].
3. He is the sole Electrical Power System Engineer in the country who is a Fellow of IEEE [FIEEE in 2006].
4. He is the first Electrical Power System Engineer in the country who became a Fellow of the Indian National Academy of Engineering (FNAE) in 1988.
5. He is a pioneer in initiating "Computer Application to Power Systems" in I.I.T.

- Delhi and in the country in 1966 .
6. He is a **pioneer** in training a large number of utility engineers in India for Computer Application to Power System Studies.
 7. Prof. Nanda's computer softwares for power system studies (load flow, fault analysis, stability studies, etc.) were the **first** to be used by the Indian utilities in 1970.
 8. Prof. Nanda's software for reactive power optimization was the very **first** used by Northern Regional Grid of India in 1985. It brought down significantly the transmission loss of the grid.
 9. Prof. Nanda has had consultancies with ABB, Siemens, BHEL, NTPC, Power Grid and many State Electricity Boards.
 10. He has successfully guided 24 Ph.D. students and 150 M.Tech. students in various aspects of power system studies and has a very large number of publications in international journals of repute like the IEEE Transactions and the IEE Proceedings.
 11. Prof. Nanda has served as a Visiting Professor in many countries such as USA, Canada, UK, France, Germany, Japan, Australia, New Zealand, South Korea, Hong Kong, Singapore, etc. He has delivered a larger number of state-of-the-art lectures in these countries and initiated collaborative research .
 12. Prof. Nanda has many National Awards to his credit because of his outstanding and pioneering contributions to power system studies.
 13. He received the PANDIT MADAN MOHAN MALAVIYA'S GOLD MEDAL from I.E. (India) in 1976.
 14. He is so far the **sole** electrical power engineer in the country who received the prestigious P. C. MAHALANOBIS MEDAL from the Indian National Science Academy (INSA) in 2002.
 15. He is so far the **only** electrical power engineer in the country who received the prestigious SYED HUSSEIN ZAHEER MEDAL from INSA in 2004.
 16. He is the **First** in the country to receive the Life Time Achievement Award in Power System Engineering in 2006 for his significant contributions in power system analysis, stability, control, and optimization at the 14th National Power Systems Conference held in December 2006 at I.I.T. Roorkee.
 17. Prof. Nanda is the **sole** electrical power engineer in the country to receive the Prof. S. N. Mitra Memorial Award of the Indian National Academy of Engineering in 2008.
 18. He is the **first** Power System Engineer in the country to receive Life Time Achievement Award in System Engineering in the International System Engineering Conference at DEI (Deemed University), Dayalbagh , AgraDayalbagh , Agra , Nov. 27 – 29 , 2009
 19. Prof.Nanda received the Jadavpur University Alumni Award “ PRABIN”, Kolkata , 2009
 20. Prof. Nanda received the “ Academic Excellence Award “ at 16th NPSC (National Power System Conference) held at Osmania University , Hyderabad , 15 – 17 Dec. 2010.
 21. Prof.Nanda was felicitated with the “ Distinguished Service Award “ by I.I.T Delhi during Golden Jubilee Celebration of IIT Delhi on 25th January 2011 .

Some Key Publications

1. **J. Nanda.** Analysis of steady state stability of a two machine system by the D-decomposition technique. **IEEE Transactions on Power Apparatus and Systems**, vol. 90, no. 4, pp. 1848-1855, July-August 1971.
2. **J. Nanda.** Optimization of voltage regulator gains by the D-decomposition technique for best steady state stability. **IEEE Transactions on Power Apparatus and Systems**, vol. 90, no. 6, pp. 2488-2494, November-December 1971.
3. **L. N. Paliwal, J. Nanda, and P. S. Satsangi.** State space modeling of a series

- compensated long-distance transmission system through graph theoretic approach. **IEEE Transactions on Power Apparatus and Systems**, vol. 97, no. 5, pp. 1646-1655, September-October 1978.
4. P. S. N. Rao, K. S. P. Rao, and J. Nanda. A novel hybrid load flow method. **IEEE Transactions on Power Apparatus and Systems**, vol. 100, no. 1, pp. 303-308, January 1981.
 5. J. Nanda and P. R. Bijwe. Optimal hydrothermal scheduling with cascaded plants using progressive optimality algorithm. **IEEE Transactions on Power Apparatus and Systems**, vol. 100, no. 4, pp. 2093-2099, April 1981.
 6. M. L. Kothari, P. S. Satsangi, and J. Nanda. Sampled-data automatic generation control of interconnected reheat thermal system considering generation rate constraint. **IEEE Transactions on Power Apparatus and Systems**, vol. 100, no. 5, pp. 2334-2342, May 1981.
 7. P. S. N. Rao, K. S. P. Rao, and J. Nanda. An exact fast load flow method including second order terms in rectangular coordinates. **IEEE Transactions on Power Apparatus and Systems**, vol. 101, no. 9, pp. 3261-3268, September 1982.
 8. J. Nanda, D. P. Kothari, and S. C. Srivastava. Some important observations of fast decoupled load flow algorithm. **Proceedings of the IEE**, vol. 75, no. 5, pp. 732-733, May 1987.
 9. J. Nanda, D. P. Kothari, and K. S. Lingamurthy. Economic-emission load dispatch through goal programming techniques. **IEEE Transactions on Energy Conversion**, vol. 3, no. 1, pp. 26-32, March 1988.
 10. M. L. Kothari, J. Nanda, D. P. Kothari, and D. Das. Discrete-mode automatic generation control of a two-area reheat thermal system with new area control error. **IEEE Transactions on Power Systems**, vol. 4, no. 2, pp. 730-738, May 1989.
 11. J. Nanda, L. Hari, M. L. Kothari, and J. Henry. Extremely fast economic load dispatch algorithm through modified coordination equations. **Proc. IEE, Part-C**, vol. 139, pp. 39-46, January 1992.
 12. J. Nanda, L. Hari, and M. L. Kothari. Challenging algorithm for optimal reactive power dispatch through classical coordination equations. **Proc. IEE, Part-C**, vol. 139, pp. 93-101, March 1992.
 13. M. L. Kothari, J. Nanda, and K. Bhattacharya. Design of variable structure power system stabilizers with desired eigenvalues in the sliding mode. **Proc. IEE, Part-C**, vol. 140, no. 4, pp. 263-268, July 1993.
 14. M. L. Kothari, J. Nanda, and K. Bhattacharya. Discrete-mode power system stabilizers. **Proc. IEE**, vol. 140, no. 6, pp. 523-531, November 1993.
 15. J. Nanda, L. Hari, and M. L. Kothari. Economic emission load dispatch considering line flow constraints through a classical technique. **Proc. IEE, Part-C**, vol. 141, no. 1, pp. 1-10, January 1994.
 16. M. L. Kothari, K. Bhattacharya, and J. Nanda. Adaptive power system stabilizer based on pole-shifting technique. **Proc. IEE, Part-C**, vol. 143, no. 1, January 1996.
 17. J. Nanda, L. L. Lai, A. Nanda, and M. Prasad. A novel approach to computationally efficient algorithms for transmission loss and line flow constraints. **Int. Journal of Electrical Power and Energy Systems**, vol. 21, pp. 555-560, 1999.
 18. J. Nanda and R. Badrinarayanan. Application of genetic algorithm to economic load dispatch with line flow constraints. **International Journal of Electrical Power and Energy Systems**, vol. 24, pp. 723-729, 2002.
 19. J. Nanda, A. Mangla, and S. Suri. Some new findings on automatic generation control of an interconnected hydrothermal system with conventional controllers. **IEEE Transactions on Energy Conversion**, vol. 21, no. 1, pp. 187-194, March 2006.
 20. S. Mishra, M. Tripathy, and J. Nanda. Multi-machine power system stabilizer design by rule based bacteria foraging. **Int. Journal on Electrical Power System Research**, vol. 77, no. 12, pp. 1595-1607, October 2007.
 21. J. Nanda, S. Mishra, and L. C. Saikia. Maiden application of bacterial foraging based optimization technique in multi-area automatic generation control. **IEEE Transactions on Power Systems**, Vol. 24, No. 2, May 2009

22. Lalit Chandra Saikia , J. Nanda , S. Mishra Performance comparison of several classical controllers in AGC for multi – area interconnected thermal system , **International Journal on Electrical Power and Energy Systems , Vol 33, issue 3 , March 2011 .**
23. Lalit Chandra Saikia , Dr.Nidul Sinha , Prof. J. Nanda , Dr.Sukumar Mishra Automatic Generation Control of a multi-area hydro-thermal system using Reinforced learning Neural Network Controller , **Int.Journal on Electrical Power and Energy Systems , Vol. 33 ,issue 4 , May 2011 .**

(B) Other Significant Positions Held

- Vice-President, Indian National Science Academy (INSA), January 2000 – Dec.2001
- Treasurer , and Council Member of INSA , Jan.1999 – Dec.1999

- Member, Governing Council, Indian National Academy of Engineering, since 1995
- Advisor, Central Electricity Authority, Ministry of Energy, Government of India
- Chairman , Programme Advisory Committee for Electrical , Electronic and Computer Engineering , Department of Science and Technology, Government of India (2001 - 2004)
- Advisor, Department of Electronics, Government of India (1980 – 84)
- Advisor, R and D Subcommittee for Energy Planning in the Subcontinent, Planning Commission, Government of India
- Government of India Advisor to University of Mauritius and Government of Mauritius for Energy System Planning (June-August 1980)
- Member R and D Group of National Council of Power Utilities (NCPU), July 1983-July 1988
- Member, Governing Council, Central Power Research Institute, Bangalore
- Member, Board of Governors, I.I.T. Delhi, August 1994-December 1996
- Member, Board of Governors, Netaji Subhash Institute of Technology, Delhi, since (1996 – 1999)
- Member, Board of Governors, Indira Gandhi Institute of Development Research, Mumbai
- Member of the Syndicate of University of Roorkee for a period of 3 years w.e.f. September 1999
- Member, All India Board of Under Graduate Studies in Engineering and Technology, AICTE (2001 – 2007)
- Member, All India Board of Post Graduate Studies in Engineering and Technology, AICTE (2001 – 2007)
- Member, Advisory Committee, Indira Gandhi Institute of Developmental Research (IGIDR), Mumbai, since 1999
- Chairman, Selection Committees for RAC, DRDO (Many years)
- Member, UPSC Selection Committees for selection of Electrical Engineers for Government engineering colleges and other organizations (Several times)
- Member, Engineering Science Research Committee of Council of Scientific and Industrial Research (CSIR), May 2001-March 2004
- Member, Committee of Ministry of Statistics and Programme Implementation, Govt. of India (2003 – 2006)

- Academic Advisor to Galgotia College of Engineering and Technology , Greater Noida ; Skyline Institute of Technology , Greater Noida ; JSS Institute of Technology , Noida ; Ideal Institute of Technology , Gaziabad ; Silicon Institute of Technology , Bhubaneswar ; Narayan Mohan Institute of Engineering and Technology , Bhubaneswar ; Ajay – Binoy Institute of Technology , Cuttack and DRIEMS , Cuttack .
- Chairman of Technical Evaluation Committees for the procurement of 500 MW units for all the Super Thermal Power Stations in the country
- Member, National Board of Accreditation (NBA) , 2008 - 2009
- Chairman, Engineering Accreditation Committee for UG/PG programmes in engineering in the country , 2008 – 2009 .
- Chairman , Standing Committee of the Academic Council of Delhi Technological University for examining course curriculum for various programs.(w.e.f 2010)
- Member, Advisory Committee for Electrical Sciences , NIT , Rourkela.(w.e.f 2009)
- Member, Advisory Committee for Electrical Sciences , IIT Bhubaneswar (w.e.f 2009)
- Member, Advisory Committee for examining course curricula in Electrical and Electrical and Electronic Engineering programs for Biju Patnaik University of Technology (w.e.f 2010)