



# INTERNATIONAL TRAINING PROGRAMMES 2019-20

***SPONSORED BY***

**MINISTRY OF EXTERNAL AFFAIRS, GOVT. OF INDIA UNDER  
INDIAN TECHNICAL AND ECONOMIC COOPERATION PROGRAMME (ITEC)**



## **FLUID CONTROL RESEARCH INSTITUTE**

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



Fluid Control Research Institute, Palakkad, India, a specialised facility for design and development of flow products / measurement techniques, is the first of its kind in South Asia. Established by the Government of India (Ministry of Industry) as a UNDP assisted project in 1989 with the active support of UNIDO as the executing agency, the Institute represents the first serious attempt to provide a frame of reference and standardisation to critical aspects of Fluid flow measurement and Control in industrial process and distribution systems. The Institute provides infrastructural facilities for applied research projects in the area of fluid flow. It also acts as a National Certifying Authority for testing and calibration of all types of flow products and related measuring instruments. 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 1750 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.

We are glad to say that over the past three decades, FCRI has contributed a lot for the growth of flow product industry by providing services in associated fields. We take this opportunity to appreciate the support given to us by various industries across the world. We also like to put on record our thanks and appreciation to all the flow product industries, business institutions in Oil, water, gas and other process industries for their immense support provided by utilizing our high-tech advanced technical services.

FCRI is manned by a team of experienced Engineers having hands-on experience on flow measurement and control. Key personnel have been trained at National Engineering Laboratory,U.K., National Research Laboratory for Metrology, Japan, Delft Hydraulics, Netherlands, Cranfield Institute of Technology, U.K, Von Karman Institute, Belgium, Bruel & Kjaer (B&K) Denmark etc. Training programmes in the area of flow measurement and control are conducted regularly by FCRI for both Indian and foreign nationals.

FCRI has been empanelled by Ministry of External Affairs, Govt. of India to impart Training under ITEC scheme. Under this scheme, professionals and people from developing countries are offered unique training courses to empower the participants with not just professional skills, but prepare them for an increasingly globalized world.

Over the past three decades, FCRI has given advanced Training to more than 1200 overseas personnel from 90 countries under ITEC scheme sponsored by Ministry of External Affairs, Govt. of India. Our high-tech Technical Training programmes cater to the growing demand of service oriented professionals. FCRI aims at reaching the mass across the globe by imparting training with updated methodology. Several personnel working in Petroleum, Oil & Gas, Process Industry, Water Boards, Refineries, Weights & Measures department etc. have been benefitted out of our technical training programmes. As a result of different activities under this programme, there is now a visible and growing awareness among other countries about the competence of India as a provider of technical know-how and expertise as well as training opportunities, consultancy services and feasibility studies. These programmes have generated immense goodwill and substantive cooperation among the developing countries. Our Training programme will provide a platform for the technology leaders to understand and leverage disruptive technologies and enable business growth through innovation. This will serve as a launch pad to share knowledge and skills relevant to emerging disruptive technologies & to create strategies to manage the risks associated with disruptive technologies. We sincerely hope that our efforts to impart quality training programmes to overseas personnel would fetch more positive results and large number of technical personnel would be benefitted from our high-tech advanced Training programmes.

Wishing the participants all the very best..

*Dr. Jacob Chandapillai*

**DIRECTOR**

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## **1.1: OIL, WATER, GAS FLOW MEASUREMENT, CONTROL TECHNIQUES & STANDARDS (01st IN SERIES)**

Instruction Medium	:	English
Number of Participants (anticipated)	:	20
Date	:	August 21, 2019 to October 21, 2019
Venue	:	Fluid Control Research Institute (FCRI), Palakkad, Kerala, India
Course fee	:	US\$ 4000 + Service tax applicable

### **Target Group**

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

### **Course Content**

General Orientation Programme on India and its culture.

Theory session 40%, on the Job Lab/Hands on training 40%, Evaluation of Projects and Standards presentation 20% on an average

- Flow Engineering Basics, Symbols, notations, schematics etc.
- Overview of units and conversion factors.
- Introduction to CFD & FEM and applications in Oil, Water & Gas Flow Metering, ANSYS,
- FLUENT Software
- Element of flow technology, method validation.
- Hands on experience on calibration of flow meters like orifice, venturi, turbine flow meters, ultrasonic flow meters, DDM, Electro Magnetic flow meter, magnetic flow meter, vortex meter etc. using water, oil, air media, calibration of CNG mass flow meters, methods validation.
- Testing of valves, safety valves and related pipeline products, air release valves, calibration of PD meter for oil application.

### **Selection & Application of flowmetres:**

Selection & Application of flowmeters used in Oil & Gas medium. Different types of flow meters. Control Techniques, Different types of control valves -Butterfly, Ball, Globe, Angle valve etc. Intelligent control valves, Flow characteristics of valves, non return valves, upstream / downstream control valves / gas filling head.

### **Flowmeters Evaluation / Calibration:**

Calibration of secondary instruments in flow metering and control, meter prover, Flowmeter "Model Approval" as per Organisation Internationale De Metrologie Legale (OIML) Standards, Calibration of flow meters in multi viscous media, Instrument, software for flow meter & control valve selection and sizings

### **Study of International Standards followed for Oil / Gas computations transfer:**

International Standards followed in Oil and Gas flow measurement like API, AGA, OIML etc. Custody transfer in petro chemical industry - Norms / Calculation, Heating value calculation.

### **Performance Quality aspects in flowmetering systems:**

Assessment of uncertainty and statistical analysis of accuracy in fluid flow, Traceability of measurement, maintenance aspects of flow meters, valves and its related custody transfer instrumentation according to OIML / ISO standards.

### **Flow network System parameters:**

Fluid flow pressure surge analysis, inspection and auditing of flow meter investigations to check conformance to API/I AGA, Flow measurement and control in industrial process control, natural gas properties and computations for flow correction, Oil and gas network distribution analysis technique storage tanks, prover systems.

### **Electronic Instrumentation Data Acquisition Systems:**

Flow measurement and control in distribution network. Flow computers for custody transfer Instrumentation related to flow measurement, Automatic level gauging of storage tanks, flow computers.



## 1.2. FLOW MEASUREMENT & CONTROL TECHNIQUES, SOFTWARE IN INDUSTRIAL PROCESS & WATER DISTRIBUTION SYSTEM (92<sup>nd</sup> IN SERIES)

Instruction Medium	:	English
Number of Participants (anticipated)	:	20
Date	:	March 16, 2020 to May 16, 2020
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, Chemical and Electrical Engineering with some back ground of industrial instrumentation and control of fluid flow. Participants may be from Industry, Water Boards, R&D organisations or Academic Institutes.

### **Course Content :**

#### ***General Orientation Programme on India and its culture.***

***Theory session 40%, On the job Lab/Hands on training 40%, Evaluation of Projects and standards presentations 20% on an average.***

#### **Flowmeters**

Differential pressure flow meters - Orifice plate, flow nozzle, venturi meters, Pilot static tubes etc. Mass flow meters - Coriolis, Thermal, Oscillating type flow meters, Vortex shedding, Fluidic, Positive Displacement meters, Turbine flow meters, Ultrasonic flow meters, Variable area meters, Electromagnetic flow meters, Latest developments in flow metering, Flowmeter selection & Sizing, Software for flow meter selection, Installation effects and maintenance aspects of flow meters, Two phase flow measurement techniques.

#### **Valves**

Control valves - Butterfly, Ball, Globe, Angle valve etc., intelligent control valve, safety relief valves, non return valves / gas filling heads etc. Performance evaluation, noise and vibration measurements of control valves, Aero dynamic noise Studies on control valves, Selection & Sizing of Valves. Automated calibration of vibration sensor and vibration analyser as per ISO 16063 part 21, DG set emission certification for seismic qualification of valves, Software for sizing of control Valves.

#### **Water Transmission & 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, Use of Software for design and optimization of water networks, selection of pumps, hydraulic transient analysis and Performance evaluation of pumps

#### **Flow network / System parameters**

Inspection and auditing of flow metering stations to check conformance to API/AGA, Flow measurement and control in industrial process control, natural gas properties and computations for flow correction, Oil and gas network distribution analysis techniques, Use of Computational Fluid Dynamic (CFD) analysis software for flow measurement and control applications. Non-Revenue Water, Leak detection methods and instruments, pipeline locators, Use of open source Software in design of water distribution systems.

#### **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. Performance evaluation of water meters, calibration of all types of flowmeters, Testing of valves, meter provers, Model approval of flowmeters as per Organisation Internationale De Metrologie Legale (OIML) standards, Calibration of flowmeters in multi viscous media.

**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. Calibration of Industrial and Laboratory grade sourcing and measuring instruments for Electrical & Thermal parameters, Performance tests for electronic measuring systems based on OIML Standards

#### **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, Inter-comparison of International labs.

#### **Electronics / Instrumentation Data Acquisition Systems**

Flow measurement and 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, Automatic level gauging of storage tanks. Design of specialized instrumentation and control set up. Software for control and Data acquisition.

## 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 their 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 for overseas personnel at FCRI are sponsored by Ministry of External Affairs, Govt. of India under ITEC scheme. Details of courses offered are available on the website of concerned Indian Embassies. Procedure to apply for the scholarship is enumerated, below, under the head “How to apply”

### 2.2 Self Financing Scheme (SFS)

Few seats are available under Self Financing Scheme also. 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). It may be noted that applications are not to be sent directly to the Institute and to be submitted through Indian Missions only. Applications, received through Indian Missions, duly verifying the credential of the candidates, will only be entertained

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

The course fee includes Tuition Fee + Study Tour + 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 Candidates.

### How to Apply

Interested candidates may (a) register themselves on <https://www.itecgoi.in> (b) fill the application form online, (c) upload a suitable photograph, and (d) forward two copies of the completely filled application form along with affixed color photographs through the nodal Ministry (Foreign Affairs Ministry) of their country. It may be noted that the High Commission of India/Indian Embassy does not entertain applications directly from the candidates. It may also be noted that applications are also not to be submitted directly to the Training institutions or to the Ministry of External Affairs. All applications are processed initially by the High Commission of India/Indian Embassy after which they are sent to the Ministry of External Affairs, New Delhi. The Ministry of External Affairs coordinates with the training institutions for selection of candidates. 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.,subject to getting permission.
- 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), Munnar, Athirapilly Water Falls,Parambikulam, Guruvayoor/Trichur,Trivandrum, Kanyakumari etc.

## 2.5. How to Reach FCRI

FCRI is at Kanjikode, Palakkad a town located in Kerala, which is very close to Coimbatore. The nearest airport is at Coimbatore which is 40 Km from FCRI. 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 other nearest International Airport is Kochi, 120 kms away from the Institute.

## 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

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# Welcome to KERALA-God's Own Country



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*Munnar, Kerala*