INDIA-AFRICA S&T INITIATIVE

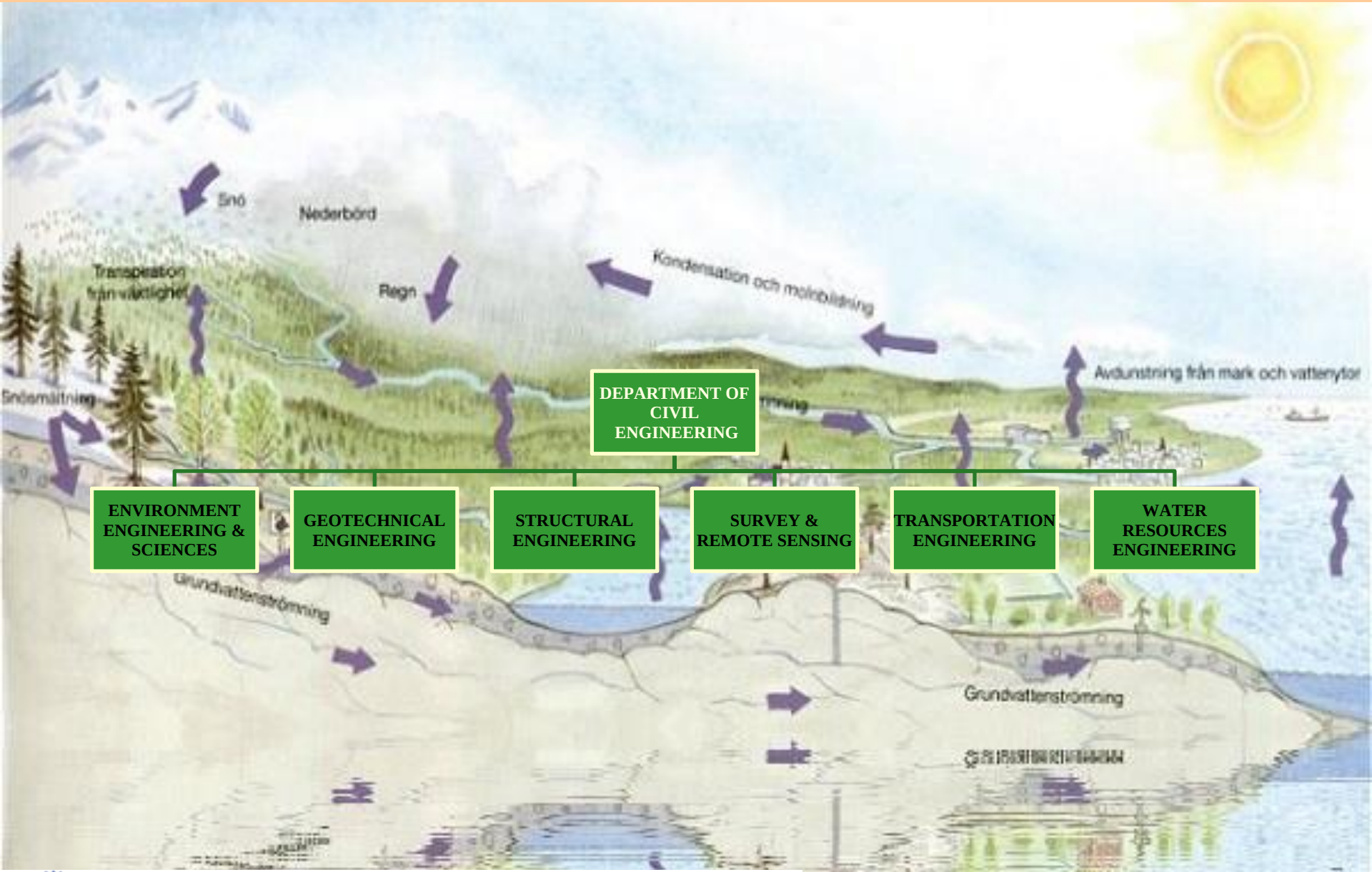
RAKESH KHOSA
PROFESSOR OF CIVIL ENGINEERING,
IIT DELHI

INTRODUCTION
TO

DEPARTMENT OF CIVIL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY, DELHI

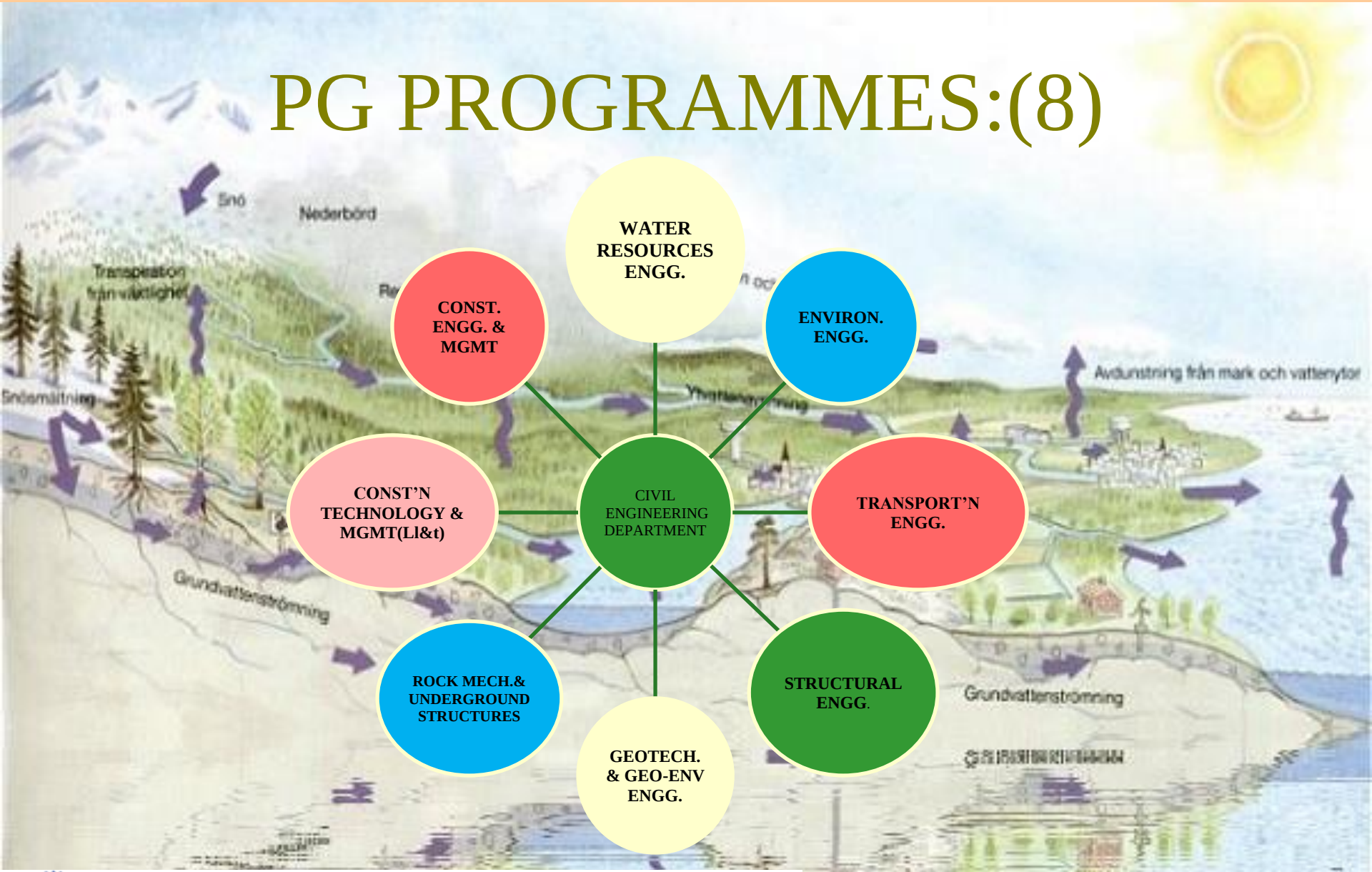
Water Resources Engineering @ Department of Civil Engineering



DEPARTMENT OF CIVIL ENGINEERING

- ENVIRONMENT ENGINEERING & SCIENCES
- GEOTECHNICAL ENGINEERING
- STRUCTURAL ENGINEERING
- SURVEY & REMOTE SENSING
- TRANSPORTATION ENGINEERING
- WATER RESOURCES ENGINEERING

PG PROGRAMMES:(8)



UG PROGRAMME

COURSES FROM THE DOMAIN OF WATER, GEO-INFORMATICS, ENVIRONMENT AND SANITATION

WATER & GEO-INFORMATICS

- CVL281 Hydraulics: 4
- CVP281 Hydraulics Lab: 1
- CVL282 Engineering Hydrology: 4
- CVL381 Design of Hydraulic Structures: 4
- CVL383 Water Resources Systems: 2
- CVL384 Urban Hydrology: 2

WATER & GEO-INFORMATICS

- CVL385 Frequency Analysis in Hydrology: 2
- CVL386 Fundamentals of Remote Sensing: 3
- CVL481 Water Resources Management: 3
- CVL482 Water Power Engineering: 3
- CVL483 Groundwater & Surface-water Pollution: 2

WATER & GEO-INFORMATICS

- CVL483 GW & SW Pollution: 2
- CVP484 Comp. Aspects in WR: 3
- CVL485 River Mechanics: 3
- CVL486 Geo-informatics: 3
- CVL837 Mechanics of Sediment Transport: 3

ENVIRONMENT AND SANITATION

- CVL721 Solid Waste Engineering: 3
- CVL724 Environmental systems analysis: 3
- CVL727 Environmental risk assessment: 3
- CVL728 Environmental Quality Modeling: 3
- CVL820 Environmental impact assessment: 3

ENVIRONMENT AND SANITATION

- **CVL822 Emerging Technologies for Environmental Management: 3**
- **CVL823 Thermal Techniques for Waste Management: 3**
- **CVL824 Life Cycle Analysis and Design for Environment: 3**

PG PROGRAMME IN ENVIRONMENT AND SANITATION (CORE)

- CVD720 Major Thesis Part-I: 6
- CVD721 Major Thesis Part-II: 12
- CVD726 Minor Project: 3
- CVL720 Air Pollution and Control: 3
- CVL721 Solid Waste Engineering: 3

PG PROGRAMME IN ENVIRONMENT AND SANITATION (CORE)

- CVL722 Water Engineering: 3
- CVL723 Wastewater Engineering: 3
- CVL724 Environmental Systems Analysis: 3
- CVL725 Environmental Chemistry and Microbiology: 3

Total Credits 39

PG PROGRAMME IN ENVIRONMENT AND SANITATION (ELECTIVES)

- CVL727 Environmental risk assessment: 3
- CVL728 Environmental Quality Modeling: 3
- CVL729 Environmental Statistics and
- Experimental Design: 3
- CVL820 Environmental Impact Assessment: 3

PG PROGRAMME IN ENVIRONMENT AND SANITATION (ELECTIVES)

- **CVL821 Industrial Waste Management and Audit: 3**
- **CVL822 Emerging Technologies for Environmental Management: 3**
- **CVL823 Thermal Techniques for Waste Management: 3**
- **CVL824 Life Cycle Analysis and Design for Environment: 3**

PG PROGRAMME IN ENVIRONMENT AND SANITATION (ELECTIVES)

- **CVL825 Fundamental of Aerosol: Health and Climate Change: 3**
- **CVL826 Quantitative Microbial Risk Assessment: 1**
- **CVL827 Environmental Implications of Engineered Nanomaterials: 2**
- **CVL828 Water Distribution and Sewerage Network Design: 3**

PG PROGRAMME IN ENVIRONMENT AND SANITATION (ELECTIVES)

- **CVP820 Advanced Air Pollution Laboratory: 3**
- **CVP821 Advanced Water and Wastewater Laboratory: 3**
- **CVS720 Independent Study: 3**

WATER RESOURCES ENGINEERING PROGRAMME

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INDIAN INSTITUTE OF TECHNOLOGY, NEW DELHI

AN INTRODUCTION

FACULTY (7 + 2 + ---)

- CHAKMA, S
- CHAHAR, B.R.
- DHANYA, C.T.
- GARG, N.K.
- KAUSHAL, D.R.
- KESHARI, A.K.
- KHOSA, R. (Indo-Africa S&T Initiative Coordinator)
- (Retd.) GOSAIN, A.K.
- (Retd.) MATHUR, S.

Faculty & Research Areas

Chahar, B.R.

Professor

Canal Design; Groundwater Modeling and Recharge; Seepage and Drainage; Stream – Aquifer interaction; Numerical Techniques; Optimization

Chakma, S.

Assistant Professor

Settlement in Landfills; GIS based Landfill Management; Watershed Management; Open Channel Hydraulics; Contaminant Hydrology

Dhanya C.T.

Associate Professor

Hydroclimatological Modeling, Nonlinear Dynamics and Chaos Theory, Stochastic Hydrology, Data Mining in Hydrology, Water Resources Management.

Faculty & Research Areas

Rakesh Khosa

Professor

Hydrodynamic and Anomalous Transport Phenomena, Water Resources Systems; Stochastic Processes; Conflict Resolution, and Hydrologic Modeling of Large River Basin; Multiscale Forecasting, LCS & SOC in Geophysical Processes, Urban Storm Water Systems, River and River Basin Morphodynamics.

N.K. Garg

Professor

Water Resources Systems; Finite Element Watershed Modelling; Irrigation Management; CAD

Faculty & Research Areas

A.K. Keshari

Professor

Hydrological and Environmental Modeling; Sustainable Development; Remote Sensing and GIS; FEM; Waste Management and Sewerage Systems; Policy Analysis and Risk Assessment; Snow and Avalanche

D.R. Kaushal

Professor

Hydraulics and Water Resources Engineering; Fluid Mechanics; Sediment Transport; Hydraulic Structures; Multiphase Flows; Slurry Pipeline and Flume; Computational Fluid Dynamics; Flow Instrumentation

Faculty & Research Areas

A.K. Gosain (Retd)

Professor

Integrated Watershed Modleing; GIS; Hydrological Modeling; Irrigation Management; Climate Change; Environmental Impact Assessment

Shashi Mathur (Retd)

Professor

Groundwater Contamination; Bioremediation of Soils; Flow through Porous Media; Phyto-remediation; Biodegradation in Landfills

PG PROGRAMME IN WATER RESOURCES ENGINEERING (CORE)

- CVD831 Major Project Part-I: 6
- CVD832 Major Project Part-II: 12
- CVL730 Hydrologic Processes and Modeling: 3
- CVL731 Optimization Techniques in Water Resources: 3
- CVL732 Groundwater Hydrology: 3

PG PROGRAMME IN WATER RESOURCES ENGINEERING (CORE)

- CVL733 Stochastic Hydrology: 3
- CVL734 Advanced Hydraulics: 3
- CVL735 Finite Element in Water Res.: 3
- CVP730 Simulation Laboratory-I: 1.5
- CVP731 Simulation Laboratory-II: 1.5

WATER RESOURCES ENGINEERING (ELECTIVES)

- CVL736 Soft Computing Techniques in Water Resources: 3
- CVL737 Env. Dynamics and Mgmt: 3
- CVL738 Economic Aspects of WR Dev.: 3
- CVL830 Groundwater Flow and Pollution Modeling: 3
- CVL831 Surface Water Quality Modeling and Control: 3

WATER RESOURCES ENGINEERING (ELECTIVES)

- CVL832 Hydroelectric Engineering: 3
- CVL833 Water Resources Systems: 3
- CVL834 Urban Water Infrastructure: 3
- CVL835 Eco-hydraulics and Hydrology: 3
- CVL836 Advanced Hydrologic Land Surface Processes: 3

WATER RESOURCES ENGINEERING (ELECTIVES)

- CVL837 Mechanics of Sediment Transport: 3
- CVL838 Geographic Information Systems: 3
- CVL839 Hydrologic Applications of Remote Sensing: 3
- CVS730 Minor Project: 3
- CVS830 Independent Study: 3

ONGOING RESEARCH THRUST AREAS

RESEARCH THRUST AREAS

- **ANOMALOUS AND FRACTAL HYDRODYNAMIC TRANSPORT PHENOMENA**
- **LAGRANGIAN COHERENT STRUCTURES AND SELF ORGANISING CRITICALITY IN GEOPHYSICAL SYSTEMS**
- **COMPLEXITIES OF FLOW THROUGH CROWDED ENVIRONMENT**

RESEARCH THRUST AREAS

- **CFD BASED MODELLING**
- **INTEGRATED WATER RESOURCES SYSTEMS PLANNING AND MANAGEMENT**
- **WATER RESOURCES CONFLICT ANALYSIS AND MODELLING**
- **HYDRODYNAMIC MODELLING OF AQUATIC BODIES AND FLOWS IN OPEN CHANNELS**

RESEARCH THRUST AREAS

- **RISK BASED FLOOD PLAIN MAPPING USING MULTIVARIATE ANALYSIS**
- **HYDRODYNAMIC TRANSPORT AND EXCHANGE PROCESSES IN ESTUARINE SYSTEMS**
- **RIVER AND BASIN SCALE MORPHODYNAMICAL PROCESSES**

RESEARCH THRUST AREAS

- **WATER SUPPLY AND DISTRIBUTION**
- **HYDRODYNAMICS OF URBAN STORM WATER TRANSPORT, MODELLING URBAN FLOODING, MANAGEMENT AND CONTROL**
- **IRRIGATIONSYSTEMS AND IRRIGATIONS WATER MANAGEMENT**

RESEARCH THRUST AREAS

- HYDROLOGIC PROCESSES AND MODELLING
- SURFACE WATER QUALITY MODELLING
- GROUND WATER: TRANSPORT AND QUALITY
- SEDIMENT TRANSPORT & RIVER MECHANICS

RESEARCH THRUST AREAS

- FINITE ELEMENT MODELLING
- GEO-INFORMATICS & REMOTE SENSING
- BIO-REMEDIATION
- CLIMATE VARIABILITY AND ACCOMPANYING CHALLENGES
- GEOINFORMATICS & REMOTE SENSING

RESEARCH THRUST AREAS

- ENVIRONMENTAL FLOWS
- CONTAMINANT TRANSPORT MODELLING
- URBAN, POINT & NON-POINT SOURCE POLLUTION
- GROUNDWATER CONTAMINATION

RESEARCH THRUST AREAS

- BIO-REMEDIATION AND REHABILITATION OF SOIL AND WATER ENVIRONMENT
- ECOSYSTEM RESTORATION
- WATER USE EFFICIENCY

RESEARCH THRUST AREAS

NUMERICAL MODELLING APPROACHES SUCH AS:

- **FINITE ELEMENTS**
- **FINITE VOLUME**
- **BOUNDARY ELEMENTS**
- **ANALYTIC ELEMENT METHODS**

INDUSTRY PARTNERSHIPS

GOVERNMENT SECTOR:

CWC; NHPC; WAPCOS; ICID; CGWB; CBIP; PLANNING COMMISSION; MOWR, RD & GR; MoUD; STATE GOVERNMENTS; NGT ETC.

INDUSTRY PARTNERSHIPS

NON-GOVERNMENT SECTOR:

RELIANCE, ADANI, GREENPEACE ETC.

ONGOING IITD CIVIL - ETHIOPIA COLLABORATION

PG PROGRAMME SINCE 2010 IN THE AREA OF

CONSTRUCTION TECHNOLOGY

CLASSES/LECTURES VIA:

REAL TIME TWO WAY HIGH SPEED VIDEO LINK

THANK YOU