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28th to 30th August 2017

Training CALENDAR 2017

C-026

MINISTRY OF EXTERNAL AFFAIRS, GOVT. OF INDIA

TCS OF COLOMBO PLAN GOVT. OF INDIA

एफ.सी.आर.आई.

FCRI

FLUID CONTROL RESEARCH INSTITUTE

(Under Ministry of Heavy Industries & Public Enterprises, Govt. of India)

An ISO 9001-2008 Certified, NABL accredited Organisation

Kanjikode West, Palakkad – 678 623, Kerala, India

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From the Director

FCRI, a state of the art Flow and Fluids Engineering Facility, established in 1989 with techno-commercial inputs from UNDP/UNIDO and transfer of expertise and skills from globally reputed facilities in Flow Measurement and Control have grown to be one of the best Research and Calibration / Test facilities around the world.

In today's highly competitive and dynamic business scenario, it is our constant endeavour to keep pace with increasing accuracy regimes for our reference systems and capabilities in all spheres of our activities. The Test, Research and Calibration facilities are continually upgraded, updated and expanded to ensure they are among the best in the world. Regular Inter-comparison exercises, International Certifications and validations, stringent Quality Audits, skilled and trained manpower and overall professionalism have contributed to our high levels of reputation and credibility.

We believe in the philosophy of giving back to industry our expertise and solutions. Our reputed and much sought after Technical Training programs, both standards and customized training solutions are specifically designed to develop, enhance and equip the industry with the latest principles, technologies and applications in Instrumentation, Flow Measurement and Control, calibration management practices, Custody Transfer and Legal Metrology requirements of the industry and regularly conducted for Corporate Viz. ONGC, GAIL, IPCL, MRPL, Weights & Measures Dept., Water Authorities, Reliance , Food Safety dept, Kerala etc., are immensely popular.

FCRI has also been conducting international Training Programs under ITEC/SCAAP/PCS of Colombo Scheme sponsored by Ministry of External affairs , Govt. of India and also under self-financing scheme. About 83 such training programs have been conducted so far and above 1000 foreign nationals from more than 90 countries have benefited from these programs. The training programs provide a platform for eye-to eye interaction between FCRI engineers and engineers from the industry/field. This facilitates a direct knowledge transfer and also helps in understanding the field problems better.

Dr. Jacob Chandapillai
Director

Training Programmes for the Year 2017

TRAINING PROGRAMMES FOR EXECUTIVES

Sl. No.	Series	Programme	Duration	Date	Fee per participant (Including Service Tax @ 15%) (Non Residential)
1	174	Advanced Flow Measurement & Instrumentation – Principles & Practice	3 days	8th to 10th February 2017	Rs. 17,750 * US $ 1,064**
2	175	Liquid Hydrocarbon Flow Measurement and Custody Transfer	3 days	5th to 7th April 2017	Rs. 17,750 * US $ 1,064**
3	176	Water Transmission & distribution Engineering	2 days	8th to 9th June 2017	Rs. 12,679* US $ 766**
4	177	On the Job Training for Field Engineers on Flowmeters & Calibration Techniques	5 days	10th to 14th July 2017	Rs. 29,162* US $ 1,736**
5	178	Basics of Computational Fluid Dynamics	2 days	27th to 28th July 2017	Rs. 12,388* US $ 749**
6	179	Gas Flow Measurement/Natural Gas Custody Transfer as per AGA Standards	3 days	11th to 13th October 2017	Rs. 17,750 * US $ 1,064**
7	180	Metrology, Pressure, Thermal & Electro Technical Measurements and Calibration	3 days	15th to 17th November 2017	Rs. 17,750 * US $ 1,064**
8	181	Control Valves & Actuators	3 days	6th to 8th December 2017	Rs. 17,750 * US $ 1,064**

* Special 10% discount for nominating 5 or more participants. * For Indians working in India ** For those working in abroad
Changes in Service Tax at the time of Registration will be applicable for all the courses

Post Graduate Certificate Programme for Practicing / Fresh Engineers

Sl.No.	Series	Programme	Duration	Date	Fee per participant
1	20	Liquid & Gas /Air Flow Measurement & Control Techniques and Standards	3 months	21st August 2017 to 20th November 2017	Rs. 63,457/- including Service Tax @ 15% (For Indian Participants) Non Residential
2	21	Fluid Flow, Instrumentation Engineering and DAS in Process Industries	3 months	10th January 2018 to 9th April 2018	Rs. 63,457/- including Service Tax @ 15% (For Indian Participants) Non Residential

FCRI's Customized Training Programmes for various Corporates:

Sl.No.	Courses	Course Title	Course Duration
1	M/s GAIL, Jaipur	"Measuring Instruments & Calibration for GAIL Engineers	5 Days
2	Ministry Consumer Affairs, Legal Metrology, New Delhi	"Fuel Dispensers for DIESEL /PETROL/CNG/ LPG" for Legal Metrology Officials	5 Days
3	M/s GAIL Nodia	" Flow Metering in Gas Business" for GAIL Engineers	4 Days
4	M/s ONGC , Vadodara	"Oil & Gas Flow Measurement & CTMS" for ONGC Engineers	5 Days
5	M/s ONGC, Dehradun	"Hydrocarbon Flow Measurement (Liquid & Gas) and Custody Transfer as per API/AGA Standards; for ONGC Engineers	6 Days
6	M/s Reliance Industries Ltd., Navi Mumbai	"Liquid Hydrocarbon Flow Measurement and Custody Transfer as per AGA Standards: for Reliance Engineers	3 Days
7	M/s Reliance Gas Transportation Infrastructure Ltd., (RGTIL), Navi Mumbai	"Natural Gas Measurement for RGTIL's Field & Measurement Engineers for RGTIL Engineers	5 Days
8	Communication & Capacity Development Unit (CCDU) Thiruvanathapuram	"Water Transmission and Distribution Engineering for Kerala Water Authority Engineers.	2 Days

9	Hindustan Zinc Limited, Jaipur	DCS And SCADA' for Hindustan Zinc Ltd.,	3 Days
10	Kerala Water Authority	"Water Transmission and Distribution Engineering	3 Days
11	Bangalore Water Supply & Seweverage Board, Bangalore	"Testing of Water Meters"	3 Days
12	M/s. AFPO AS – Norway'	' Liquid & Gas Flow Measurement for Engineers	5 Days
13	Kenya Bureau of Standards, Nairobi, KENYA	"Ultrasonic Flow Meters"	5 Days
14	M/s Dares Salam Water &Sewerage Authority, Tanzania	"Testing & Calibration of Water Flow Meters""	10 Days
15	Food Safety Commissionerate Govt. of Kerala, Thiruvananthapuram	Calibration of Glass wares & Weighing Balances" for Officials from Food & safety Dept.	3 Days
16	M/s. Honeywell Bangalore	Liquid Hydro Carbon Flow Measurement & Custody Transfer	3 Days

International Training Programmes 2017-2018

Sl.No.	Programmes	Duration	Date of Training Course
1	Quality System Certification (ISO 9001) & Six Sigma Practices For Organisations/Laboratories (Testing/Calibration)	9 weeks	August 01, 2017 to September 30, 2017
2	Oil, Water And Gas Flow Measurement And Control Techniques & Standards	9 Weeks	August 21, 2017 to October 21, 2017
3	Digital Library Practices & Information Technology Application for Advanced Knowledge Management	7 weeks	November 01, 2017 to December 15, 2017
4	Instrumentation & Control & Data Acquisition System In Fluid Floe In Process & Petroleum Engineering	9 weeks	January 10, 2018 to March 10, 2018
5	Flow Measurement & Control Techniques / Software in Industrial Process & Water Distribution System	9 weeks	March 15, 2018 to May 15, 2018

*Subject to MEA approval

TRAINING PROGRAM **SERIES 174**

Advanced flow measurement and instrumentation – Principles & Practice

3 Days - 8th to 10th February 2017

OBJECTIVES

The course will cover the basics and recent trends in Industrial flow measurement. It is designed to cover interests of personnel involved in plant design, flow monitoring, calibration and purchase of flow measuring equipments and associated instruments/electronic accessories.

TOPICS

- Principles of Flow Meters · Linear Non Linear Non Intrusive Types
- Calibration Methods of Flowmeters viz. Gravimetric, Volumetric, Meter Proving
- Uncertainty Estimation as per ISO/NABL norms
- Selection and Sizing of Flowmeters for Specific Applications
- Flow Measurement Techniques in Large Ducts ▲ Flare Gas Measurement
- Auxiliary Measurement Systems – Pressure, Temperature & Density Measurement
- Domestic Gas Metering ▲ Introduction to Multiphase or Polyphase Flow
- L P G Metering ▲ Model Approval Testing of Flow Metering System as per OIML Standard

EXPERIMENTS/DEMONSTRATION

Calibration of industrial flow meters as per relevant standards in (1) Gas (2) Liquid

TARGET GROUP

Industrial personnel involved in the area of Flow Measurement & Instrumentation, Flow Audit, Process Control, Plant System, Design, Flow Network Design and Water Transmission & Distribution Systems.

Registration fee (Non Residential) : For Indians working in India Rs. 15,435 + Service Tax @ 15% Rs. = 2,315/- =Total Rs. 17,750 per participant. For those working abroad US $ 908 + Service Tax @ 15% US $136 + Charge US $ 20 = Total US $ 1,0 64 per participant.

(We accept e-payment only. For bank details ref. page No.12)

TRAINING PROGRAM **SERIES 175**

Liquid Hydrocarbon Flow Measurement and Custody Transfer

3 Days- 5th to 7th April 2017

OBJECTIVES

How important is the accurate bulk liquid measurement for companies? Petroleum products bought and sold on the world wide market may be transported over thousands of miles and change ownership many times from the well head to the end user. Each time the product changes ownership, a "custody transfer" is completed and both buyer and seller expect their asset share to be accurately measured. More often than not, companies find measurement do not match up and this may result in serious losses to the companies, litigations and arbitrations at national/international courts or both. After the beginning of the dismantling of Administrative pricing mechanism in India the competition among Petroleum companies is all the more tougher. Process measurement occurs within refineries and other process plants as part of the refining and manufacturing process. There are many occasions within a refinery or process plant when liquids need to be measured so that the right products will be produced. These applications can be grouped under the title of process measurement and are very critical in many applications. A clear understanding of the intricacies of fluid measurement will solve problems associated with flow measurements. But it is easier said than done. For everyone involved in hydrocarbon flow measurement it is important to share the knowledge to maximize the benefits that accurate flow measurements can accrue. A common question invariably at flow measurement courses and workshops is "What type of meter is best for my application". The answer obviously depends on many factors, but shall first be preceded by ignored considerations of assorted influences of flow, fluid, and measurement.

This course has been designed to cover the interests of petroleum production and process industries, power sector, flow meter manufacturers, dispenser manufacturers and users, aviation industry, pipeline transporters (petroleum product), research organizations and academic institutions.

TOPICS

- Fundamentals of Flow Measurement
- Principles and Operation of Flow Meters - An Overview
- Coriolis Mass Flow Meters for Custody Transfer-Theory and Practice I Ultrasonic Flow Meters
- Model Approval of Flow Meters, Petroleum Dispensers and LPG Dispensers as per OIML R 117
- Uncertainty Estimation in Flow Measurement as per ISO/ NABL Guidelines
- Selection of Flow Meters I Installation Effects on Flow Meters
- Calibration of CNG Dispensers - Field Experience/ Pipe Provers
- Multiphase Flow Metering
- Calibration of Flow Meters - Gravimetric, Volumetric and Master Meter Methods
- Importance and Measurement of Temperature, Pressure and Density
- Auditing of Gas Flow Metering Installations
- Pipe Prover
- Ultrasonic flowmeters

EXPERIMENTS / DEMONSTRATION

Calibration of Flow Meters in – Water Flow Laboratory Oil Flow Laboratory

TARGET GROUP

Metering and Instrumentation Engineers, Production and Reservoir Engineers Hydrocarbon Accountants, Product Suppliers, Metering System Vendors, Government Agencies, Researchers.

Registration fee (Non Residential) : For Indians working in India Rs. 15,435 + Service Tax @ 15% Rs. = 2,315/- =Total Rs. 17,750 per participant. For those working abroad US $ 908 + Service Tax @ 15% US $136 + Charge US $ 20 = Total US $ 1,0 64 per participant.

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TRAINING PROGRAM **SERIES 176**

Water Transmission and distribution Engineering

2 Days - 8th to 9th June, 2017

OBJECTIVES

The course is designed to benefit water supply engineers involved in design and maintenance of Water transmission and distribution systems. Principles, Guidelines, various aspects of flow metering etc. will be discussed.

TOPICS

- Analysis/Simulation of Water distribution Networks
- Differential pressure flowmeters & performance evaluation of flowmeters
- Performance evaluation /Testing of valves
- Testing of water meters
- Hydraulic transients in transmission systems
- Pumps & Pumping systems for water industry systems
- Flow measurement in large diameter pipes
- Automated meter reading systems for water meters
- Flow measurement in Open Channels

LABORATORY EXPERIMENTS

(1) Testing of Water Meter (2) Testing of Valves

TARGET GROUP

Technical personnel with experience related to Water Supply Industry, Persons Responsible for Design/Maintenance of Water Supply System, Consultants, Flowmeter Manufacturers/Suppliers, Hydel Power Plants, Water Resources Management Departments, Water Treatment Plant Engineers. etc.

Registration fee (Non Residential) : For Indians working in India Rs. 11,025 + Service Tax @ 15% Rs. 1,654 = Total Rs. 12,679 per participant. For those working abroad US $ 648.90 + Service Tax @ 15% US $ 97. + Charge US $ 20 = Total US $ 766 per participant.

(We accept e-payment only. For bank details ref. page No.12)

TRAINING PROGRAM **SERIES 177**

On the Job Training for Field Engineers on Flowmeters and Calibration Techniques

5 Days - 10th to 14th July 2017

OBJECTIVES

The course envisages to cater to the requirements of Technical personnel from Petroleum, Natural Gas, Petrochemical, Process and Manufacturing Industries for on the Job Training of Flow metering and Auxiliary measurement system for both liquid and Gas flow measurement. Awareness of accurate flow measurement and calibration methods & practices results in enhanced revenue generation, improvements in recoveries, accurate process control, improved quality of the end products, less disputes in custody transfer applications and overall improvement of the efficiency of the plant metering systems. The course is designed to provide direct hands on training in flow measurement and calibration. The participants will be given on the job training in the Liquid and air flow calibration facilities at FCRI. In addition, they will also be given training in calibration of secondary instruments for pressure, temperature, Density measurements and geometrical parameters in the respective labs.

TOPICS

- Calibration of Flow Meters in Air/Gas/Water and Oil Medium
- Calibration of flow meters using primary & secondary standards
- Pressure measurement and calibration/calibration of Dimensional parameters
- Calibration of voltage, current, resistance and time
- Temperature measurement and calibration
- Uncertainty analysis and preparation of Uncertainty budget

TARGET GROUP

Technical personnel from Mechanical, Instrumentation, Chemical, Petroleum, Electrical Engineering or related background with exposure to Industrial Instrumentation. The course will benefit 'Oil/Gas Metering Engineers, Instrumentation Engineers, Process Control Engineers, Production and Reservoir Engineers, Laboratory Engineers, Quality Managers, Hydrocarbon Accountants, Metering System Vendors, Flow Meter Manufacturers, Product Suppliers, Government Regulators, Researchers and others from related fields.

Registration fee (Non Residential) For Indians working in India Rs. 25358 + Service Tax @ 15% Rs. 3,804 = Total Rs. 29,162 per participant. For those working abroad US $ 1,492 + Service Tax @ 15% US $ 224 + Charge US $ 20 = Total US $ 1,736 per participant.

" We accept e-payment only. For bank details ref. page No.12

TRAINING PROGRAM **SERIES 178**

Basics of Computational Fluid Dynamics

2 Days - 27th to 28th, July 2017

OBJECTIVES

Computational Fluid Dynamics (CFD) is the branch of science dealing with simulation of fluid flows with heat and mass transfer in various engineering and natural objects. Fluid flows play the key role in the working process of many modern engineering devices. Designing of these devices for the required operational parameters is impossible without reliable prediction of characteristics of these flows. CFD plays a vital role in modeling and design optimization of modern engineering devices. The course is designed to cover the essentials of CFD with software application and case studies.

TOPICS

- Introduction to CFD
- Basics of Fluid Flow and Governing Equations
- Discretization and Solution Methods (FDM & FVM)
- Turbulence Modeling
- Applications of CFD
- Method of CFD Analysis Using Commercial CFD Software
- Demonstration of FLUENT Software and Flow Simulation
- Meshing and Boundary Conditions
- Case studies including Industrial Problems
- Importance of CFD in Flow Metering and Design
- All classes are fully Theoretical with Typical Software Demonstration and no Lab Session

TARGET GROUP

Technical Personnel from Civil, Mechanical, Chemical, Hydraulics Aeronautical & Aerospace Engineering Fields, Researchers and others from relevant field.

Registration fee (Non Residential). For Indians working in India Rs. 12,388. For research scholars & Academic staff Rs. 10,112/-. For those working abroad US $ 749 per participant.

(We accept e-payment only. For bank details ref. page No.12)

TRAINING PROGRAM **SERIES 179**

Gas Flow measurement/Natural Gas Custody Transfer as per AGA Standards

3 Days - 11th to 13th October 2017

OBJECTIVES

Gas flow measurements play a very vital role in petrochemical industries and process plants. Flow measurement and control is an essential requirement for assuring the quality as per the relevant standards and the safe operation of the piping network and personnel involved. The course is designed to deal with all the relevant aspects of gas flow measurement and control and will also cover the new technological developments in the field.

TOPICS

- Gas Flow measurement
- Gas Properties, Compressibility, Heating Value and Chromatography
- Flow Meters: Orifice, Turbine, Ultrasonic, Coriolis Principles, Applications, Installations, Calibration.
- Domestic Gas/CNG Metering and Dispensing
- Flare Gas Measurement/Flow Measurement in Large Ducts
- Verification and calibration of Flow Computers.
- Uncertainty Analysis in Flow Measurement.
- In Situ Auditing/Field Validation of Flow Metering Station as per AGA Standards
- Model Approval as per OIML norms
- Diaphragm Gas meters
- CNG Dispenser

EXPERIMENTS/DEMONSTRATION

Calibration of Gas Flow Meters

TARGET GROUP

Personnel from Mechanical, Instrumentation, Chemical, Petroleum or Electrical Engineering with a background of industrial instrumentation and control in gas flow measurement and related field. Participants may be from gas industries, flow meter manufacturers, other related industries like refineries, power plants, fertilizers, R&D organisations or academic institutions.

Registration fee (Non Residential) : For Indians working in India Rs. 15,435 + Service Tax @ 15% Rs. = 2,315/- =Total Rs. 17,750 per participant. For those working abroad US $ 908 + Service Tax @ 15% US $136 + Charge US $ 20 = Total US $ 1,0 64 per participant.

(We accept e-payment only. For bank details ref. page No.12)

TRAINING PROGRAM **SERIES 180**

Metrology, Pressure, Thermal & Electro Technical Measurements and Calibration

3 Days 15th to 17th November 2017

OBJECTIVES

National and International trade depends on acceptable system of measurement standards for efficient operation. Recognizing critical role of metrology, the International Standards Organisation (ISO) has given it a due important place in the International Quality Standards ISO 9000, 14000 & 18000 series by incorporating specific clauses on Calibration and Traceability. The course covers specification of laboratory reference equipments, testing and calibration techniques including documentation, traceability, uncertainty evaluation as required by ISO 17025/NABL 141 guidelines for accreditation of laboratories in different areas like Mechanical, Thermal, Electro-technical etc.

TOPICS

- Basics of Measurement and Calibration
- Dimensional Metrology Precision Measurement/Calibration Techniques
- Mass Metrology (Mass, Density, Volume etc) and Calibration Techniques
- Pressure Metrology and Calibration of Pressure Measuring Instruments
- Thermometry and Calibration ▲ Transducers, Transmitters and Calibration Techniques
- Laboratory Accreditation as per NABL Norms ▲ Traceability and Inter-comparison Campaigns
- Quality Standards and Relevance of Calibration
- Assessment of Uncertainty of Measurements for Laboratory Environs
- Uncertainty Estimation - case studies

EXPERIMENTS / DEMONSTRATION

1. Dimensional, Mass and Pressure Calibration
2. Thermal and Electro-technical Calibration

TARGET GROUP

Personnel with 2-3 years experience in Metrological or inspection sectors and quality groups from Engineering Industries, Industrial, Process Control & Instrumentation and other related areas can participate.

Registration fee (Non Residential) : For Indians working in India Rs. 15,435 + Service Tax @ 15% Rs. = 2,315/- =Total Rs. 17,750 per participant. For those working abroad US $ 908 + Service Tax @ 15% US $136 + Charge US $ 20 = Total US $ 1,0 64 per participant.

(We accept e-payment only. For bank details ref. page No.12)

TRAINING PROGRAM **SERIES 181**

Control Valves & Actuators

3 Days - 6th to 8th December 2017

OBJECTIVES

The course presents a practical approach to selection, sizing, installation and performance evaluation of control valves/actuators. These elements form critical control devices in industrial/process piping/flow systems. Present course also covers matching of valve/actuator technical specifications and system operational parameters.

TOPICS

- Basic Classification of Valves and their Characteristics
- Basics of Selection and Sizing of Control Valves and Matching Actuator, Meeting System Operational
- Requirements etc.
- Air valves, Safety Relief Valves and Breather cum Relief Valves Test Procedures
- Cavitation in Control Valves-Theory and Testing
- Valves for Cryogenic Services-Test Program
- Fugitive Emission from-Theory and Testing
- Diagnostics for Valve Actuators
- Endurance/Life Cycle Test of Valves and Actuators
- Performance Evaluation of Control Valves and Actuators
- Control Valves for Nuclear Applications
- Noise Levels from Control Valves
- Seismic Qualification of valves.

LABORATORY EXPERIMENTS

1. Flow Coefficient Test of Valves. 2. Fugitive emission testing of Valves
3. Seismic Testing of Valves 4. Special Tests on Valves

TARGET GROUP

Personnel who are involved in design, selection, installation or operation of Valves and Actuators within the Oil & Gas, Petroleum, Water, Chemical Process, Pharmaceuticals, Plastics, Paper and Food Industries. A basic understanding of flow measurement/control requirements & applications would be advantageous.

Registration fee (Non Residential) : For Indians working in India Rs. 15,435 + Service Tax @ 15% Rs. = 2,315/- =Total Rs. 17,750 per participant. For those working abroad US $ 908 + Service Tax @ 15% US $136 + Charge US $ 20 = Total US $ 1,0 64 per participant.
(We accept e-payment only. For bank details ref. page No.12)

POST GRADUATE CERTIFICATE PROGRAMME (PGCP) IN 'LIQUID & GAS/AIR FLOW MEASUREMENT & CONTROL TECHNIQUES AND STANDARDS'

3 Months – 21st August 2017 to 20th November 2017

POST GRADUATE CERTIFICATE PROGRAMME (PGCP) IN 'FLUID FLOW, INSTRUMENTATION ENGINEERING AND DAS IN PROCESS INDUSTRIES'

3 Months - 10th January 2018 to 9th April 2018

Course Contents :

For the 'August to November 2017' PGCP batch, more emphasis will be given on Flow Measurement & Control related topics and for the 'January to April 2018' PGCP batch, Topics on Instrumentation & Data Acquisition System will be given more coverage.
The commonly covered topics for both the above PGCP batches are as mentioned below

Principles and Practice of Flow Measurement

Flow Measurement in Single phase fluids: Principles and types of Linear & Non- linear Flow meters, Differential pressure based flow measurement devices, Inline and insertion flowmeters for conduits and closed ducts: Turbine Flow meters, Positive Displacement Flowmeters, Vortex Flowmeters, Ultrasonic Flowmeters, Coriolis Mass flowmeters, Thermal Mass flowmeters, Fluidic Oscillation flowmeters, Open-channel flow measurement methods.

Special Applications, Selection Sizing of Flow Meters and Installation Effects

Measurement of Multiphase flow, Flow measurement in large diameter pipes and Hydro-power penstocks, Introduction to Particle Imagery Velocimetry (PIV), Laser Doppler Velocimetry (LDV) and Hot-

wire/Hot-film anemometers, Installation effects for various flowmeters, Selection and sizing of Flow meters for various Applications, Piston Provers and Bell-provers.

Secondary Instrumentation and Auxiliary Measurement Systems

Instrumentation for Secondary parameters in flow measurements: Pressure, Temperature, Density, etc. Calibration methods and systems for transducers/sensors for Pressure, Temperature, Density, etc. Electronic Process Transmitters, Smart transmitters. Level Measurement and Tank Gauging principles and practice. Gas Chromatography.

Test & Measurement Instruments and Electronic Trouble Shooting

Digital Multimeters, Cathode Ray Oscilloscopes, Paper and paperless Recorders, Timers and Frequency meters/Counters, Electrical signals and parameters: Voltage, Current, Power-factor, Frequency and Power. Multi-function Calibrators. Trouble-shooting of Electronic systems, Loop-checking, trouble-shooting signals from flowmeters.

Other General Instrumentation and Special Topics

Piping and Instrumentation Diagrams, Hazardous Area Instrumentation/Intrinsic Safety (IS) protection. Principles of Measurement and Calibration systems for Viscosity, Mass and Dimensional metrology (Length and Volume), Co-ordinate Measuring system (CMM). Noise and Vibration Measurement

Data Acquisition Systems and Process Automation

Data Acquisition Systems (DAS), Graphical Interface (GUI) Software for DAS, Supervisory Control And Data Acquisition (SCADA), RTUs and PLCs, Ladder Logic Programming concepts for PLC, Introduction to programming in NI-LabVIEW, Distributed Control System: principles, history, architecture. Data Loggers and Remote data acquisitions systems. HART and Field buses, Digital serial communication (RS232C, IEEE-488, USB, etc.), Interfacing Test &Measurement Instruments to Computer Using IEEE-488 & RS-232C.

Custody Transfer Flow Measurements, Auditing and Model Approval

Custody transfer flow measurement scenario, Flow metering for Custody transfer of Liquid Petroleum quantities, AGA standards for Orifice and Turbine Flowmeters for natural Gas, AGA standard for Natural Gas compressibility calculations, Custody Transfer Accuracy and Contractual needs, Compact volume provers/Pipe-provers for custody transfer applications, Flow Computers for Oil & Gas Flow Custody transfer, Tank Gauging and Tank Farm Management system. Inspection and Auditing of Natural Gas Custody Transfer Installations. Dispensers for Petroleum and Compressed Natural Gas and Testing of Dispensers.

Study of international Standards-AGA, API, OIML etc. for Oil and Gas flow measurement computations and custody transfer

International and National Standards for flow measurement-American Petroleum Institute (API), Organisation Internationale De Metrolgie Legale (OIML), American Gas Association (AGA) and ISO Standards

Performance/QR Evaluation/Calibration of Flow Meters

Calibration Techniques, Primary and Secondary Calibration, Gravimetric Method, Volumetric Method, Master Meter Method, Meter Provers, Pipe Provers & Tank Provers, Calibration of liquid and gas flowmeters, Calibration at site and case studies.

Auditing and Validation of Flowmetering Stations and Custody Transfer Installations

Inspection, Auditing and validation of Petroleum and natural gas custody transfer installations standards and practices, system Layout and installation requirements as per relevant standards, inspection, and validation of secondary instruments and validations of flow computers, validation of CNG dispensers at site and case studies.

Flow Control Techniques - Control Valves and Actuators

Types of valves, intelligent control valves, flow characteristics of valves, performance evaluation of control valves. Selection and sizing of control valves. Actuators selection and sizing, testing of actuators, diagnostics of valve actuators, matching Actuators for control valves and electronic controllers.

Software and computational fluid dynamics

Software for selection and sizing of flow meters, selection and sizing of control valves, Computational Fluid Dynamics (CFD), Applications, and Case Studies.

Projects/Seminars

Eligibility: Four Year Engineering Graduation in B.E/B.Tech with consistently good academic record. Graduation in disciplines : Instrumentation, Mechanical, Electrical, Electronics, Chemical or Mechatronics. Those who have not completed graduation or without Provisional/Degree Certificate need not apply.

Desirable : Valid GATE score

Duration of Course :

1. 'Liquid & gas/air flow measurement & control techniques and standards'
   3 months - 21st August to 20th November 2017
2. 'Fluid flow, instrumentation engineering & DAS in process industries'
   3 months - 10th January to 9th April 2018

Course Fee : Rs. 55,180 + Service Tax extra @ 15% Rs. 8,277 Total Rs. 63,457 (Excluding cost of boarding & lodging).

Mode of Payment : We accept e-payment only. For bank details ref. page No.12
Course is open to Indian citizens only.

Accommodation : The course is purely Non-residential. FCRI Hostel facility can be provided as per request of students, if available.

How to apply : A detailed Bio-Data along with self attested copies of Certificates in proof of Qualification & Experience (if any) may be mailed to below indicated Address to reach us before the due date along with non-refundable Registration Fees for Rs. 500/-

Tentative	August '17 Batch	January '18 Batch
Last date for receipt of Applications	14th August 2017	3rd January 2018
Date of Screening Test/Interview	16th August 2017	5th January 2018
Closing of Admissions	18th August 2017	8th January 2018

Postal Address for sending Application

The Head-Training, FLUID CONTROL RESEARCH INSTITUTE, Kanjikode West,
Palakkad - 678 623, Kerala, INDIA
Communication/Enquiries : Email: training@fcriindia.com
Phone :+ 91-491-2566120/2566206/2566119/2569010 Fax : 91-0491-2566326

FCRI Hostel facilities & Mess for Course Participants:

FCRI has got Hostel Facilities inside FCRI campus. The course participants can avail this facility with an advance request on payment of nominal hostel fees & mess, as per availability.

TRAINING PROGRAMMES HITHERTO

Sl. No.	Programme	No. of Programs	Duration	Participants
1	Training Programmes for Executives	173	2 to 5 days	Participants from various industries
2	Customised / Tailor made Training Programme	142	3 to 5 days	Around Participants from HPCL, HAL, W&M, TNPEC, Navel Dockyard, Reliance etc.
3	Post Graduate Certificate Programme	18	3 months	315 fresh engineers
4	International Training (ITEC/Colombo Plan /SCAAP Self Financing Scheme)	83	2 to 3 months	Above 1000 Participants from 90 countries

For further information and registration, please contact:

Fluid Control Research Institute

Kanjikode West, Palakkad - 678623, Kerala, India
Phone: 91-491-2566120 / 2566206 / 2566119 / 2569010
Fax :91-491-2566326
Email: training@fcriindia.com, fcri@fcriindia.com
Website: www.fcriindia.com

Custom/Corporate Training Programme:

We are also conducting training programme for corporates / companies on mutually convenient slots / date & required topics at FCRI. The courses are both as basic course for fresh engineers (induction programmers) as well as advanced level courses for senior executives and working engineers and technicians

Training Course Fee to be paid by e-payment (RTGS/NEFT) only.
Bank Details : State Bank of India(SME Branch) Kanjikode west, Palakkad - 678 623.
Account No. 10258760349. IFSC Code : SBIN0006640

NABL Approved Test Facilities:

Control Valves/Actuators	CV, FL, Seat leakage test, Fugitive emission, cryogenic testing, torque
Water Meters	All test as per IS 6784, IS 779, IS 2373, ISO 4064
Butterfly Valves & Actuators	POD tests as per AWWA C504 & C540
Venting devices/air valves	API 2000
Safety Relief Valves	ASME PTC 25
Gas Turbine Meters	OIMLR137-1 Model Approval
Gas Regulators	BS EN 334
Diaphragm Gas Meters	BS EN 1359 Model Approval
Liquid Flow Meters	As per relevant standards

RECOGNITIONS OF FCRI

Agency	Category
National Accreditation Board for Testing and Calibration Laboratories (NABL)	Calibration/Testing of Flow Products, Mechanical Measurements Thermal Calibration, Electro Technical Calibration
Netherlands Measurement Institute (NMI)	CLATF (20 Bar, 400 m^3/h) of FCRI complies with the criteria for Calibration Laboratories as per ISO/IEC 17025
Department of Science & Technology	Recognized R&D Institute
Department of Weights & Measures (Ministry of Civil Supplies)	Model Approval tests on flowmeter for custody transfer of oil/gas as per OIML Standard
Chief Controller of Explosives, Nagpur	Testing of Safety Relief Valves
Bureau of Indian Standards	Testing of Water Meters, Anemometers etc.
Institution of Fire Engineers, New Delhi	Hydraulic Qualification tests on fire fighting equipments
Central Pollution Control Board	Certification of Petrol, Kerosene & Diesel Generators for type approval
Nuclear Power Corporation	Seismic Studies for Power plant Equipments
Ministry of External Affairs (ITEC) & Ministry of Finance, Dept. of Economic Affairs (Colombo Plan)	Training programmes for Foreign Nationals on Flow Measurement and Instrumentation for Oil Gas & Water utilities/industries
GCAS Quality Certification Pvt. Ltd	ISO 9001:2008 Certification in Calibration & testing of fluid flow component, calibration of mechanical, electro technical, thermal instruments, flow calibration & measurements at site, project consultancy & implementation, professional training.

About FCRI

An ISO-9001:2008 accredited, autonomous Research Institute under the Ministry of Heavy Industries & Public enterprises, Govt. of India, FCRI is celebrating its Silver Jubilee in 2014. FCRI has had unique and focused expertise in Flow Measurement and Control, Fluid Dynamics, Instrumentation and Data Acquisition, Computational Fluid Dynamics and Finite Element Analysis, Technical computational Software, etc.

ISO-17025 accredited Fluid Flow Laboratories at FCRI are considered one of the best in this part of the world. FCRI has been accredited and approved by a number of certifying bodies and agencies.

Please visit www.fcriindia.com for knowing more on FCRI.

Major Calibration & Test Facilities at FCRI

Laboratory Fluid flow NABL C026/T027	Maximum Flow Rate (m^3/h)	Maximum Line Size	Uncertainty in Flow Rate (% reading)	Uncertainty in Volume (% reading)
Water Flow	4500 15000	900mm 2000mm	Upto 200m^3/h : ±0.05% 200 to 2500m^3/h : ±0.10% 2500 to 4500 m^3/h : ±0.15% 5000-15000m^3/h : ±0.5%	20m^3 : ± 0.05%
Air Flow At Ambient conditions	10000	400mm	0.016 m^3/hr to 0.25m^3/hr : ±0.3% 0.25 m^3/hr to 40m^3/hr : ±0.1% 40 m^3/hr to 400m^3/hr : ±0.15% > 400m^3/hr 10000m^3hr : ±0.25%	0-0.5 m^3 : ±0.1% 2 m^3 : ±0.1%
Closed loop Air Test Facility (20 Bar) *Calibration Loop *Gravimetric Loop Velocity	10- 400^{m3}/h 4-1000kg/h	150mm 50mm	± 0.3% ± 0.1%	
Oil Flow	650	250mm	upto 6m^3/hr : ± .04% 6-100m^3/hr : ± .05% 100-600m^3/hr : ± .075%	Upto 1.8m^3 : ± 0.03% 1.8m^3 to 9 m^3 : ± 0.04%
Compressed Natural Gas	4500 Kg/hr	1.5"	± 0.1%*	*under-Accreditation

Mechanical Calibration Metrological, Pressure, Noise, Vibration etc. NABL C 056		Parameters	Range	Calibration & Measurement Capability	Parameters	Range	Calibration & Measurement Capability
		MASS-Standards Weights	1mg and upto 500kg	0.0025 mg	PRESSURE pressure transducers	1 to 60kg/cm^2 60 – 1200kg/cm^2	0.02% of rdg 0.024% of rdg
		MASS-Weighing Balance & Mass Comparator	Various ranges from 0-2 g to 600 Kg	mg to 0.02 Kg	Pressure-gauge pressure transducers (pneumatic)	30mbr to 2000 mbar abs	0.021% of rdg
			600 Kg to 2000 Kg	0.1 Kg		0.25 bar to 20 bar abs	0.015% of rdg
			2000 Kg to 20000Kg	3.53 Kg			
		VOLUME -Specific Gravity bottle, Pipettes, Burettes Measuring Flasks	1 ml – 5000 ml	0.058ml to 0.7ml	Pressure-Low pressure gauge & differential	0.2 mbar to 3.2 mbar	0.5% rdg
						3.2 mbar to 9.5 mbar	± 0.15%of rdg
						10mbar to 160mbar	± 0.077%of rdg
		DENSITY - Hydrometers	0.64 g/cc – 1.98 g/cc	±0.0005 g/cc	Pressure-gauge pressure transducer (pneumatic)	30 mbar to 2000 mbar	± 0.023% of rdg
		VISCOSITY – Dynamic	1to 85000 mPas/cSt	+/- 0.7% rdg	Pressure-vacuum (gauge)	-15 to 980mbar g	± 0.015 of rdg
		VISCOSITY – Kinetic	0.002 to100000 cSt	+/- 0.5% rdg	LENGTH- slip Gauges (steel)	0.5 – 100 mm	0.05 µm to 0.16µm
		Acoustic Pressure – Free Field	125 Hz to 20 Hz	≤0.5 dB	Vibration Test Facility	6000 Kgf / 2000Kgf shaker 5 Hz to 2000 Hz	
		Acoustic Pressure – Pressure Field	94 & 114 dB @ 1 kHz 124 dB @ 250 Hz	0.5dB	Acoustic Test Facility	Hemi Anechoic Chamber ISO3745	
		Acoustic Power	125Hz to 16 kHz	2.0dB	Temperature & RH Test Facility	-70 to 180 deg C 10 to 98 % RH	
		Vibration Amplitude - Analyzer	0.1 to 15g (acceleration) 1 to 240mm/s(velocity) 0.01 to 10mm(displacement)	2.4 %			
		Vibration Amplitude –Sensor Linearity	2Hz to 15 kHz Upto 30g pk	≤2.5 % 1.25%	* IP Tests	Dust – IP 5X, 6X	
		Speed (Contact)	100 to 10000 rpm	1.6 rpm			
		Speed (Non-contact)	60 to 100000 rpm	≤2.4 rpm		Water – IP X3 to X8	
Electro Technical Calibration NABL C 0254			±100µV to ±1000 V ±0.1mV to ±1000V 1mV to 1000V 100mV to 1000V	0.60% to 0.001% 0.12% to 0.012% 0.4% to 0.014% 0.04% to 0.03%	DC Current Source Measure AC Current Source Measure	±100µA to ±1000A ±100µA to ±20A 100µA to 700A 100µA to 10A	0.014% to 2.0% 0.013% to 0.05% 0.04% to 1% 0.06% to 0.035%
		Resistance Source Measure	10µΩ 10G Ω 100µΩ 1G Ω	0.6% to 0.02% 0.42% to 0.5%			
		Time	1 Sec – 5400 sec	1.53 µSec to 5.4mSec	Frequency	1 Hz to 1 GHz	10mµHz to 1.2 Hz
Calibration NABL C		Temperature	-70 ºC to +1200 ºC	±0.07ºC to 1.3ºC	Fixed Point Cells	-38.8344ºC to 961.78ºC	2.9mºC to 19.7mºC
		*Temperature & Humidity Chamber	- 70ºC to 180ºC 10% to 95% RH				

*Not in NABL Scope

HOTEL TARIFF AT PALAKKAD, KERALA

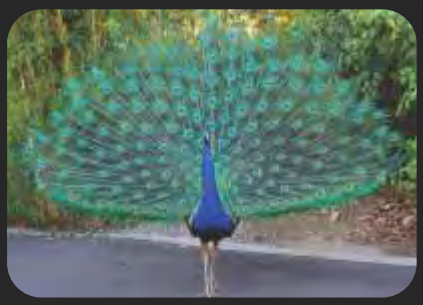
Hotel & Distance to FCRI (in KM)	Phone No. (0491)	E-mail	Single Occupancy (Rs.) AC	Single Occupancy (Rs.) Non AC	Double Occupancy (Rs.) AC	Double Occupancy (Rs.) Non AC
Indraprastha (8)	2534641	info@hotelindraprastha.com	1500	--------	1700	--------
ATS Regency (8)	2537477	atsresidencypalakkad@gmail.com	--------	--------	2000	--------
The Grand Kera (9)	2536000	gm.thegrandkerapalakkad@gmail.com	2000	--------	2500	--------
ITL Residency (8)	2525262	itlresidency@gmail.com	--------	--------	1200	900
KPM Regency (8)	2534601	prasad@kpmhotels.com	1000	--------	1250	--------
Tripenta (5)	2815210	prasad@kpmhotels.com	--------	--------	2500	--------
Fort Palace (8)	2534621	fortpalacehotel@gmail.com	1650	1300	1800	1500
Sayoojyam Residency (8)	2504550	sayoojyamresidency@yahoo.com	1480	--------	1750	--------
Riva Residency (7)	2545654	rivaresidency@gmail.com	1050	800	1150	900
Gazala Inn (8)	2546581	hotelgazala@yahoo.com	1500	1200	1750	1400
Soorya City (8)	2521831	sooryacity@gmail.com	900	600	1000	750
Boon Inn (8)	2547444	booninnpkd@gmail.com	1400	1100	1600	1300
Kairali Towers (7)	2547174	kairalitowers@gmail.com	1300	600	1600	700
Srichakra International (6)	2570901	hotelsrichakra@gmail.com	1900	1400	2300	1800

During the course days FCRI will be providing pick-up & drop from local hotels to FCRI (9 am to 5.30 pm). The name of the hotel booked may be informed in advance to Training Department (training@fcriindia.com) in order to facilitate pickup from the hotel.

The above rates are approximate & indicative only and exclusive of taxes and with special discount offered to FCRI Clients. Accommodation can be booked directly. Assistance can be provided by FCRI (if required) for accommodation booking.

Distance from Nearest Airports to Palakkad (FCRI)

Coimbatore - Palakkad - 40 Kms
Cochin - Palakkad - 140 Kms
Calicut - Palakkad - 160 Kms
Nearest Railway Station
Palakkad Junction - 11 Kms



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Fluid Control Research Institute
Kanjikode West, Palakkad -678623, Kerala, INDIA
Ph:+91-491-2569010 / 2566120

Kerala

is the land of exceptional natural beauty. Tucked away within little villages and bustling towns, sheltered by the elegant coconut palms, Kerala deserves the name God's Abode. The major places of visit are Cochin - natural harbour with beautiful backwater, Thekaddy - Wildlife sanctuary, Palakkad - Malampuzha Dam, Fort, Nelliampathi, Munnar-Gracious hill station, Thiruvananthapuram - Capital of Kerala, Kovalam-a beautiful beach and Kanyakumari-Southern tip of India. Places of Interest for sight seeing in and around Southern Part of India are Ooty, Kodaikanal (hill stations), Bengaluru & Mysore (Palace), Madurai Meenakshi Temple etc.

Welcome to God's own Country

एफ.सी.आर.आई.
FCRI
FLUID CONTROL RESEARCH INSTITUTE
An ISO 9001:2008 certified, NABL accredited organisation
(Under Ministry of Heavy Industries & Public Enterprises, Govt. of India)

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