

**Short Course Sponsored by GIAN MHRD, GOI**  
**on**

**Vibration Problems in Rotating Machines: Diagnosis and Rectification**

(171030L02), February 18 – March 1, 2019

**Overview**

Rotating machineries find a wide variety of applications in industries such as turbine generator systems in power plant, nuclear sector, marine, aerospace and many more. These rotating machineries often come across different kind of faults like unbalance, misalignment, crack, rotor bow, bearing fault, gear fault etc. The course will give the participants an understanding of the ways in which measured data can be interpreted to gain an insight into a machine's operation and to diagnose incipient faults. This will be achieved by studying the effects of a range of machine faults, the means of acquiring and presenting plant data and advanced techniques of data analysis.

<b>Modules</b>	<b>Day 1 Monday 18<sup>th</sup> Feb 2019</b>	<b>Lecture 1:</b> 10:00AM to 11:00 AM: AL: Introduction <b>Lecture 2:</b> 11:15AM to 12:15 PM: AL: Machine Classifications <b>Tutorial 1:</b> 2:00 PM to 3:30 PM: AL: Simple modelling using MATLAB
	<b>Day 2 Tuesday 19<sup>th</sup> Feb. 2019</b>	<b>Lecture 3:</b> 10:00AM to 11:00 AM: AL: The Presentation of Data <b>Lecture 4:</b> 11:15AM to 12:15 PM: AL: Understanding the Data Assignment-I <b>Tutorial 2:</b> 2:00 PM to 3:30 PM: AL: Series of problems taken from chapter 2 of the book.
	<b>Day 3 Wednesday 20<sup>th</sup> Feb. 2019</b>	<b>Lecture 5:</b> 10:00AM to 11:00 AM: AL: Modelling <b>Lecture 6:</b> 11:15AM to 12:15 PM: AL: Analysis <b>Tutorial 3:</b> 2:00 PM to 3:30 PM: AL: Problems from chapter 3 of the book along with model solutions
	<b>Day 4 Thursday 21<sup>st</sup> Feb. 2019</b>	<b>Lecture 7:</b> 10:00AM to 11:00 AM: AL: Faults in Machine 1 <b>Lecture 8:</b> 11:15AM to 12:15 PM: AL: Balancing <b>Tutorial 4:</b> 2:00 PM to 3:30 PM: AL: Problems on Balancing from book Chapter 4
	<b>Day 5 Friday 22<sup>nd</sup> Feb. 2019</b>	<b>Lecture 9:</b> 10:00AM to 11:00 AM: AL: Rotor misalignment <b>Lecture 10:</b> 11:15AM to 12:15 PM: AL: Cracked Rotors <b>Tutorial 5:</b> 2:00 PM to 3:30 PM: AL: Sample problems with model solutions
	<b>Day 6 Monday 25<sup>th</sup> Feb. 2019</b>	<b>Lecture 11:</b> 10:00AM to 11:00 AM: AL: Interaction through Bearings <b>Lecture 12:</b> 11:15AM to 12:15 PM: AL: Other Forms of Excitation <b>Tutorial 6:</b> 2:00 PM to 3:30 PM: AL: Sample problems with model solutions
	<b>Day 7 Tuesday 26<sup>th</sup> Feb. 2019</b>	<b>Lecture 13:</b> 10:00AM to 11:00 AM: AL: Comparing models with data <b>Lecture 14:</b> 11:15AM to 12:15 PM: AL: Least Squares with Physical Parameters <b>Tutorial 7:</b> 2:00 PM to 3:30 PM: AL: Sample exercise in data manipulation. Assignment-II Problem will be set on the rundown of a turbine.
	<b>Day 8 Wednesday 27<sup>th</sup> Feb. 2019</b>	<b>Lecture 15:</b> 10:00AM to 11:00 AM: AL: Further Analysis Methods <b>Lecture 16:</b> 11:15AM to 12:15 PM: AL: The Singular Value Decomposition <b>Tutorial 8:</b> 2:00 PM to 3:30 PM: AL: Sample problems with model solutions and comparative studies from chapter 8.
	<b>Day 9 Thursday 28<sup>th</sup> Feb. 2019</b>	<b>Lecture 17:</b> 10:00AM to 11:00 AM: AL: Case Studies <b>Lecture 18:</b> 11:15AM to 12:15 PM: AL: The future <b>Tutorial 9:</b> 2:00 PM to 3:30 PM: AL: Sample problems with model solutions and discussion.
	<b>Day 10 Friday 1<sup>st</sup> March 2019</b>	<b>Lecture 19:</b> 10:00AM to 11:00 AM: AL: Review of course material and discussion. <b>Examination :</b> 1.30 PM to 3.30 PM

<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>➤ Students at all levels (BTech/BE/MSc/MTech/ME/PhD) or Faculty from academic and research institutes.</li> <li>➤ Professionals, Executives, Engineers and Researchers from industries like HAL, NAL, and automobile &amp; turbine industries, power plants etc.</li> </ul>
<b>Fees</b>	<p>The participation fees for taking the course is as follows:  <b>Participants from industry/research organizations: ₹ 7500 /-</b>  <b>Participants from academic institutions: ₹ 5000 /-</b>  <b>For students: ₹ 2000 /-</b>  <b>Participants from abroad : US \$500</b></p> <p>The above fees include all instructional materials, laboratory equipment usage charges. The individual course participants will have to borne the charges for their food, transport and accommodation separately. Limited participants will be provided with sharing accommodation in the institute guest house and hostel on payment basis.</p> <p><b>Registration:</b>  Interested participants will have to first register with the GIAN website <a href="http://www.gian.iitkgp.ac.in">http://www.gian.iitkgp.ac.in</a> for a one-time non-refundable registration fee of Rs. 500 which will enable them to enroll for any number of courses being offered. Subsequent registration will have to be done with the host institution by paying the requisite fees.</p> <p><b>Mode of Payment:</b>  <b>DD</b> for registration fee in favor of the <b>Continuing Education, NIT Rourkela</b>, payable through any Nationalized Bank at Rourkela. <i>DD should reach to Dr. Mohit Lal at the address give below.</i></p>

## The Faculty



**Prof. Arthur W Lees (B.Sc., Ph.D., D.Sc., C.Eng., C.Phys., F.I.Mech.E., F.Inst.P., L.R.P.S.):**

Professor Lees graduated in Physics and remained Manchester University for three years research. After completing his PhD , he joined the Central Electricity Generating Board, initially developing Finite Element codes then later resolving plant problems. During his time in industry, Professor Lees was author of over 100 internal reports, mainly relating to plant problems, making recommendations on maintenance and operations. As a result of his research, Professor Lees has published over 130 journal and conference papers and two textbooks. He is a regular reviewer of many technical journals and was, until his recent retirement, on the editorial boards of the Journal of Sound & Vibration.



**Dr. Mohit Lal** is an Assistant Professor in the Department of Industrial Design, National Institute of Technology Rourkela, Odisha, India. He received his Ph.D. degree in Mechanical Engineering with specialization in Machine Design from the Indian Institute of Technology Gwahati, India, in 2013. His current research

interests include Condition monitoring of rotating machinery, characteristics parameters estimation of rotor AMB systems, Human vibration in Product Design etc.



**Dr. Mohammed Rajik Khan** is an Assistant Professor in the Department of Industrial Design, National Institute of Technology Rourkela Odisha, India.

## Course Coordinator

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