Global Initiative of Academic Networks (GIAN) Course on Synchronized Phasor Measurements for Enhancing Situation Awareness in Smart Grid

October 9-13, 2017

Course Overview [*Course Code: 175024D01*]

The modern electrical power system has found its niche as an unequivocal engineering marvel, being the single largest and most complex machinery, as proclaimed by American academy of engineering. As a consequence, there have been urgent needs for commensurate measures to monitor, operate and control power system over a wide geographical area, incorporating renewable energy sources. Wide-area measurement system (WAMS) is a powerful tool for monitoring the Smart Grid by the efficient use of Information and Communication Technology (ICT). Phasor Measurement Units (PMUs) are key components of a WAMS, providing precise, real-time grid measurements that are time-stamped according to a common time reference. The "synchronized phasors" from several PMUs, distributed across the network, are then communicated to a centralized unit that evaluates the dynamic operating state of network which is the edifice of situation awareness. Situation awareness (SA) is defined as the perception of key components of power system, the comprehension of meaning of the perceived data in relation to operators' goals and objectives, and the projection of the future behaviour of system components based on their current state as well as the perceived information. Power grid operators and planners with a high level of SA will be able to develop a set of strategies and responses to events, which contributes to the prevention of undesirable situations such as blackouts. Thus, PMUs play a vital role for enhancing power grid situation awareness.

Course participants will be exposed to the state-of-the-art topics through lectures and tutorial sessions that will not only reinforce their conceptual comprehension, but also augment the ability for pragmatic applications.

Modules	**LEC-1**	**Evolution of Synchronized Phasor Measurements (SPM) for Smart Grid**	Oct-9
	LEC-2	**PMU based wide area monitoring and information sharing between Micro-Grids**	Oct-9
	LEC-3	**State estimation using SPM in smart grid**	Oct-10
	TUT-1	**Implementation of state estimation algorithms**	Oct-10
	LEC-4	**Data analytics framework for power grid control and dynamic stability monitoring**	Oct-11
	TUT-2	**Implementation of data analytics framework**	Oct-11
	LEC-5	**Wide area Situational Awareness (SA) using SPM**	Oct-12
	TUT-3	**Implementation of recursive and non-recursive algorithms for synchrophasor measurements**	Oct-12 Oct-13
	LEC-6	**Synchrophasor Initiatives in India**	Oct-13
	TUT-4	**Event detection and classification using synchrophasor data**	

You Should Attend If…

- You are an executive, engineer and researcher from power grid, service and government organizations including R&D laboratories.
- You are a Student of B.Tech/B.E., M.Tech./M.E. , Ph.D .and faculty from reputed academic institutions and technical institutions.

Fees

The participation fees for taking the course is as follows:

Participants from abroad	Industry/ Research Organizations	Academic Institutions	Research Scholar/ Student
US $500+18%GST	**Rs. 15,000/- + 18%GST**	**Rs. 10,000/- + 18%GST**	**Rs.5000/- + 18%GST**

The above fees include all instructional materials, computer use for tutorials and assignments and laboratory equipment usage charges. The participants will be provided with accommodation in Guest house & Hostel (Research scholar/student).

Course Registration

a. In GIAN portal

Stage-1: Web Portal Registration: Please visit http://www.gian.iitkgp.ac.in/GREGN/index and create login User ID and Password. Fill up the blank registration form and do web registration by paying Rs. 500/- online through Net Banking / Debit / Credit card. This provides the user with life time registration to enrol in any number of GIAN courses offered.

Stage-2: Course Registration: Login to the GIAN portal with the user ID and Password already created in Stage- 1. Click on Course Registration option at the top of Registration Form. Select the Course titled "Synchronized Phasor Measurement for Enhancing Situation Awareness in Smart Grid" from the list and click on Save option. Confirm your registration by clicking on 'Confirm Course'.

b. The selected participants will have to send Institute's registration form, duly filled along with course fee details to the Course Coordinator. (E-mail: gianbitee@gmail.com)

Important dates	Last date for registration in GIAN portal	**20th September, 2017**
	Last date for intimation to selected participants	**21st September, 2017**
	Last date for course registration for selected participants(by email)	**26th September, 2017**

The Faculty

Dr. Innocent Kamwa received a PhD in electrical engineering from Laval University, Québec, Canada, 1988, after graduating in 1984 at the same university. Since then, he has been with the Hydro-Québec Research Institute, where he is Chief Scientist for Smart Grid and Chief of Power Systems and Mathematics with a technical staff of 51 scientists, most of whom hold a PhD or Master degree in Electrical Engineering.

Dr.Kamwa is a registered P. Eng. in Québec and an Adjunct Associate Professor of Power Systems Engineering at McGill University in Montréal and Laval University in Quebec city, where he has mentored more than 30 graduate students since 1991. The 2005 IEEE Fellow for "Contributions to the identification of synchronous generator models and innovations in power grid control", is co-Editor in Chief of IET Proceedings on Generation, Transmission, Distribution, Editor of IEEE Trans. on Power Systems and IEEE Power Systems Letters.

Dr. Kamwa has authored or co-authored over 189 publications shown on Researchgate.net, including 105 peer reviewed journal papers, with an RG score of 36.07 higher than 95% of all members. IEEE explorer lists 75 Journal and 60 conference papers. He was awarded the best Transactions paper prize of the IEEE/PES in 1998, 2003, 2009 and 2012 and the outstanding IEEE/PES standard prize in 1998, 2006 and 2011. A member of the "NERC task force on Smart grid," he was also recognized as a worldwide leader in Power Grid Control by the MIT Technology review in February 2004. According to a 2011 analysis by the Council of Canadian Academies, Dr. Kamwa is "an author of one of the top 1% most highly cited papers in his field worldwide". He is a member of the Canadian Academy of Engineering. He is the Chair of Power & Energy Society (PES) Stability subcommittee and Treasurer/Standard Coordinator of its Electric Machinery Committee. He is also a recipient of the IEEE PES 2013 Distinguished Service Award.

Prof. Dusmanta Kumar Mohanta received the Ph.D. Eng. degree from Jadavpur University, Kolkata, India. He was an Electrical Engineer with the Captive Power Plant, National Aluminium Company (NALCO), Angul, India from 1991-1998. He is currently a Professor with the Department of Electrical and Electronics Engineering, BIT, Mesra, Ranchi. He has more than 19 years of teaching experience in addition to his industrial experience of 8 years. He has been a Senior Member of IEEE(USA), Member of IEEE PES RRPA subcommittee , Life Member of ISTE and a Fellow of Institutions of Engineers(India).He is an Editor of Power Components & Sysstems (Taylor & Francis Publications) and Associate Editor of IET Proceedings on Generation, Transmission and Distribution.

Dr. Mohanta has authored or co-authored over 150 publications, including 65 peer reviewed journal papers. He has 2 patents to his credit.

Number of participants for the course will be limited to fifty.

Duration of Lectures and Tutorials : 2 hours each.

The course inauguration and desk registration will take place on Oct 09, 2017

Evaluation Examination will be on October 13, 2017.

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Course Co-ordinators

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Prof. Rakesh Chandra Jha received the B.Sc. Eng. (Electrical) degree from the BIT Sindri, India; the M.E. degree from Birla Institute of Technology (BIT), Mesra, Ranchi, India; and the Ph.D. Eng. degree from Birla Institute of Technology, Mesra, Ranchi. He is currently a Professor with the Department of Electrical and Electronics Engineering, BIT, Mesra. He has more than 30 years of teaching experience. He has been a Member of IEEE(USA), Life Member of ISTE and a Fellow of Institutions of Engineers(India).