

सिंचाई अनुसंधान संस्थान  
IRRIGATION RESEARCH INSTITUTE

**WELCOME  
TO**

**IRI, ROORKEE**

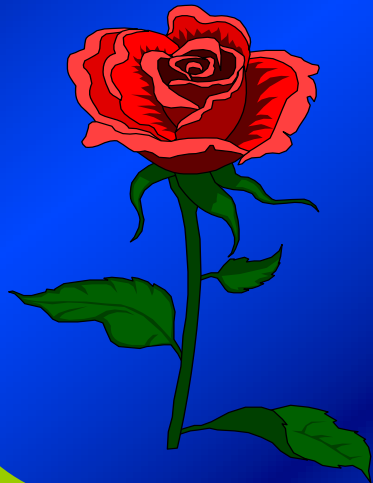
**An ISO 9001:2008 Certified Organization**



सिंचाई अनुसंधान संस्थान  
रुड़की

आई०एस०ओ 9001:2008 प्रमाणित संस्था

आपका स्वागत



करता है।

# Roorkee Town

- A historic town
- A well known Education and Research centre.
- Situated at the foothills of Himalayas and considered to be the gateway to pilgrimage centres of Uttarakhand State.
- Latitude  $29^{\circ}52'00''$  N
- Longitude  $77^{\circ}53'52''$  E
- Reduced Level 268.00 m amsl

## Thomason (Jenny Lind) Engine

8 km long track

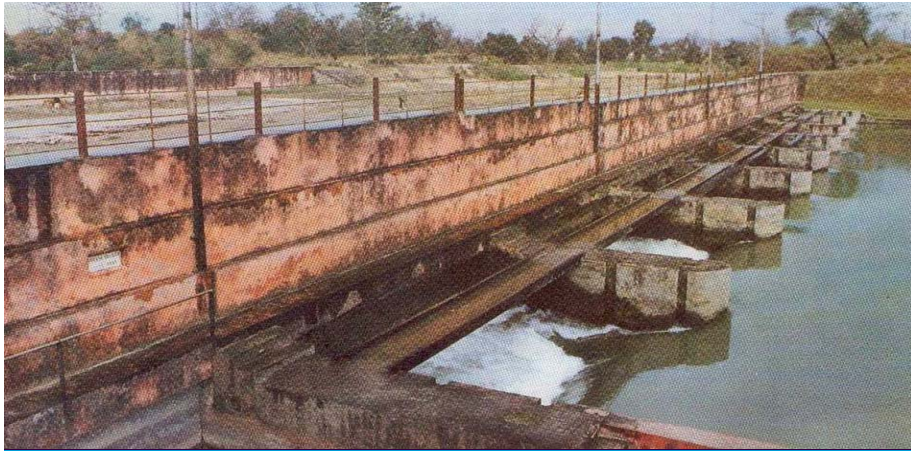
Roorkee

First Train in India

Piran Kaliyar

Gauge	– 4' 8.5"	No. of Wheels	– 6
Speed	– 6 km/h	Length of Track	– 8 km

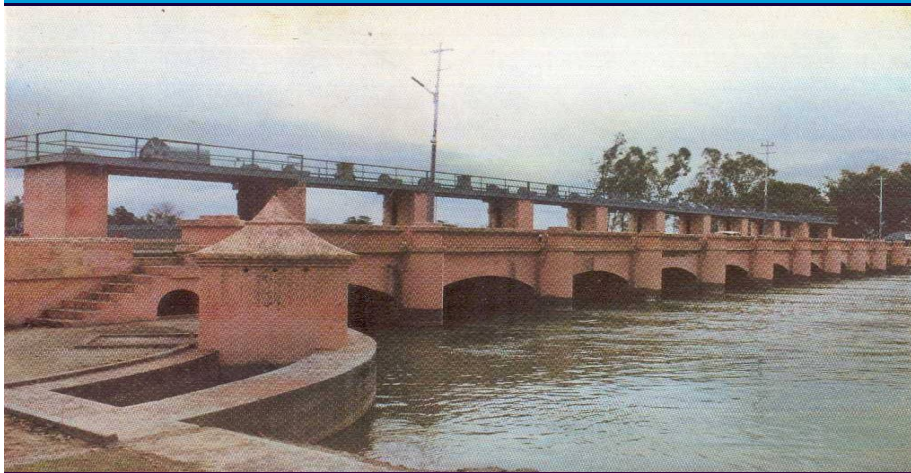
Deployed in the Service on **Dec. 22, 1851** between **Roorkee** and **Piran Kaliyar** during the construction of Solani Aqueduct on the Upper Ganges Canal for the first time in India.



Ranipur Syphon



Pathri Super Passage



Danauri Level Crossing



Solani Aqueduct

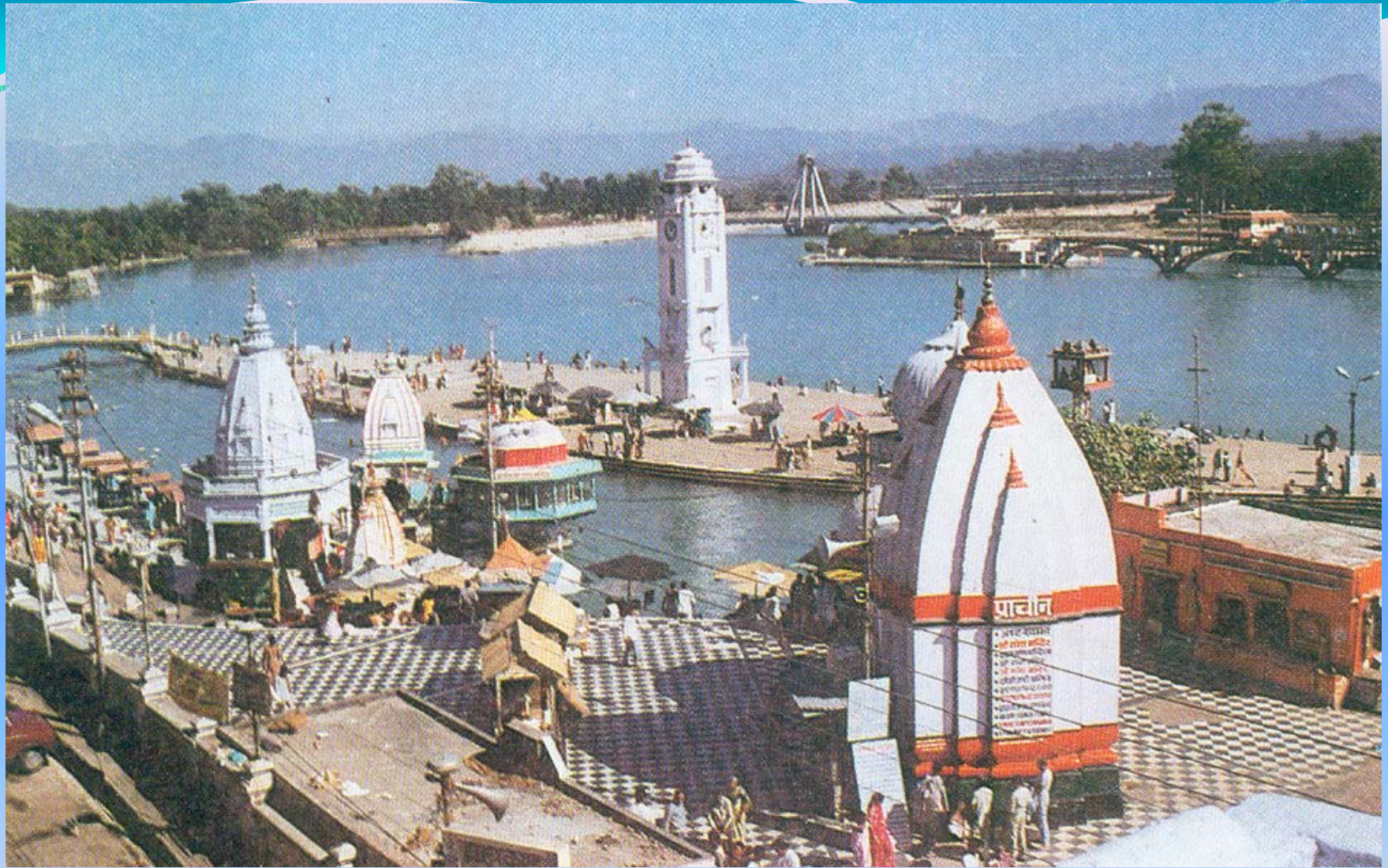
**Four Cross Drainage Works located on 160 year old Upper Ganga Canal conceived and built by Sir Proby Cautley in a length of 19 km.**



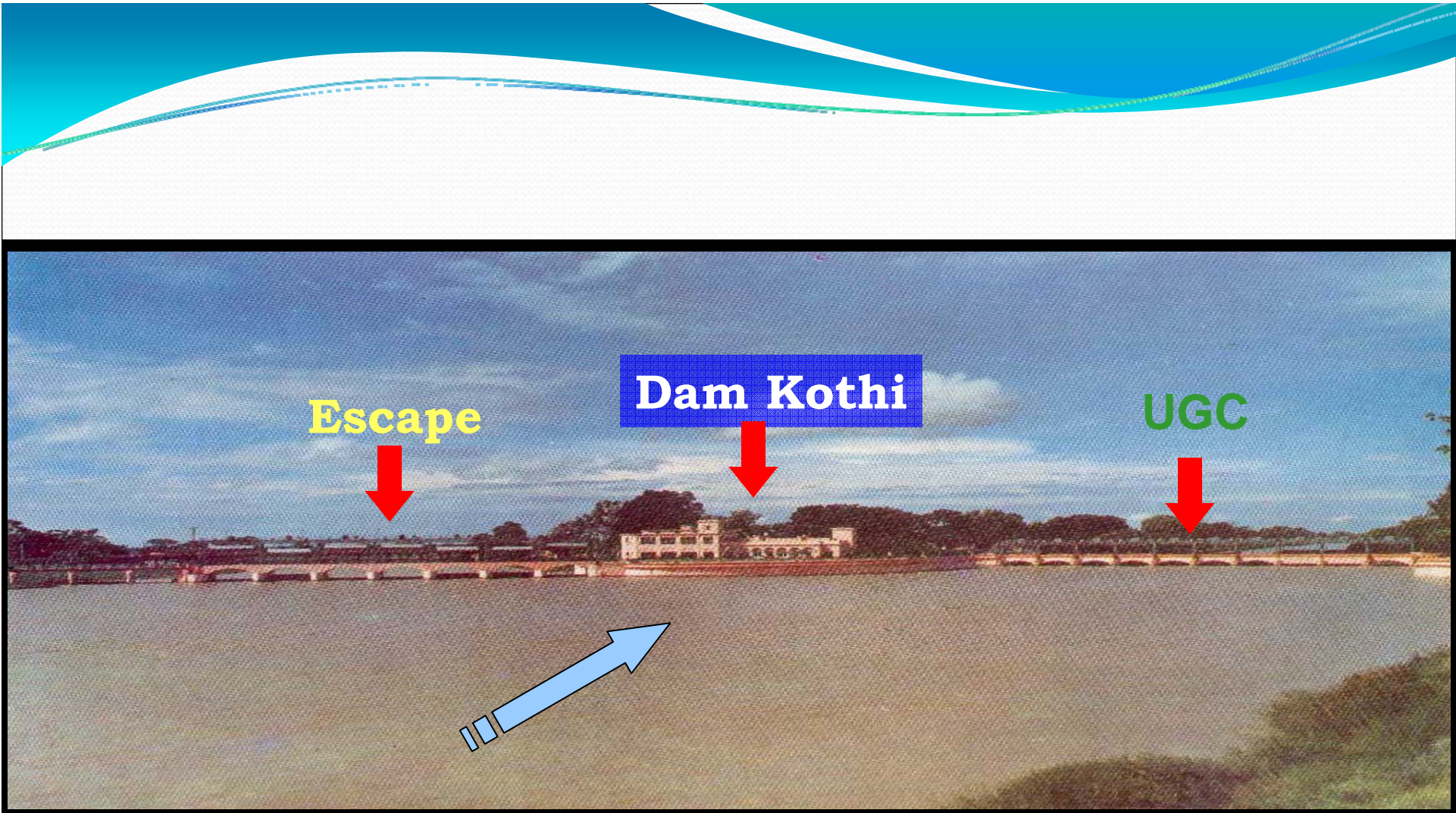
**Head Regulator**

**River Ganga**

**Bhimgoda Barrage at Hardwar, 30 km Roorkee**



Famous Har-ki-Pairi(Hindu Pilgrimage) built on Upper Ganga Canal at Haridwar



## Head of Upper Ganga Canal at Haridwar



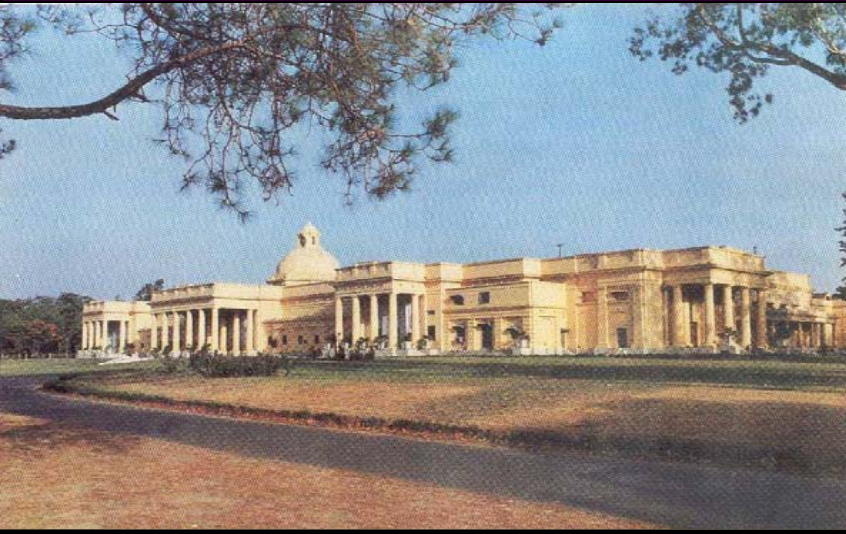
# Engineering Institutions at Roorkee



Govt. Workshop 1843



Bengal Engineers Group 1853



Thomason College/Univ. of Roorkee/IIT 1848



Aerial view

# Engineering Institutions at Roorkee



Central Building Research  
Institute 1950



Irrigation Research  
Institute 1954



Irrigation Design  
Organisation 1978



National Institute of  
Hydrology 1978

# Water Resources Departments at IIT & IRI, Roorkee



Civil Engineering Department



Water Resources Development and Management

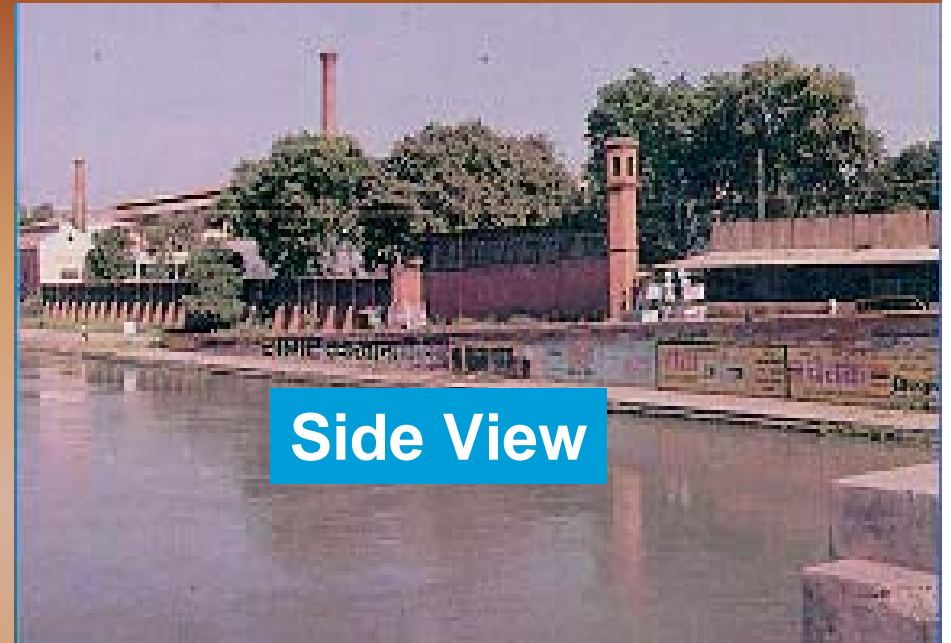


Alternate Hydro Energy Centre



Hydraulic Research Station Bahadrapad

# Govt. Workshop, Roorkee



Oldest Mechanical Workshop **established** in **1843** for the fabrication of Hydro mechanical equipment for the Construction of Upper Ganga Canal.

**Now, it is a part of Uttarakhand Irrigation Department.**

# Govt. Workshop, Roorkee



Wife of Col. Maclagan, Principal, Thomason College gave birth to a son in a room of the Workshop during the **First War of Independence** in 1857.

# Irrigation Design Organisation



Established in 1978 for the Design of Multi purpose hydroelectric projects in the Ganga and Yamuna Valley in the Himalayas.

Hydraulic and Structural Designs of various Water Resources and Hydropower Projects have been carried out in last 34 years.



**IRRIGATION**

**RESEARCH**

**INSTITUTE**

**ROORKEE**

**An ISO 9001:2008 Certified Organization**

# Irrigation Research Institute

- ❖ Under Administrative control of Uttarakhand Irrigation Department.
- ❖ Started as a Unit at Lucknow in 1928.



# Irrigation Research Institute

- ❖ Mr. Gerald Lacey, the propounder of famous Lacey's Regime Theory, was the first Research Officer of the Research Unit, who later became the
- ❖ Principal of the then Thomason College of Civil Engineering, Roorkee (Now, IIT Roorkee).

# Irrigation Research Institute

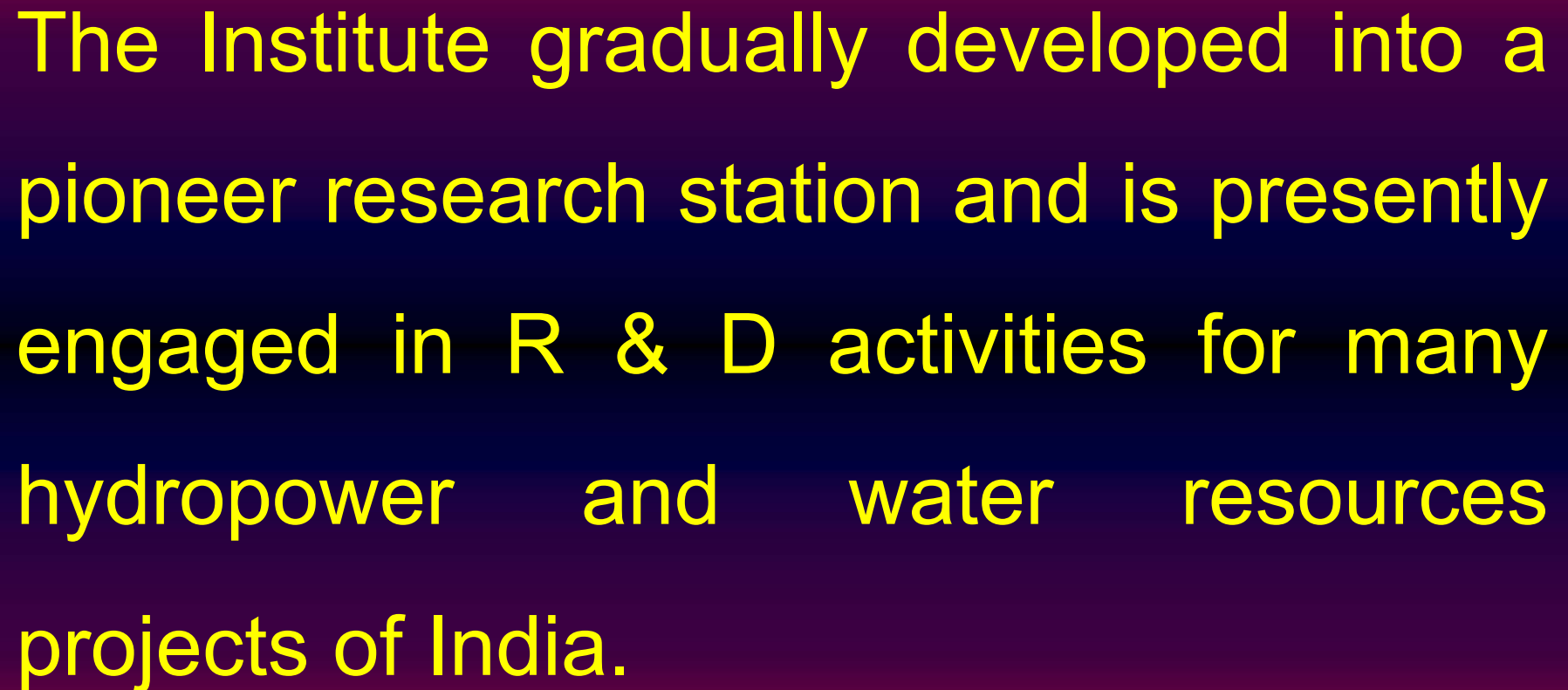
Later in 1946, the activities were expanded and it was shifted to Bahadrabad (Roorkee), where abundance of Hydraulic Model experimental facilities, **Water (6 - 8 cumec), Water Head (6-10m) and Space (~ 18 hect.)** were available.

A photograph of the Irrigation Research Institute in Roorkee. The main building is white with a sign that reads 'सिंचाई अनुसंधान संस्थान' (Irrigation Research Institute) and '1954'. A blue metal bridge spans a river in the foreground. The scene is framed by a yellow border.

# Irrigation Research Institute Roorkee

An ISO 9001:2008 Certified Institute

Established in 1954 at Roorkee



The Institute gradually developed into a pioneer research station and is presently engaged in R & D activities for many hydropower and water resources projects of India.

# Field of Activities

❖ **Evolving efficient and economical Design of Hydraulic and Hydropower Structures.**

❖ **Capacity of Reservoirs and Sedimentation Studies**

❖ **Mathematical Modeling of Hydraulic Structures**

# Field of Activities



**Ground Water Modeling**



**Canal Lining, Seepage Studies**



**Mathematical Modeling of Hydrological Events**

# Field of Activities



**Carrying out Geotechnical Investigations.**



**Design of Concrete Mixes.**



**Application of GIS and Remote Sensing Techniques in Water Resources Development.**

# Laboratories at IRI, Roorkee

## Material Testing

- **Cement and Concrete Lab.**



- **Roller Compacted Concrete Lab.**

- **Soil Laboratories**



- **Rock Mechanics Lab.**



- **Water Quality & Chemical Lab.**



# Laboratories at IRI, Roorkee

## Ground Water

- **Aquifer Modeling Lab.**
- **Electrical Analogy Lab.**
- **Artificial Ground Water Recharge Study.**

# Laboratories at IRI, Roorkee

## Basic Research

- **Computer Centre**



- **Mathematical Modeling Lab.**

- **Photoelastic Lab.**

- **Remote Sensing & GIS Lab.**



# Hydraulic Research Station, Bahadrapad



- about 20 Km from Roorkee enroute to Hardwar
- extends over an area of 30 Hectares
- the Water requirement is met by a gravity up to 10 m drop with feeder channel capacity of 8.5 cumec



Aerial View

**Hydraulic Research Station Bahadrabad**



**Aerial View**

**Hydraulic Research Station, Bahadrapad**



Main Feeder Channel

**Hydraulic Research Station, Bahadradab**

# Studies Carried out on Important Hydroelectric and Water Resources Projects



Tehri Hydroelectric Project (Uttarakhand)

# Studies Carried out on Important Hydroelectric and Water Resources Projects



**Top View of 260.5 m high Tehri Dam Model**



# Notable Contributions made by IRI, Roorkee

 **Design of Sharda Type Fall for Canals**

 **Design of Tunnel and Hopper Type Desilting Chambers**

 **Design of Different type of Filters for Tubewells**

# Notable Contributions made by IRI, Roorkee

☞ **Energy Dissipation through interaction of Two Jets in Space**

☞ **Energy Dissipation by Swirling Device for Shaft Spillways of Tehri Dam Project**

☞ **Impact Type Energy Dissipators for Ranipur Superpassage**

# Notable Contributions made by IRI, Roorkee

☞ **Design of Surge Systems under Transient Conditions**

☞ **Evolving Hydraulic Design Criterion for River Training Works**

☞ **Use of Isotope as Radio Active Tracer for Measurement of Discharge, Seepage etc.**



# Main Activities at

# Hydraulic Research Station Bahadrabad

# Modeling of Bridges across River Brahmaputra



**Model of a Rail-cum-Road Bridge across river Brahmaputra (Assam) at Bogibill**

# Modeling for Estimation of HFL



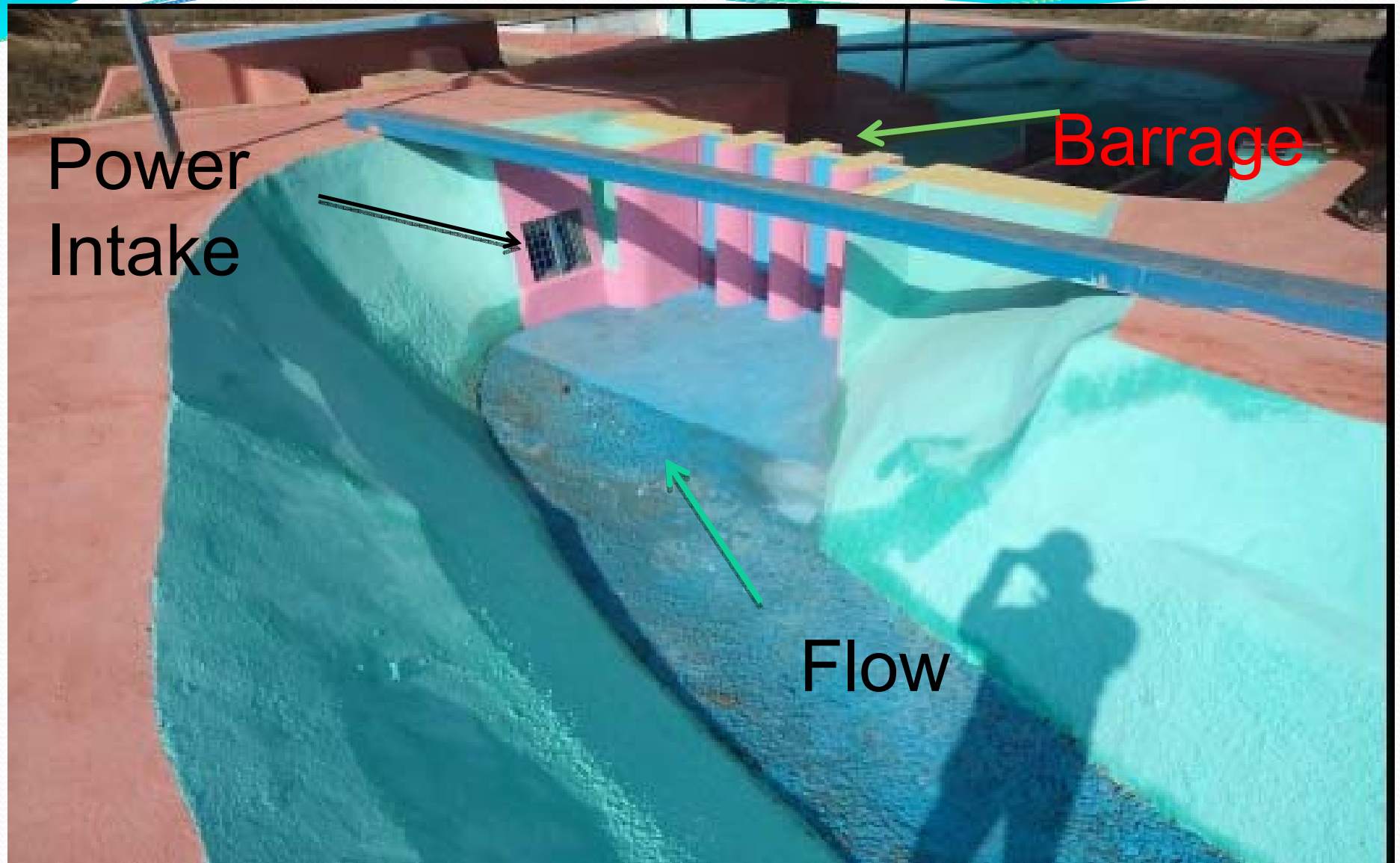
**Model of the river Ghaggar at Panchkula  
(Haryana)**

# Modeling of Barrages



**Model of Anandpur Barrage on river Baitarni (Odisha)**

# Modeling of Barrages



**Model of Miyar Barrage (Himachal Pradesh)**

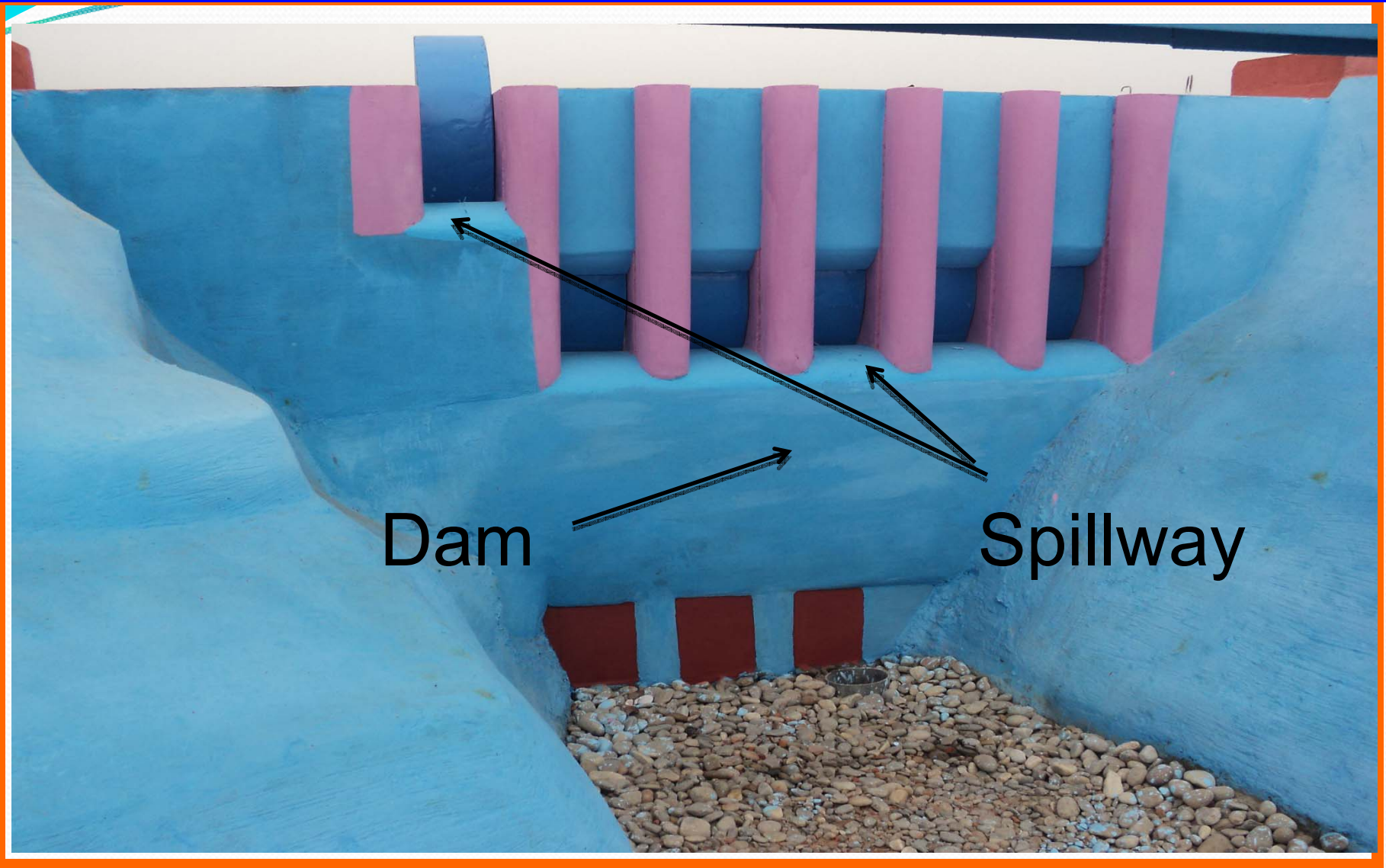


# River Training, Flood Protection Works and Anti-erosion Measures



Model of Chitauni Bund on river Sharda(UP)

# Modeling of Dams and Spillways



**Front View of Dam Model of Ratle HEP (J & K)**

# Modeling of Dams and Spillways



Trajectory over flip bucket

**D/S View of Ratle Dam Model**

# Modeling of Dams and Spillways



Top View

D/S View

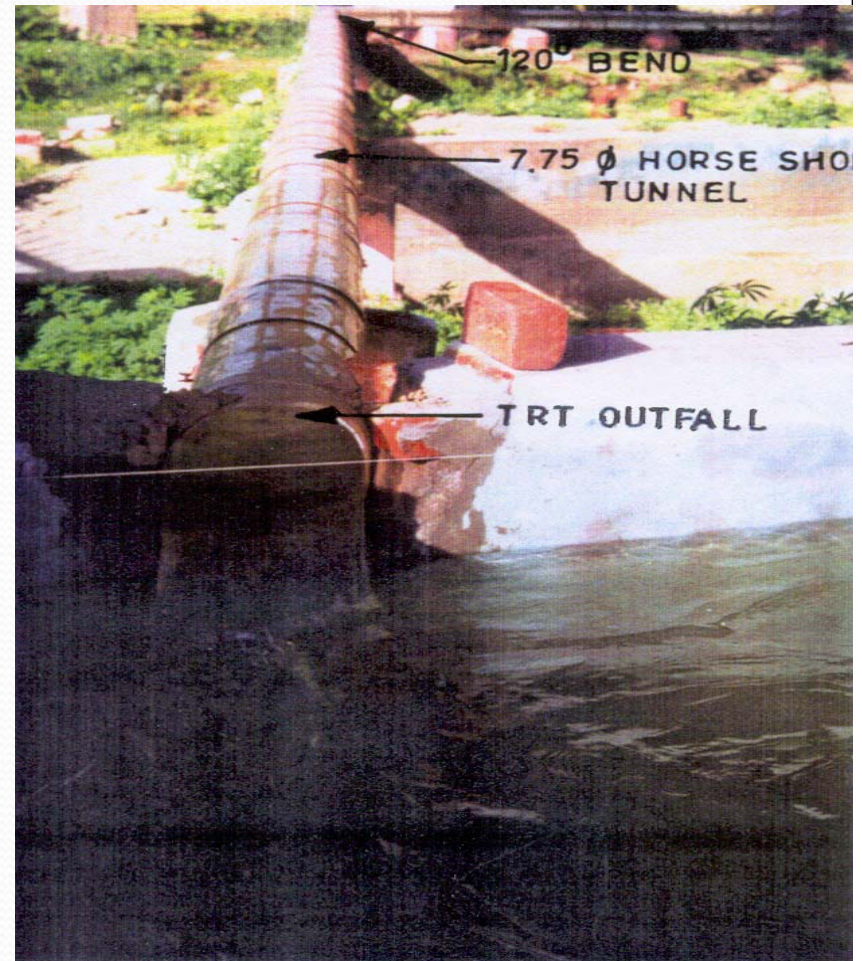


Flows through Spillway & Under Sluice



**Model of Dam of Dibbin HEP**

# Modeling of Water Conductor System and Water Hammer Studies



Model of Tail Race Manifold System

Tala Hydroelectric Project (Bhutan)

# Modeling of Water Conductor System and Water Hammer Studies



# Modeling of Water Conductor System and Water Hammer Studies



Model of Dharasu Surge Tank of Maneri Bhali  
Hydroelectric Project Stage-II(UK)

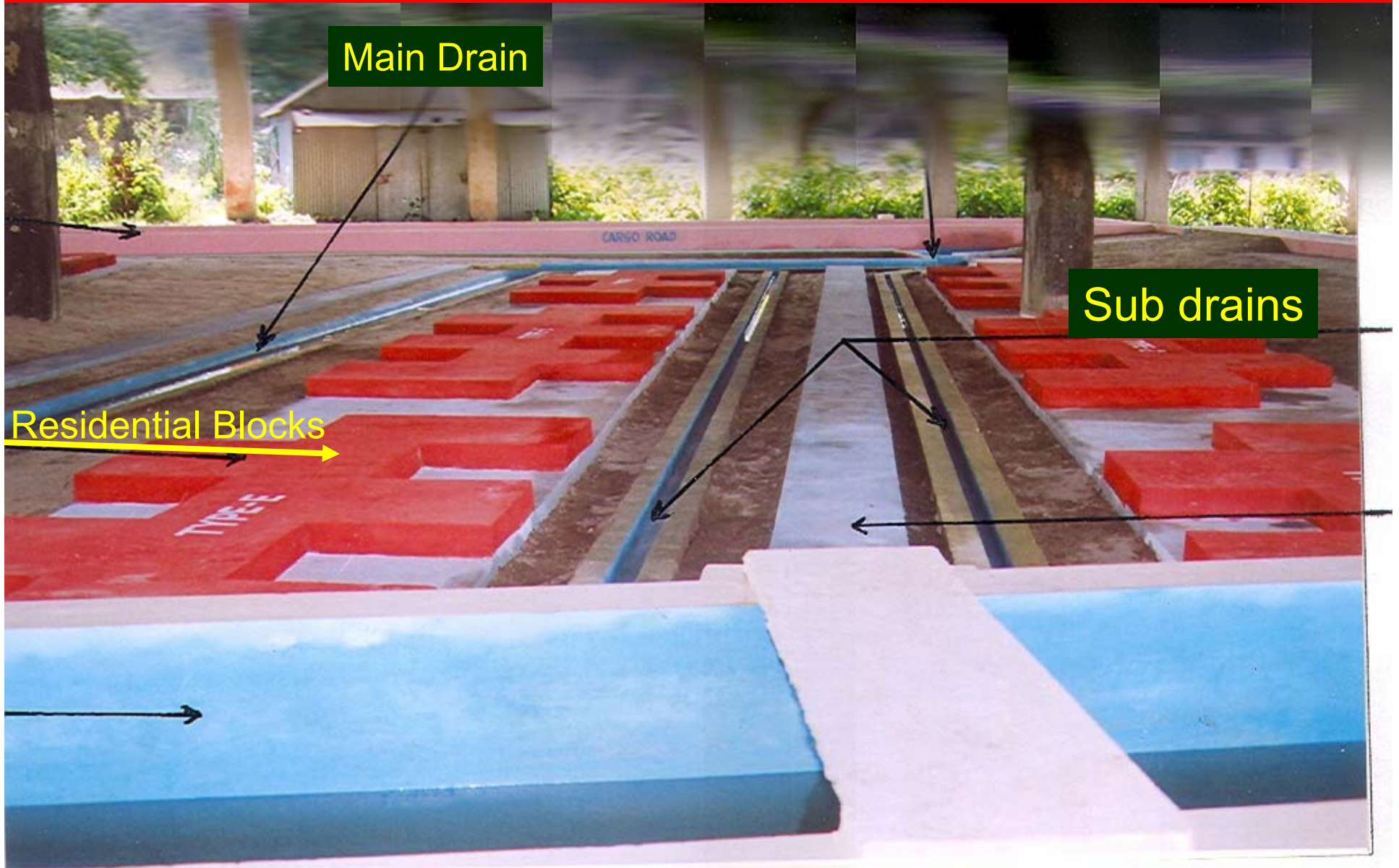
# Modeling of Desilting Chambers



Desilting Chamber of Bhilangana Hydroelectric Project

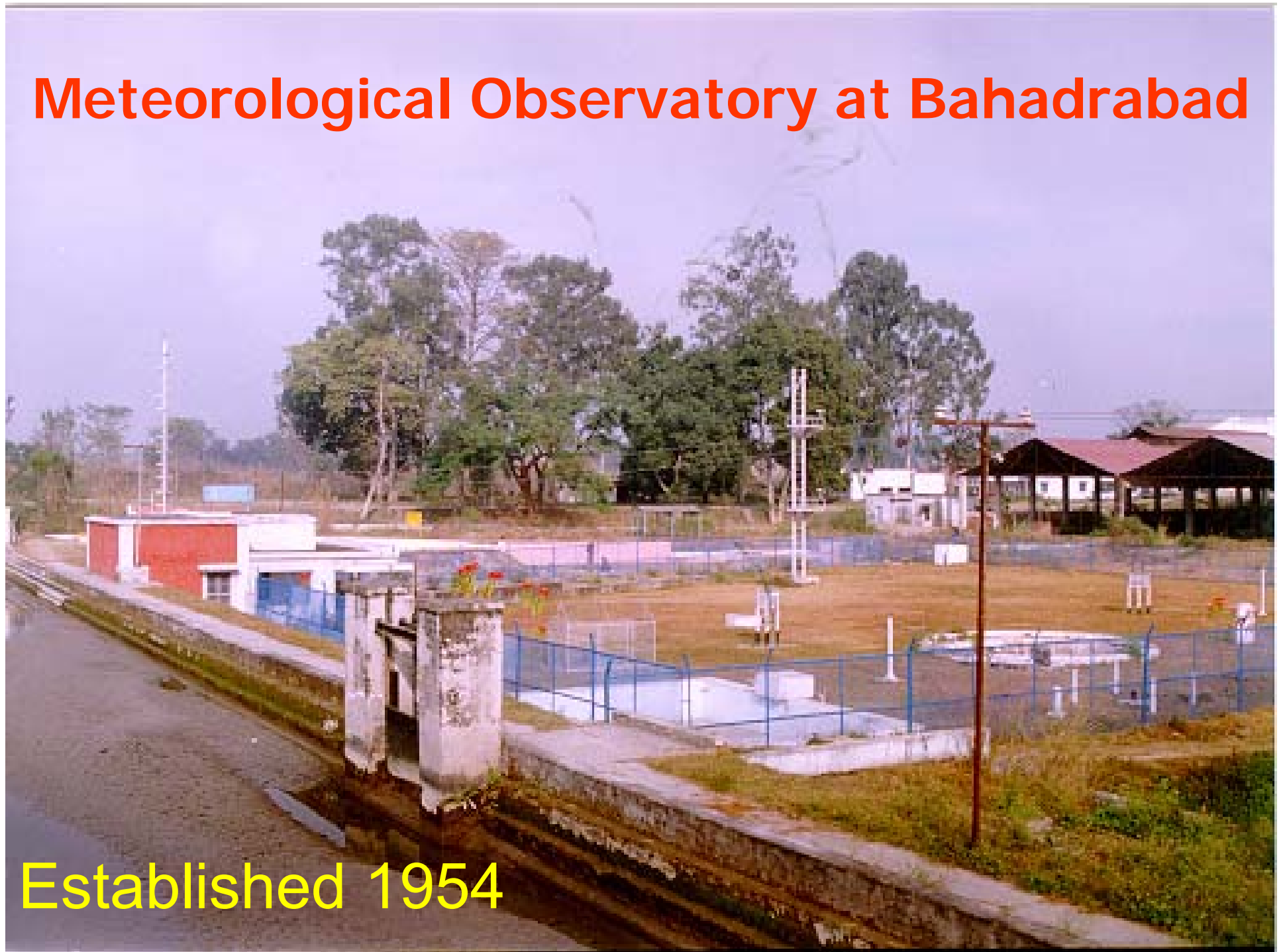


# Drainage Modeling









Model of Township-Mangalore Refinery and Petrochemicals Ltd.

# Meteorological Observatory at Bahadrapad



Established 1954








# Studies Carried out on Important Hydroelectric and Water Resources Projects

-  Water Management Scheme at Greater Shillong Meghalaya
-  Rangit Hydroelectric Project Arunachal
-  Bridge Siting at Lohit River Arunachal
-  Energy dissipator of Hydroelectric Project at Kalpong Andman  
Nicobar
-  Bridge Siting near Tezpur at Brahmaputra River Assam
-  Bridge Siting near Dehing at N.H. 37 Assam

# Studies Carried out on Important Hydroelectric and Water Resources Projects

-  Tirhut Canal Bihar
-  Proposed Road Bridge on Kosi River, Kursela Bihar
-  Salal Hydroelectric Project J&K
-  Rangit Hydroelectric Project Sikkim
-  Omkareshwar Hydroelectric Project MP

# Studies Carried out on Important Hydroelectric and Water Resources Projects

-  Larji Hydroelectric Project HP
-  Giri Hydroelectric Project HP
-  Bhabha Hydroelectric Project HP
-  Ganvi Hydroelectric Project HP
-  Rontong Hydroelectric Project HP
-  Baspa Hydroelectric Project HP
-  Nathpa Jhakri Hydroelectric Project HP

# Studies Carried out on Important Hydroelectric and Water Resources Projects



Karcham Wangtoo Hydroelectric Project

HP



Baggi Hydroelectric Project

Punjab



Western Yamuna Canal

Haryana



Ghaggar Bridge Siting in Panchkula

Haryana



Sukri Weir

Rajasthan



Rajasthan and Sarhind Feeder Channel





Rajasthan



Saurashtra Branch Canal, Surendra Nagar

Gujarat

# Studies Carried out on Important Hydroelectric and Water Resources Projects

-  Jarauli Pump Canal Project UP
-  Lahchura Dam Project UP
-  Agra Barrage Project UP
-  Mahoba Dam Project UP
-  Modernisation of Upper Ganga Canal Project UP
-  Eastern Ganga Canal Project UP
-  Sharda Sagar Dam UP

# Studies Carried out on Important Hydroelectric and Water Resources Projects

-  Madhya Ganga Canal Project UP
-  Saryu Canal Project UP
-  Sharda Sahayak Project UP
-  Chambal Dal Canal Project UP
-  Rihand Dam Project UP
-  Ban Sagar Feeder Channel Project UP
-  Ramganga Project UP



# Studies Carried out on Important Hydroelectric and Water Resources Projects



Tehri Dam Project

UK



Yamuna Hydroelectric Project Stage- I

UK



Yamuna Hydroelectric Project Stage- II

UK



Maneri Bhalı Hydroelectric Stage- I

UK



Maneri Bhalı Hydroelectric Stage- II

UK



Chilla Hydroelectric Project








UK



Srinagar Hydroelectric Project

UK

# Studies Carried out on Important Hydroelectric and Water Resources Projects

-  Vishnuprayag Hydroelectric Project UK
-  Lakhwar Vyasi Hydroelectric Project UK
-  Jamrani Dam Project UK
-  Khara Hydroelectric Project UK
-  Katapathar Barrage UK
-  Tanakpur Hydroelectric Project UK
-  Nanaksagar Dam Project UK

# Current Assignment

- (i) **Sedimentation/Desilting chamber/tank**
  - (a) Shri Nagar HEP(Uttarakhand)
  - (b) Upper marsyangdi HEP (Nepal)
  - (c) Pipalkoti HEP(Uttarakhand)
  - (d) Rangit HEP (Sikkim)
  - (e) Tista Stage-III HEP(Sikkim)
  - (f) Naitwar-Mori HEP(Uttarakhand)

# Current Assignment

## (ii) Spillway, Under sluice and Energy dissipation devices

- Kalisindh Dam Project (Rajasthan)
- Dibbin HEP (Arunachal Pradesh)
- Miyar HEP (Himachal Pradesh).
- Ratle HEP (Jammu & Kashmir)
- Rogini-Chu HEP (Sikkim)
- Bijoli- Holi HEP (Comprehensive Model)
- Pipalkoti HEP (Uttarakhand)
- Hasan Dam (Republic of Yemen)
- Upper Marsyangdi HEP (Nepal)

# Current Assignment

## (ii) Spillway, Under sluice and Energy dissipation devices

- Jhelum Tamak HEP (Uttarakhand)
- Nyabarongo HEP-Rwanda (East Africa)
- Samodha Barrage (Chhatishgarh)
- various barrages across river Mahanadi (CG)
- Rangit stage IV HEP (Sikkim)
- Kemang HEP (AP)
- Barrage Shimla (HP)
- Soma-Sissri HEP (Arunachal Pradesh)

# Current Assignment

- **(iii) Hydraulic Design of Power Intake**
- Dibbin HEP (Arunachal Pradesh)
- Miyar HEP (Himachal Pradesh).
- Ratle HEP (Jammu & Kashmir)
- Rogini-Chu HEP (Sikkim)
- Bijoli- Holi HEP (Himachal Pradesh)
- Pipalkoti HEP (Uttarakhand)
- Nyabarongo HEP-Rwanda (East Africa)
- Tehri Pump Storage Projects (Uttarakhand)

# Current Assignment

## **(iv) Determination of axes of Barrage, bridge, etc.**

- Miyar HEP (Himachal Pradesh)

## **(v) Estimation of High Flood Level**

- Kalisindh Dam Project (Rajasthan)

## **(vi) Studies for flood protective measures**

- Protection works of Railway Bridge No. 47 & 51 across river Kosi and Baghmata in Mansi-Saharsa Section (Bihar)
- Rail-cum-Road Bridge across river Brahmaputra at Bogibil (Assam)

# Current Assignment

## **(vii) Studies for River Training Works**

- Kalisindh Dam Project (Rajasthan)
- Availability of Water from River Ghaghra to Tanda Pump House (Uttar Pradesh)

## **(viii) Studies for Canal, Canal Head and Cross Regulators, Cross drainage works (Aquaduct, Super passage, siphon aquaduct, level crossing), etc.**

- Anandpur Barrage (Odisha)



# Current Assignment

## **(ix) Surge Tank and Penstocks**

- Rampur HE project (Himachal Pradesh)
- Tehri Pump Storage Projects (Uttarakand)

## **(x) Diversion Tunnel**

- Dibbin H.E. Project (Arunachal Pradesh)
- Upper Marsyangdi HEP (Nepal)

## **(xi) Studies for afflux due to construction of dam/barrage/bridges, etc.**

- Kalisindh Dam Project (Rajasthan)

# Current Assignment

## **(xii) Studies of Reservoir sedimentation**

- Dibbin H.E. Project (Arunachal Pradesh)
- Upper Marsyangdi HEP (Nepal)
- Ratle HEP (Jammu & Kashmir)
- Bijoli- Holi H E Project (Himachal Pradesh)
- Nyabarongo HEP-Rwanda (East Africa)
- Miyar H.E. Project (Himachal Pradesh).

## **(xiii) Studies for afflux due to construction of dam/barrage/bridges, etc.**

- Kalisindh Dam Project (Rajasthan)

# Current Assignment

**(xiv) Studies for guide and afflux bunds due to construction of dam/barrage/bridges, etc.**

- Rail-cum-Road Bridge across river Brahmaputra at Bogibil (Assam)

**(xv) Pump Storage Plants**

- Tehri PSP (Uttarakhand)

**(xvi) Basic Study**

- Scour Around Piers

# Current Assignment

## Ground Water Recharge Studies

- **Artificial Ground Water Recharge Studies of Gurgaon & MahendraGarh (Haryana)**

## Soil Testing

- **Lab. & In-situ tests of Soils of Various Projects**

# Current Assignment

## Material Testing

### Testing of

- Cement,
- Aggregates,
- Bricks,
- Steels, etc. of various Projects



# AWARDS

- The Institute received the **Ist C.B.I. & P. Trophy in 1986** for Outstanding Contribution in the field of Research & Development.
- The Institute also received **CBIP - HI - TECH Award - 87.**

# Awards



**Pt. Jawahar Lal Nehru Birth Centenary  
Research Award(CBIP)**



**Young Engineers Award(CBIP)**



**Cash Your Idea Awards(CBIP)**

# Awards

 **Hydrosem Award** of The  
Institution of Engineers (India)

 **Four Gold Medals (Khosla Awards)**

 **D. B. ANAND Medal (CBI&P)**



# Awards



**Several Certificates of Merit**



**A number of Cash Awards**



**Various Other Awards**

**More than 600 Research Papers have been published.**



Thank You