Emerging Cutting-Edge Technologies in Advanced Electrical Machines and Drives: Design & Performance Issues, Fault Diagnosis, Failure Prognosis and Mitigation

Overview of the course:

Electric motor drives have changed the whole scenario at domestic and industrial fronts. Wastage of electric power is of great concern, as the available energy sources are not able to meet the emerging demands. Consequently, increasing the requirements of high performance and energy efficient electric motor drives. Variable speed motor drives and power electronics find application in almost all spheres of life and these have found wide acceptance worldwide. This is happening at a time when the energy crisis is becoming an impending reality and environmental related issues are a major concern. It is, therefore, illusory to think that these challenges can be faced by incremental work in product development along with fundamental research. A need therefore exists to review the past, analyse the root cause of present situation and address the emerging challenges.

The subject course would investigate emerging cutting-edge technologies in advanced electrical ma-chines and drives, their design and performance issues, fault diagnosis, failure prognosis and mitigation. Study the fundamental developments that have come about due to market pressure and demands. Explore the areas that can provide the keys to research and development for the newer generation of engineers and academicians.

Internationally acclaimed academician, researcher and practitioner with proven knowledge, experience, and demonstrable ability in teaching, consultancy, research, and training in the field of Electric Machines and Drives will deliver lectures and discuss cases in the course.

Modules	**This course consists of one module only.** **6th November, 2017 to 10th November, 2017.**
You Should Attend If You are	▪ Students of B.Tech, M.Tech, Ph.D. research scholars and faculty members of academic institutions and technical institutions. ▪ Executives, engineers and researchers from utilities, services and government organizations, including R&D laboratories.
Registration Fees	The participation fees for attending the course is as follows: **Overseas Participants: US$ 200** **Industry/ Research Organizations: Rs. 5000** **Participants from Academic Institutions: Rs. 2000 (Rs. 1000 for SC/ST participants)** **Research Scholars/Students/Alumni: Rs. 1000 (Rs. 500 for SC/ST participants)** After registration on GIAN portal http://www.gian.iitkgp.ac.in/GREGN/index, the candidates are advised to submit the prescribed fee in the form of DD in favor of **"Registrar, DTU"** payable at Delhi along with printout of online submitted application form to **Dr. Mini Sreejeth, Course Coordinator (GIAN), Department of Electrical Engineering, Delhi Technological University, Bawana Road, Delhi-110042** on or before **29.10.2017**. The shortlisted participants will be informed through e-mail. The above fee includes all instructional materials, computer use for tutorials and assignments and laboratory equipment usage charges. **The course fee does not include boarding and lodging. The paid hostel/guest house accommodation may be provided on first come first serve basis with prior request.**

Teaching Faculty

Prof. Elias G. Strangas (M'80) received the Dipl.Eng. degree in electrical engineering from the National Technical University of Greece, Athens, Greece, in 1975, Master of Science in 1977 and the Ph.D. degree in 1980 from the University of Pittsburgh, Pittsburgh, PA. He was with Schneider Electric, Athens, from 1981 to 1983 and the University of Missouri, Rolla, from 1983 to 1986. Presently He is Professor at **Department of Electrical and Computer Engineering, Michigan State University**, East Lansing since 1986 where he heads the Machines and Drives Laboratory. His research interests include the design and control of electrical machines and drives, finite-element methods for electromagnetics, and the fault prognosis and mitigation of electrical drive systems, drive system reliability; electric and hybrid power train analysis. He has published more than 120 refereed papers in prestigious journals and conferences and has published six books/ reports. He also holds 2 issued patents. In 2015, he received the pristigious Fulbright Fellowship, Technical University Graz, Austria, and IEEE Diagnostics Achievement Award.

Host Faculty

Prof. Madhusudan is Head of Electrical Engineering Department and Dean Academic (UG) at Delhi Technological University Delhi India. He received his B.Sc.(Engg.) Degree in Electrical Engineering, M.E. degree and Ph.D Degree from Faculty of Technology, Dayalbagh Educational Institute, Agra, India, University of Allahabad, Allahabad, India and University of Delhi, Delhi, India respectively. He teaches power electronics and electrical machines at DTU. His research interests are in the area of modelling and analysis of electrical machines, voltage control aspects of self-excited induction generators, power electronics and drives. Prof. Singh is a Fellow of the Institution of Engineers (IE), India and of the Institution of Electronics and Telecommunication Engineers, New Delhi, India. He is also a member of the IEEE, USA.

Dr. Mini Sreejeth received her B. Tech, M. Tech and Ph.D degrees from Mahatma Gandhi University, Calicut University and Delhi University respectively. She joined Delhi Technological University (DTU) as Senior Lecturer in 2007. Presently she is an Associate Professor in the Electrical Engineering Department, DTU. Her research interests are in the area of modelling, control and operation of electric drives. Dr. Sreejeth is a life member of Indian Society for Technical Education, New Delhi, India. She is also a member of the IEEE USA.

Course Coordinator(s)

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For Registration:
http://www.gian.iitkgp.ac.in/GREGN/index

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Course Schedule (6th November, 2017 to 10th November, 2017)

6th November, 2017
Registration: 9:30 AM to 10:30 AM
Inauguration: 10:30 AM to 12:00 PM

Date	Day	Time	Type of Class	Topic
6th November, 2017	Monday	12:00 PM – 1.30 PM	Lecture-1	Analysis and design of electrical machines and drives, power electronics and electromechanical systems.
		3.00 PM – 4.30 PM	Lecture-2	Overload considerations for design and operation.
7th November, 2017	Tuesday	10:00 AM – 11:00 AM	Lecture-3	Motor parameter variations as a function of frequency and saturation.
		11:30 AM – 12:30 PM	Lecture-4	Iron and magnet losses and torque calculation using magnetic equivalent circuit.
		02.30 PM – 04:30 PM	Tutorial 1	Problem solving session on design of electric drives, magnetic losses and torque calculations.
8th November, 2017	Wednesday	9:30 AM – 11:00 AM	Lecture-5	Drives for electric and hybrid vehicles, thermal analysis of permanent magnet motor for electric vehicle applications.
		11:30 AM – 01:00 PM	Lecture-6	Evaluation of parameter identification method for permanent magnet ac machines.
		2.30 PM – 4.30 PM	Laboratory 1	Hands on experience on different simulation techniques used for parameter identification.
9th November, 2017	Thursday	09:30 AM – 11:00 AM	Lecture-7	Review of diagnostic techniques and trends in fault diagnosis for electrical machines.
		11:30 AM – 01:00 PM	Lecture-8	Effect of failure prognosis and mitigation on the reliability of motor drives.
		02:30 PM – 04:30 PM	Tutorial-2	Problem solving session on different diagnostic techniques.
10th November, 2017	Friday	10:00 AM – 11:00 AM	Lecture-9	Research directions in the analysis of productive life of inverter-based drive.
		11:30 AM – 12:30 PM	Lecture-10	New trend in the design of power electronics interfaces and electromechanical systems for applications in hybrid vehicles for meeting sustainable energy requirements.
		12.30 PM – 1.30 PM	EXAMINATION	
		2.30 PM – 4.30 PM	DISCUSSIONS AND VALEDICTORY FUNCTION	