



# INTERNATIONAL TRAINING PROGRAMMES 2017-18

## SPONSORED BY

Ministry of External Affairs, Govt. of India Under  
Indian Technical and Economic Cooperation Programme (ITEC) /  
Special Commonwealth Africa Assistance Plan (SCAAP)

## FLUID CONTROL RESEARCH INSTITUTE

(An ISO 9001-2008 certified, NABL accredited organisation  
under Govt. of India, Ministry of Heavy Industries & Public  
Enterprises ), Kanjikode West, Palakkad 678 623, Kerala, India  
Tel : 91 - 491 -2 566120 / 2566206, Fax : 91 - 491 - 2566326  
E mail: [training@fcriindia.com](mailto:training@fcriindia.com)  
Website : [www.fcriindia.com](http://www.fcriindia.com)



FROM THE DESK OF DIRECTOR  
**Dr. JACOB CHANDAPILLAI**



Fluid Control Research Institute (FCRI) was established by the Govt. of India during 1984 with the technical and financial assistance of the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organisation (UNIDO) as the executing agency and M/s. Instrumentation Ltd. as the implementing agency on behalf of Ministry of Industry.

In the present industrial scenario, quality assurance is a key factor for the success of any industrial venture. Conformance to the ISO 9001 quality norms has become a pre-requisite for industrial products. Fluid Control Research Institute is a unique centre for R&D and Quality/Reliability Evaluation of flow products.

Through in house R&D efforts, FCRI has successfully developed and transferred technical know how for a variety of products, viz. Cone flowmeter, Thermal mass flowmeter etc. More than 1500 organisations, spread all over India have benefited from FCRI's consultancy services which includes design evaluation, quality improvement, establishment of appropriate flow measurement and control technology.

Training programmes in the area of flow measurement and control are also conducted regularly by FCRI for both Indian and foreign nationals. More than 150 national training courses and 81 International training programmes have been conducted at this prestigious Institute. Apart from the regular training programmes, FCRI has also been conducting Inhouse Training programmes regularly for organizations like ONGC Ltd., GAIL Ltd., Legal Metrology officials. Training plays a vital role in all organizations. An organisation needs to assess its people's skills training needs - by a variety of methods - and then structure the way that the training and development is to be delivered, and managers and supervisors play a key role in helping this process. People's personal strengths and capabilities - **and aims and desires and special talents (current and dormant)** - also need to be assessed, so as to understand, and help the person understand, that the opportunities for their development and achievement in the organisation are not limited by the job role, or the skill-set that the organisation inevitably defines for the person. As early as possible, let people know that their job role does not define their potential as a person within or outside the organisation, and, subject to organisational policy, look to develop each person in a meaningful relevant way that they will enjoy and seek, as an individual, beyond the job role, and beyond work requirements.

With this in view, FCRI aims at reaching the mass across the globe by imparting training with updated methodology. Several Technical/Managerial personnel working in Petroleum and Oil & Gas, Process Plants, Water Boards, Mining Industry etc. have been benefitted out of our technical training programmes.. FCRI has already imparted Training to more than 1000 foreign nationals from 80 countries and over the past 21 years, we have been conducting Training programmes under the aegis of Indian Technical & Economic Cooperation (ITEC ) and Special Commonwealth Assistance for Africa Programme (SCAAP) of Ministry of External Affairs. 81 Training programmes for foreign nationals have been conducted on subjects relating to Instrumentation, Flow Measurement and Control, Calibration Management Practices, Custody transfer and Legal Metrology requirements etc.

Our reputed and much sought after Technical Training Programmes, both standard 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 etc.

Wishing the participants all the very best..

*Dr. Jacob Chandapillai*

**DIRECTOR**

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## 11: OIL, WATER & GAS FLOW MEASUREMENT & CONTROL TECHNIQUES & STANDARDS (84th IN SERIES)

Instruction Medium	:	English
Number of Participants (anticipated)	:	15 - 20
Date	:	August 21 ,2017 to October 21, 2017
Venue	:	Fluid Control Research Institute (FCRI), Palakkad, Kerala, India
Course fee	:	US\$ 4000 + Service tax applicable

### Target Group

Technical personnel in Mechanical, Instrumentation, Civil, Instrumentation, Chemical and Electrical Engineering with some back ground of industrial instrumentation and control of fluid flow. Participants may be from industry, R&D organisation or Academic Institutes.

### Course Content

#### Petroelum & Natural gas Flowmeasurement - Standards and Practices

Properties of petroleum fluids, Natural gas properties & heating value calculations, Gas chromatography , Flow Basics, Elements of pipe /ducted flow and Basic Metering Concepts, Flow measurement techniques, Primary standards and practices in flow measurement.

#### Study of international standards-AGA, API, OIML, etc. for Oil and Gas flowmeasurement computations and Custody transfer

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

#### Selection and Application of flowmeters

Different types of flowmeters- Linear & Non-linear flowmeters , differential pressure Turbine flowmeters, P.D. Meters, , Vortex flowmeters, Ultrasonic flowmeters, Coriolis Mass Flowmeters Thermal Mass Flowmeters etc - principles , applications and installation effects, Selection & sizing of Flowmeters for various applications.

#### Performance/ QR evaluation /Calibration of flowmeters

Calibration Techniques, Primary and Secondary Calibration, Gravimetric Method, Volumetric Method, Master Meter Method ,Meter Provers , Pipe provers and Tank Provers . Calibration of Liquid and Gas Flowmeters, Calibration at Site and case studies, Assessment of uncertainty and statistical analysis of accuracy in fluid flow measurements & Traceability of measurements.

#### Instrumentation for Flowmeasurement and Auxiliary measurement systems

Pressure and differential pressure measurement-Methods , Principles ,instruments & standards Temperature measurement and standards, Thermo wells, Density measurement ,Online Densitometers ,Measurement of Viscosity, Time and frequency measurement , Level Gauging of storage tanks, Sensors and Transducers ,Pressure Sensors Temperature sensors, Smart Transmitters, Data Acquisition Systems and Flow Computers.

#### Calibration of Auxiliary /secondary instruments for flow measurement (Pressure, temperature, density, Viscosity, mass etc. )

Pressure Calibration, Calibration of pressure transducers, Calibration of Mass and Weighing balances. Density and Volume calibration, Temperature Measurement and calibration and calibration of electrical parameters.

#### Custody Transfer flow measurement of Petroleum and Natural Gas and Custody Transfer instrumentation

Custody Transfer of Petroleum and Natural Gas – Standards and Practices, Flowmeters for custody transfer, Accuracy & contractual needs, Provers for custody transfer applications , Custody Transfer instrumentation , Flow computers for Custody Transfer and Leased automatic custody transfer.

#### Auditing / Validation of Flowmetering stations and custody transfer installations

- Inspection, Auditing / Validation of Petroleum and natural gas, flow metering stations – Standards and practices, System Lay out and installation requirements as per relevant standards Inspection and Validation of secondary instruments and Validation of Flow computers. Validation of CNG dispensers at site and case studies .

#### Model Approval of Flowmeters as per OIML international standards

Model Approval of Flowmeters as per Organisation Internationale De Metrolgie Legale (OIML) standards, Electrical Tests for Model approval, Enviornmental & Endurance tests

#### Flow Control Techniques – Control Valves and Actuators

Type of Valves, Flow characteristics of valves, performance evaluation of control valves, Selection and sizing of control valves, Actuators- selection and sizing, testing of actuators and matching Actuators for control Valves.



## 1.2 INSTRUMENTATION & CONTROL & DATA ACQUISITION SYSTEM IN FLUID FLOW IN PROCESS & PETROLEUM ENGINEERING ENGINEERING (85<sup>th</sup> IN SERIES)

Instruction Medium	:	English
Number of Participants (anticipated)	:	20-25
Date	:	January 10, 2018 to March 10, 2018
Venue	:	Fluid Control Research Institute (FCRI), Palakkad, Kerala, India
Course fee	:	US\$ 4000+service tax (under Self Financing scheme only)

### Target Group

Technical Personnel in Electronics, Instrumentation, Electrical, Industrial Engineering working in Oil & Gas industry, Process Industries and related fields can apply. Participants may be from industry, R&D organisation or Academic Institutes or Govt. Officials.

### Course Content:

- **Instrumentation for Flow measurement**  
Pressure and differential pressure measurement-Methods, Principles, instruments & standards, Temperature measurement-Principles, Instruments and standards Thermo wells, Density measurement ,Online Densitometers, Measurement of Viscosity, Level Gauging of storage tanks.
- **Sensors, Transducers & Transmitters**  
Introduction to working principle and features of Sensors and Transducers for Pressure, Temperature, Level, Density, Mass etc. and smart transmitters.
- **Selection and Application of flowmeters**  
Different types of flowmeters-differential pressure flowmeters, Turbine flowmeters, P.D. Meters, Vortex flowmeters, Ultrasonic flowmeters, Coriolis Mass Flowmeters etc - principles, applications and installation effects, Selection & sizing of Flowmeters for various applications.
- **Performance/ QR evaluation/Calibration of flowmeters**  
Calibration Techniques, Gravimetric Method, Volumetric Method, Master Meter Method ,Meter Provers, Pipe provers and Tank Provers, Calibration of Liquid and Gas Flow meters, Assessment of uncertainty and statistical analysis of accuracy in fluid flow, Traceability of measurements and Calibration at Site & case studies.
- **Calibration of Auxiliary /secondary instruments**  
Pressure Calibration , Calibration of pressure transducers, Calibration of Mass and Weighing balances. Density calibration, Volume calibration, Temperature Measurement and calibration, Timer calibration, Calibration of counters, Frequency Calibration and calibration of electrical parameters.
- **Data Acquisition systems and Flow computers**  
Data Acquisition System (DAS), Supervisory Control and Data Acquisition (SCADA), Field Bus, PLC and Introduction to LAB VIEW programming for Data Acquisition & Control, Introduction to DCS & Flow computers.
- **Custody Transfer flow measurement and Custody Transfer instrumentation**  
Custody Transfer of Petroleum and Natural gas –standards and practices, Flow meters for custody transfer, Provers for custody transfer applications, Custody Transfer instrumentation, Flow computers for Custody Transfer and Leased automatic custody transfer.
- **Auditing and Validation of Flow metering stations**  
Inspection, Auditing and Validation of Petroleum and natural gas custody transfer installations – Standards and practices, System Lay out and installation requirements as per relevant standards, Inspection and Validation of secondary instruments and Validation of Flow computers, Validation of CNG dispensers at site and case studies.
- **Model approval of Flowmeters**  
Model approval of flowmeters for Liquid and Gas application, Model approval as per OIML standards, Electrical tests for model approval etc.
- **Flow Control Techniques- Control Valves and Actuators**  
Type of Valves, Flow characteristics of valves, performance evaluation of control valves, Selection and sizing of control valves, Actuators–selection and sizing , testing of actuators matching Actuators for control Valves.

### 1.3. FLOW MEASUREMENT & CONTROL TECHNIQUES /SOFTWARE IN INDUSTRIAL PROCESS & WATER DISTRIBUTION SYSTEM (86<sup>th</sup> IN SERIES)

Instruction Medium	:	English
Number of Participants (anticipated)	:	20-25
Date	:	March 15, 2018 to May 15, 2018
Venue	:	Fluid Control Research Institute (FCRI, Palakkad, Kerala, India
Course fee	:	US\$ 4000 +service tax (for Self Financing Scheme only)

#### TARGET GROUP

Technical personnel in Mechanical, Instrumentation, Civil,Hydraulic, Instrumentation, Chemical and Electrical Engineering with some background of industrial instrumentation and control of fluid flow. Participants may be from industry, Water Boards, R&D organisation or Academic Institutes.

#### COURSE CONTENT

- **Selection and Application of flowmeters**  
Different types of flowmeters- Linear & Non-linear flowmeters, differential pressure flowmeters, Electromagnetic flowmeters, Turbine flowmeters, PD meters, Vortex flow meters, Ultrasonic flowmeters, Coriolis Mass flowmeters Thermal Mass Flowmeters etc. – Principles, applications and installation effects, selection & sizing of flowmeters for various applications.
- **Performance /QR evaluation /Calibration of flowmeters**  
Calibration Techniques, Primary and Secondary Calibration, Gravimetric Method, Volumetric Method, Master Meter Method, Meter Provers, Pipe Provers and Tank Provers, Calibration at Site and case Studies.
- **Calibration of Auxiliary/secondary instruments for flow measurement (Pressure, Temperature, density, Viscosity, Mass etc.)**  
Pressure calibration, Calibration of pressure transducers, Calibration of Mass and Weighing balances, Density and Volume calibration, Temperature Measurement and calibration of electrical parameters.
- **Performance / Quality aspects in flowmetering systems**  
Assessment of uncertainty and statistical analysis of accuracy in fluid flow measurement, Quality audit and measurement audit, traceability of measurements and Intercomparison of International labs.
- **Flow network/System parameters**  
Water hammer analysis, flow measurement & control in Industrial Process control, distribution network design and analysis techniques, CFD analysis.
- **Water Transition & Distribution Systems**  
Design aspect of water distribution systems, testing of water meters, Automated meter reading systems, pumping systems, Sumps and intakes, performance evaluation of pumps, water level controllers.
- **Electronics / Instrumentation data Acquisition Systems**  
Flow measurement & Control in distribution network, Supervisory control and data acquisition system (SCADA). Electronic design of control loops, Different types of controllers, Flow computers for custody transfer, Instrumentation related to flow measurement, Design of specialized instrumentation and control set up.
- **Valves**  
Control valves, Butterfly, Ball, Globe , Angle valve etc., Intelligent control valve, safety relief valves, non-return valves, upstream/downstream control valves/ gas filling heads etc. Performance evaluation, noise & vibration measurements of control valves.

## 2. General Information

- **Research - Test Facility**

In case trainees require calibration of flowmeters / instruments they can bring the same if it is handy. Opportunity is given to discuss flow metering problems with FCRI Engineers. FCRI will provide necessary services for calibration / testing / consultancy during their training at nominal charges.

- **Selection of Participants**

Candidates are requested to submit job report based on his study, qualification & experience with the application form. The report will be assessed for selection of candidates for the training course.

- **Reports**

Trainees will be required to submit the following reports during the course of training programme and at the end.

- a) Report on laboratory exercises
- b) Project report on selected problem
- c) Comprehensive training report

### 2.1 Sponsorship

The Training programmes organised at FCRI are sponsored by Ministry of External Affairs, Govt. of India under ITEC/SCAAP schemes. Details of courses offered are available on the website of concerned Indian Embassies. Those interested have to contact concerned Indian Embassies abroad for more details.

### 2.2 Self Financing Scheme

Applications to be forwarded through respective Indian Missions to FCRI. All expenses to be borne by Candidate / Sponsoring Organisation. Prescribed application form is available at FCRI website [www.fcricriindia.com/training](http://www.fcricriindia.com/training).

Course fee (under Self Financing Scheme): US\$ 4000 for 9 weeks. Service tax will be extra as applicable.

The course fee includes Tuition Fee + Industrial Visits + FCRI Hostel and Food Expenses. The course fee has to be paid in advance to FCRI before the commencement of the course. Pickup and drop at Coimbatore/Kochi/Kozhikode Airport by FCRI. To & Fro travel expenses, Medical and other incidentals are to be borne by the Candidate.

### How to Apply

Applications must be submitted on line at [www.itecgoi.in](http://www.itecgoi.in) by filling up the **online application form** and take a print out of filled form. **This form is to be submitted to the nodal/designated Government Department/Agency of applicant's country.** The nodal department/agency will in turn forward the applications to the Embassy/High Commission of India. Applications must reach the Indian Embassy/High Commission not later than 3 months before the commencement of the course. Upon selection, the Embassy/High Commission of India will inform the concerned nodal Department/Agency who will in turn inform the applicant. Decision for grant of scholarship rests solely with the Ministry of External Affairs, Government of India.

## 2.3 Facilities & Extra Curricular Activities

Institute provides following facilities :

- Accommodation at FCRI International Trainees' Hostel
- TV with all International Channels for entertainment
- Indoor games viz. Table Tennis, Badminton (shuttle), Carroms etc.
- Outdoor sports viz. football ground, volleyball court
- Mini bus for educational and sight seeing trips



## 2.4 Industrial Visits & Sight Seeing

- Visits to industries and Sight seeing trips around southern part of India will be arranged during the weekends. Industrial visits include valve manufacturing units, heavy industries, IISc./IIT/IIM and other major industries from public and private sector.
- 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, Munnar - Gracious hill station, Trivandrum - 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), Bangalore & Mysore (Palace), Madurai Meenakshi Temple etc.

## 2.5. How to Reach FCRI

FCRI is at Kanjikode, a town located in Palakkad. Kerala State. It is well connected to the International Airports of New Delhi, Madras (Chennai), Bombay (Mumbai), Coimbatore, Cochin (Kochi) & Calicut (Kozhikode), southern part of the Indian Peninsula (Kerala State). The nearest domestic airport is at Coimbatore which is 40 Km from FCRI.

## 2.6 Climate

Tropical climatic conditions prevail in this area. During the period from January to March weather will be pleasant with average day temperature about 28°C and the night temperature about 22°C. April to June average day temperature will be about 34°C and night temperature about 26°C. June to August average day temperature will be 28°C and night temperature about 24°C with monsoon rains. September to December weather will be pleasant with average day temperature about 26°C and night temperature about 22°C.

## 2.7 Communication Channels

E-Mail	:	<a href="mailto:training@fcriindia.com">training@fcriindia.com</a>
Website	:	<a href="http://www.fcriindia.com">http://www.fcriindia.com</a>
Fax	:	91 - 491 - 2566326
Phone	:	91 - 491 -2566120 / 2566206 / 2566119





# Welcome to KERALA - God's Own Country



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

Kanjikode West, Palakkad – 678 623, Kerala, India

Phone: 0491-2566119, 2566120/2566206, 2569010, Email : [fcri@fcriindia.com](mailto:fcri@fcriindia.com), [training@fcriindia.com](mailto:training@fcriindia.com)

Fax: 0491-2566326



*Munnar, Kerala*