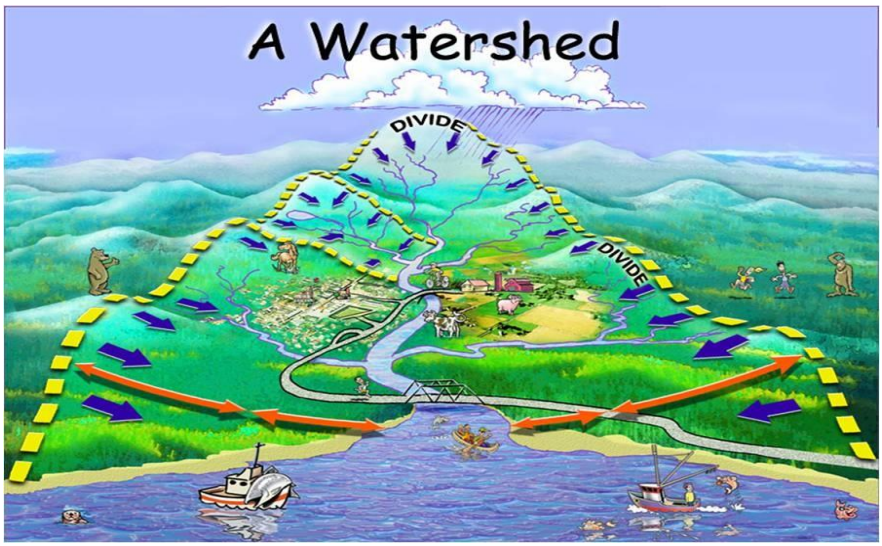
Five Days Training Course on

ADVANCED TOOLS & TECHNIQUES FOR HYDROLOGICAL INVESTIGATIONS

(22 – 26 February, 2021 at NIH, Roorkee)

A BRIEF REPORT



Compiled by:

Dr. Santosh M. Pingale, Scientist-C
Dr. Soban Singh Rawat, Scientist-D

NATIONAL INSTITUTE OF HYDROLOGY
ROORKEE- 247667 (UTTARAKHAND)

Training Course Organisers

Director	Dr. J. V. Tyagi
Division	Hydrological Investigations Division
Divisional Head	Dr. Sudhir Kumar, Scientist-G
Course Coordinator	Dr. Santosh M. Pingale, Scientist-C
Course Co-Coordinator	Dr. Soban Singh Rawat, Scientist-D

INTRODUCTION

Water, which covers approximately 70% of the Earth's surface, sustains plant and animal life, plays a vital role in the formation of weather, and helps to shape the surface of the planet through erosion and other processes. India is one of the fastest-growing economies in the World. The developmental activities are putting much pressure on all the natural resources of the country. Water is no exception. There is a competition for utilization of water for power, irrigation, municipal, industrial, recreation, aesthetic and other uses. The overall impact is apparat in water conflicts.

The accurate and reliable hydrological database is required for the development of management plans. Further, changing LULC and climatic conditions are affecting both the quality and quantity of water. Hydrological investigations are fundamental for assessing water resources and understanding the hydrological processes. Because, the hydrologic cycle is so diverse, hydrologic measurement and analysis methods span many disciplines: including soils, oceanography, atmospheric science, geology, geophysics and limnology, and so on.

Apart from the conventional techniques, now many advance techniques and instruments are available for hydrological investigations worldwide. It is high time that the engineers, scientists and professionals working in the field of water resources and hydrology start adopting these techniques to improve their capabilities. Among the advanced techniques, application of environmental isotopes, google earth engine, remote sensing and GIS has increased dramatically. Isotope techniques can be used to measure groundwater recharge, a pattern of sedimentation in water bodies, track pollution in groundwater, leakage and seepage from water bodies, measurement of hydrogeological parameters, origin and age of groundwater, surface water and groundwater interactions.

OBJECTIVES

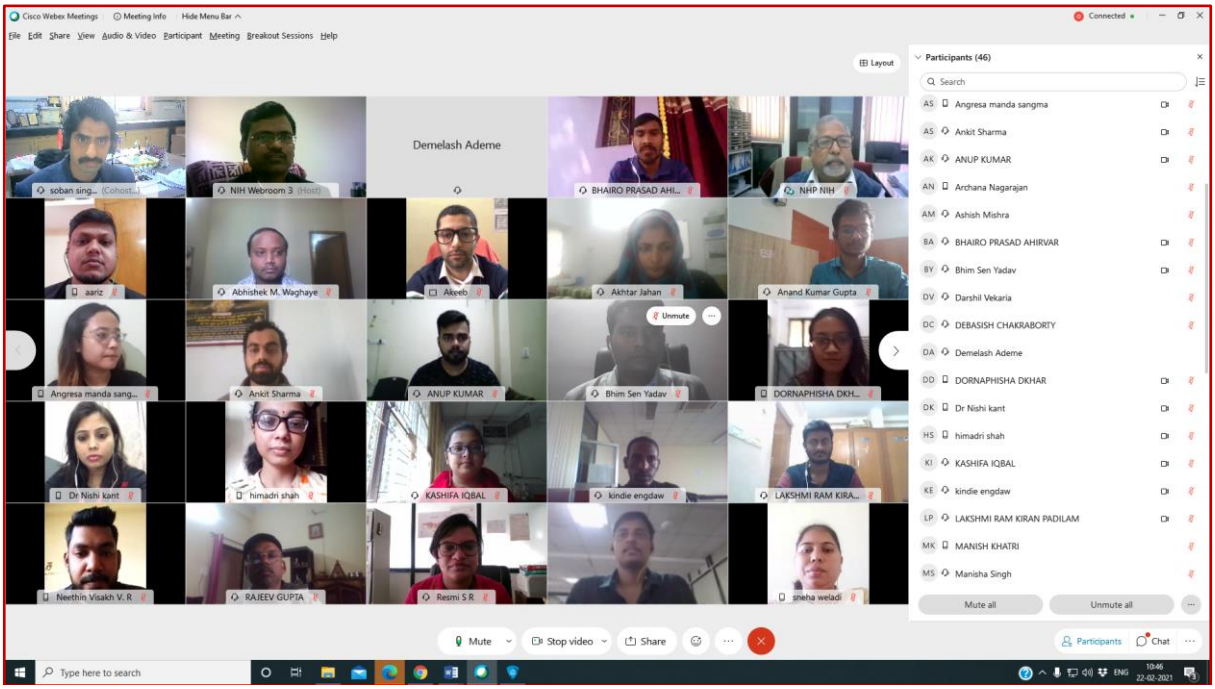
To impart knowledge to the professionals (engineers, scientists, policymakers & academicians) of various governments, private organizations actively working in water resources and agencies concerned with hydrological investigations, water resources planning and management about:

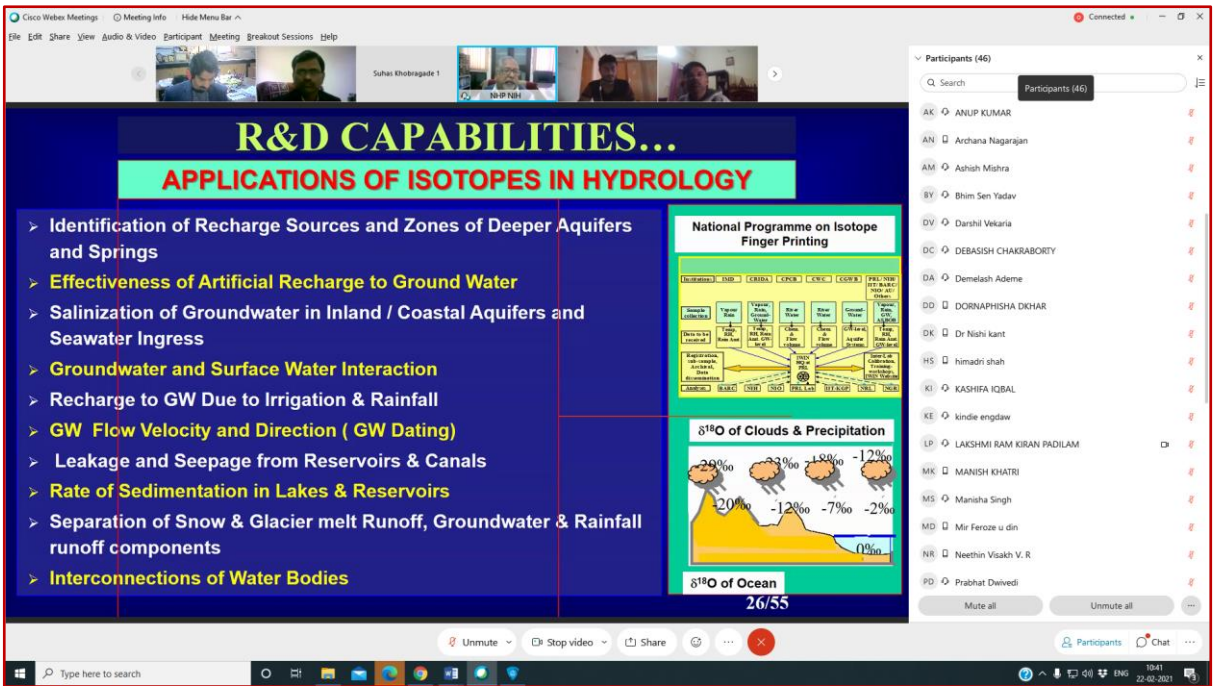
i. Adavanced tools and techniques for hydrological investigations for sustainable water resources planning and management.
ii. developing strategies and action plans for water resources planning & management using the advanced tools & techniques.

INAUGURATION

The five days training course was organised by the Hydrological Investigations (HI) Division from 22 to 26th February, 2021 on virtual mode. The inauguration function of the training course was organised on 22nd February, 2021 at 10.15 AM. Dr. Sudhir Kumar, Sc-G & Head, HI division was the chief guest. The function was presided over by

Dr. Santosh M. Pingale, Scientist-C & Course Coordinator, HI Division, formally welcomed all the participants and briefly informed about the training course and its objectives.

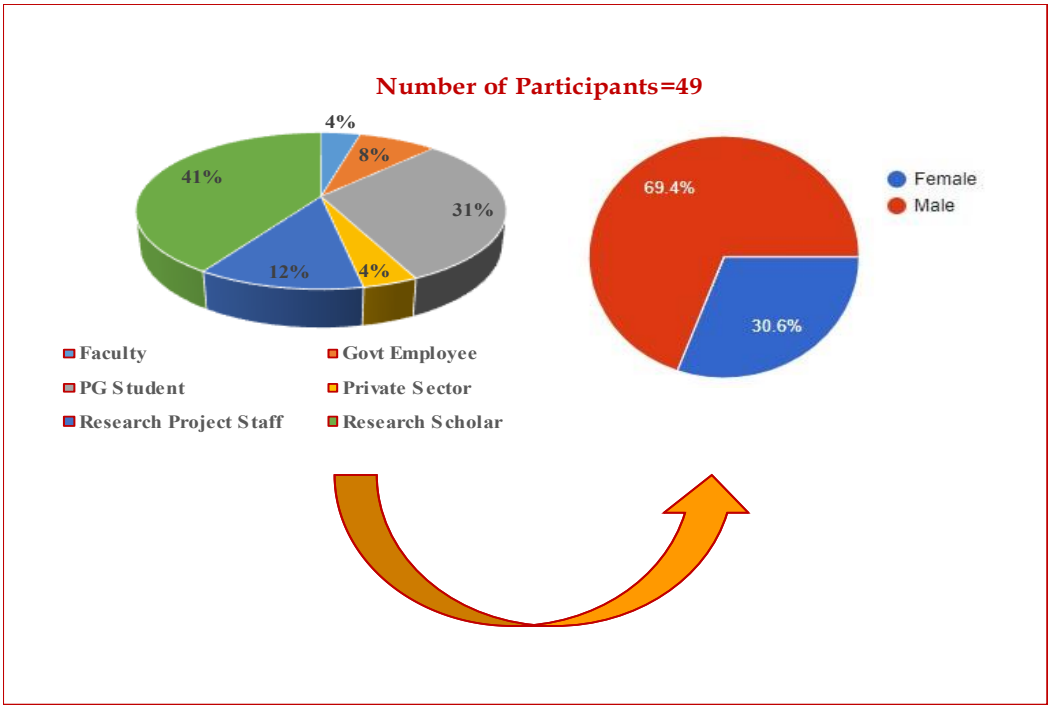


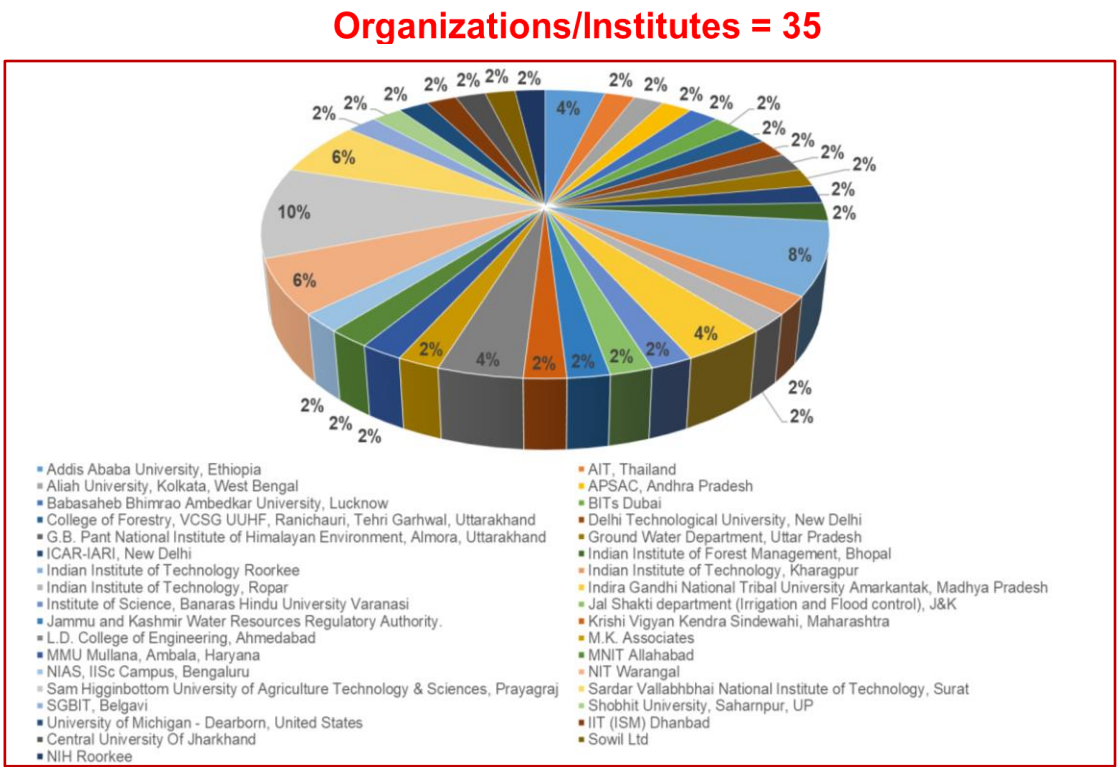


PARTICIPATION

The course was intended for professionals (Engineers, Scientists, Policymakers & Academicians) of various governments, private organizations actively working in water resources and agencies concerned with hydrological investigations, water resources planning and management. Masters students and research scholars were encouraged to attend this course.

A total of fourty-nine (49) candidates attended the training course. It mostly included research scholars, consultants, and academicians. The participants belonged to different organizations of different scientific streams from India, United States of America (USA), United Arab Emirates (UAE), Ethiopia and Thailand. Participants from India were included from Andhra Pradesh, Delhi, Gujarat, Haryana, Himachal Pradesh, J&K, Jharkhand, Karnataka, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, and West Bengal States. While the Participants from UAE, USA, Ethiopia and Thailand were included from Dubai, Dearborn, Addis Ababa and Bangkok, respectively. A list of participant is given in Annexure–I.





COURSE FEES

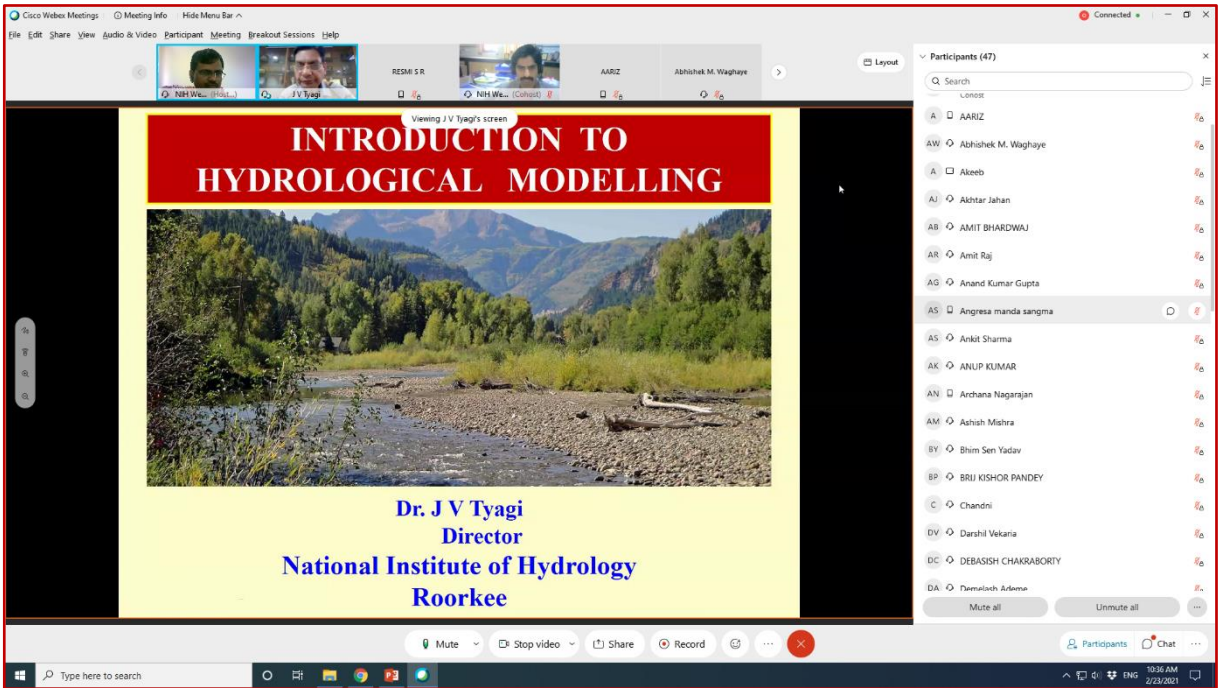
The training course was funded from the participants course fees to support the expenses, which was kept as:

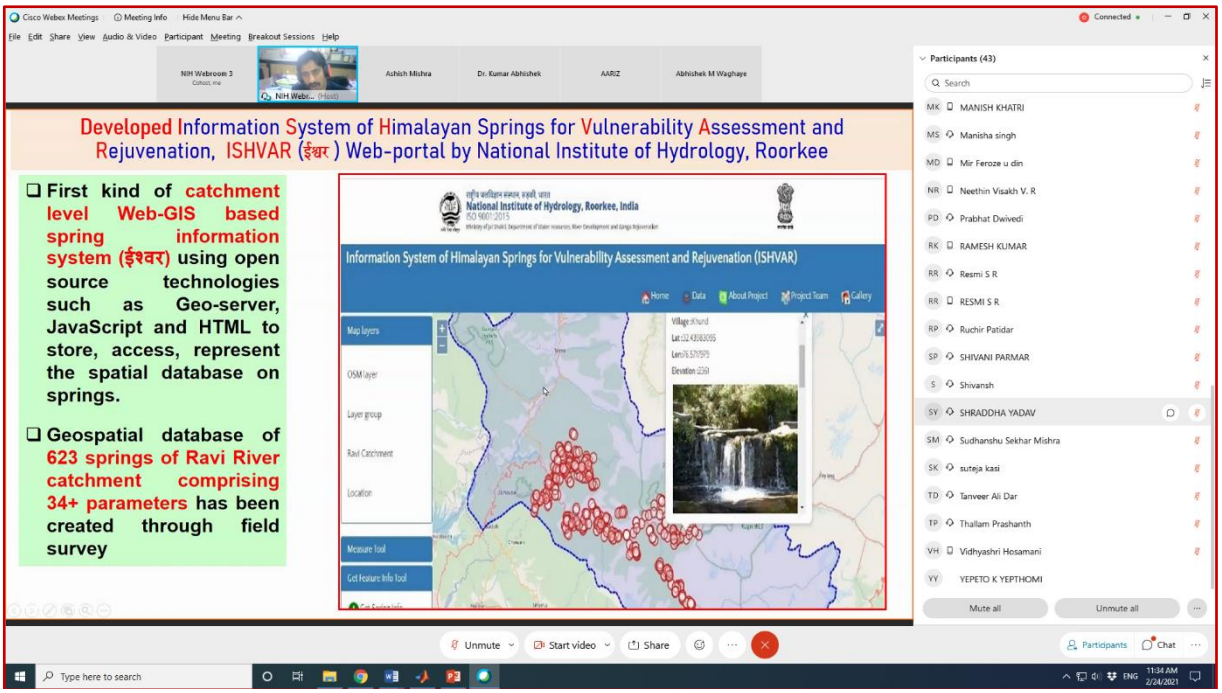
Govt. Employee	=	Rs. 2,000/-
NGO's and PSUs	=	Rs. 3,000/-
PG Students/Research Scholar	=	Rs. 1,000/-

COURSE CONTENT AND FACULTY

The Training Course consisted of lectures by the subject experts from the National Institute of Hydrology, Roorkee. Efforts were made to cover the various theoretical and some practical aspects. Case studies carried out by the Institute were included. A tutorial on soft computing techniques for hydrological analysis were included. The hands-on GIS and Remote Sensing as well as water and sediment yield estimation using Soil and Water Assessment Tool (SWAT) were conducted. The hands-on GIS application in water quality data processing were also conducted. The hydrological techniques for mapping, measurement and revival of mountain springs were demonstrated. In addition, a hands-on spring aquifer recharge & dynamic storage estimation were conducted. A hands-on google earth & google earth engine application for water resources projects were conducted. A demonstration on groundwater flow modelling software (Visual MODFLOW) were also organized. Various laboratory and field instruments such as Isotope Hydrology Laboratory, Meteorological Observatory, Soil Water Laboratory and Water Quality Laboratory were demonstrated. Most of the faculty of the training course were the senior scientist of the NIH Roorkee who have carried out studies on hydrological and geophysical investigations, hydrological modelling, groundwater modelling and water quality analysis for water resources planning and management over last 20-30 years.

The various lecture topics covered in the training course and the corresponding faculty are given in Annexure-II.





SCHEDULE

The duration of the training course was five days. The training courses included 14 lectures, 10 laboratory hands-on/Sofware demonstration/tutorial sessions, 2 Field and laboratory instruments demonstration. The detailed schedule of the e-training course is given at Annexure-II.

VIDEO SESSIONS

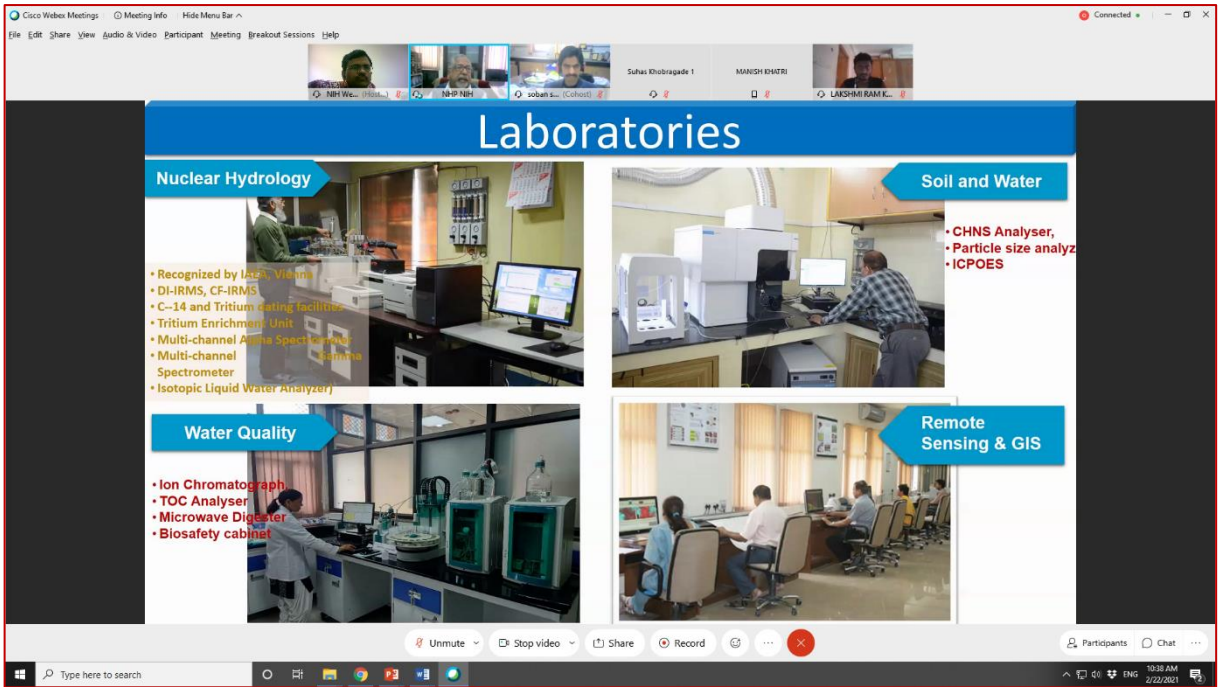
To make the training course interesting and informative, some video sessions related to water resources were added during the lectures.

LECTURE MATERIAL

The lecture material/presentations were provided to the participants as softcopies.

DEMONSTRATION

Due to the COVID-19 pandemic situation, this training course was organised on virtual platform. Therefore, participants were shown and demonstrated field and laboratory investigation photos and videos of the field visits of the previous training course which was organised by the HI Division during November 4 to 8, 2019. The participants were provided exposure on water quality sampling, depth water sampling, sediment core sampling, measurement of water level in hand pumps, isotope sample collection techniques.

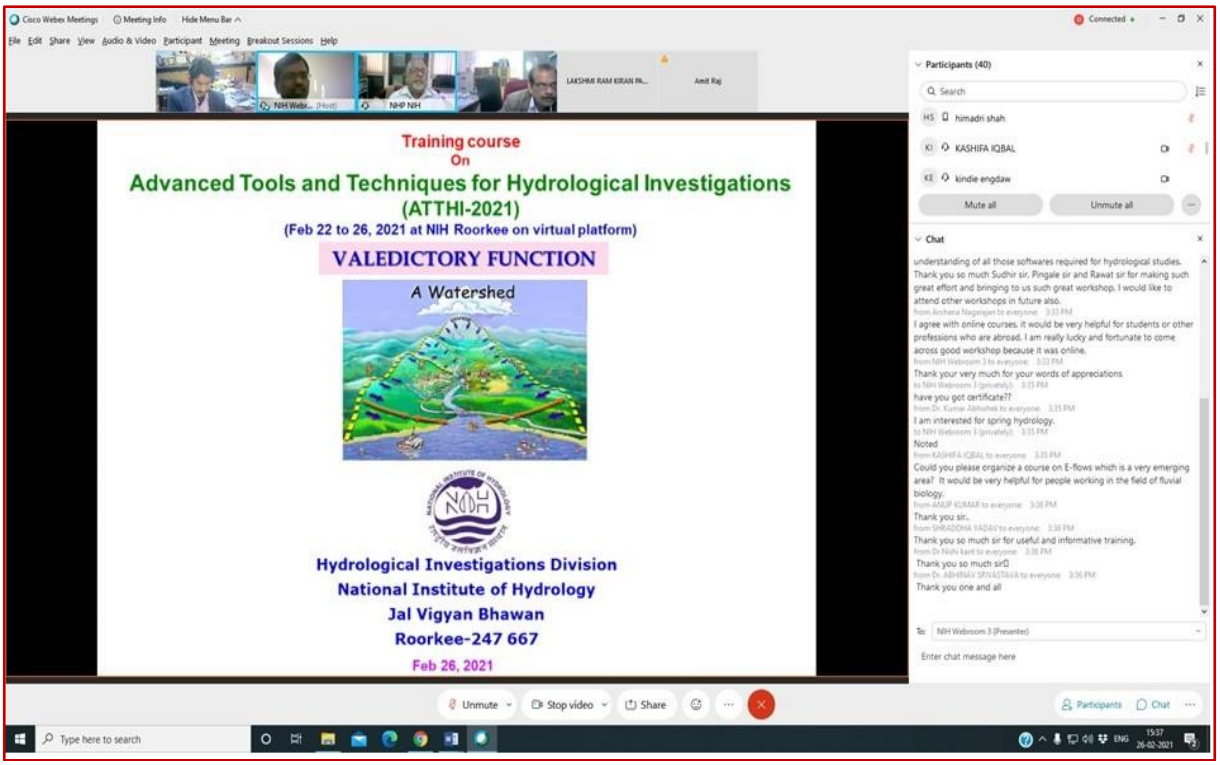


FEEDBACK FROM PARTICIPANTS

The organisation and management of the e-training course was highly appreciated by the participants. However, some of the participants expressed the need for physical training instead of online, longer course duration, and to include more modelling and practical contents. A sample of the feedback received from the participant is enclosed in Annexure III.

VALEDICTORY FUNCTION & CERTIFICATE DISTRIBUTION

The valedictory function of the e-training course was held on 26th February, 2021 at 4.30 PM. Due to other engagements, Director was not available for the valedictory function. So, function was presided by Director-In charge Dr. Sudhir Kumar, Sc-G & Head, Hydrological Investigations Division. The Course Coordinator, Dr. S.M. Pingale, Sc-C, HID presented a brief report of the five days training course. During the valedictory function e-certificates were awarded to the participants. A sample of the certificate is enclosed in Annexure-IV.


Training course
On
Advanced Tools and Techniques for Hydrological Investigations
(ATTHI-2021)
(Feb 22 to 26, 2021 at NIH Roorkee on virtual platform)
VALEDICTORY FUNCTION
A Watershed
Hydrological Investigations Division
National Institute of Hydrology
Jal Vigyan Bhawan
Roorkee-247 667
Feb 26, 2021
Participants (40)
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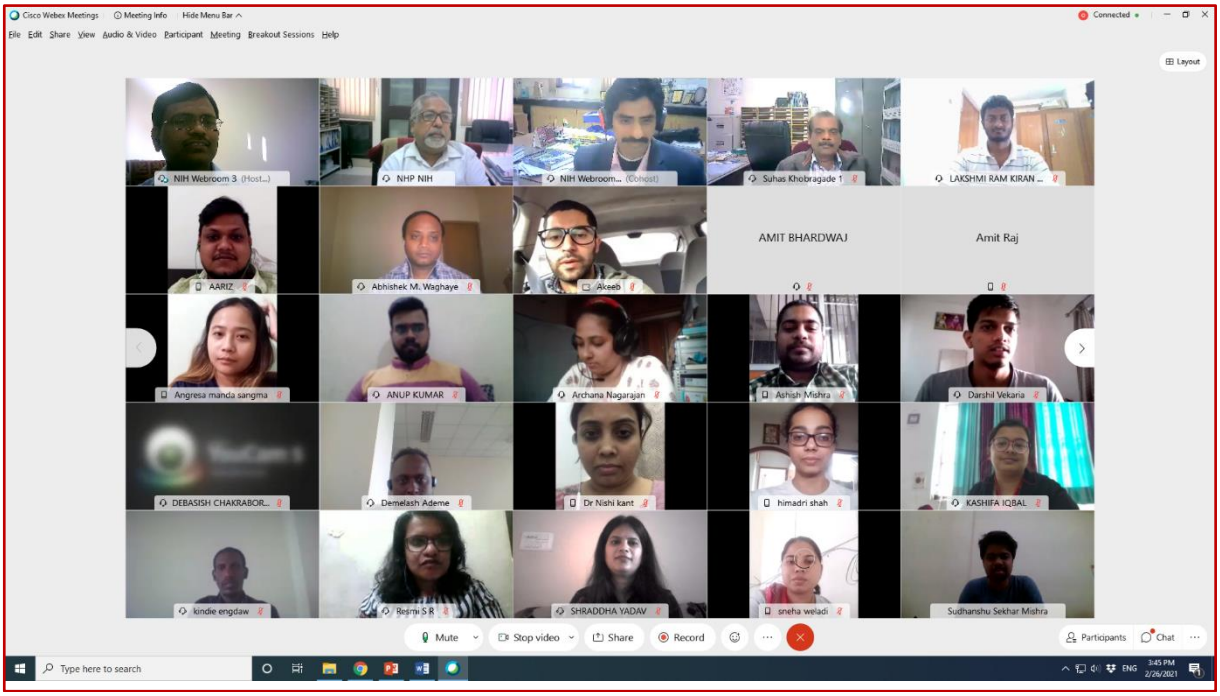
KASHIFA IQBAL
kindie engdaw
Mute all
Unmute all
Chat
Unmute
Stop video
Share
Participants
Chat


NIH Webroom 3 (Host...)
NHP NIH
NIH Webroom... (Cohost)
Suhas Khobragade 1
LAKSHMI RAM KIRAN ...
AARIZ
Abhishek M. Waghaye
Akeeb
AMIT BHARDWAJ
Amit Raj
Angresa manda sangma
ANUP KUMAR
Archana Nagarajan
Ashish Mishra
Darshil Vekaria
DEBASISH CHAKRABOR...
Demelash Ademe
Dr Nishi kant
himadri shah
KASHIFA IQBAL
kindie engdaw
Resmi S R
SHRADDHA YADAV
sneha weladi
Sudhanshu Sekhar Mishra
Mute
Stop video
Share
Record
Participants
Chat

FINANCIAL ASPECTS

The total fund received and expenditure incurred for the training program is presented in Table 1:

Table 1 Total fund received and expenditure incurred.

SN	Item	Amount (Rs)
1	**EXPENDITURE**	
i.	Honorarium to faculty	36000
ii.	Mementos for faculty	5940
iii.	Refreshment	2760
iv.	Stationery items	990
TOTAL EXPENDITURE		**45,690**
2.	**FUND RECEIVED (Registration fees)**	**59,000**

Annexure-I

LIST OF PARTICIPANTS

S. N.	NAME	DESIGNATION	ORGANIZATION	CONTACT NO.	E-MAIL ID
1	Aariz Ahmed	Research Scholar	NIAS, IISc Campus, Bengaluru	8692883318	aariznias@gmail.com
2	Abhishek M. Waghaye	Research Scholar	ICAR-IARI, New Delhi	9552205271	waghayeabhishek@gmail.com
3	Akhtar Jahan	Research Scholar	Indian Institute of Technology, Roorkee	9451574715	ajahan@es.iitr.ac.in
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6	Anand Kumar Gupta	PG Student	Institute of Science, Banaras Hindu University Varanasi	9454580485	akumargupta272@gmail.com
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8	Ankit Sharma	PG Student	Indian Institute of Technology Roorkee	9625058825	a_sharma@wr.iitr.ac.in
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11	Ashish Mishra	Research Project Staff	Delhi Technological University	916375153371	ashishmishra824@gmail.com
12	Bhairo Prasad Ahirvar	Research Project Staff	Indira Gandhi National Tribal University Amarkantak, Madhya Pradesh	9752189945	bhairop.20@gmail.com
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14	Brij Kishor Pandey	Faculty	BITs Dubai	971556341870	brijpandey@dubai.bits-pilani.ac.in
15	Chandni	Research Scholar	Indian Institute of Technology Roorkee	8894046468	chandni@wr.iitr.ac.in
16	Darshil Vekaria	Research Scholar	L.D. College of Engineering, Ahmedabad	7203859495	darshilvekaria11@gmail.com
17	Debasish Chakraborty	PG Student	Aliah University, Kolkata, West Bengal	8617705003	myselfdc01@gmail.com
18	Demelash Ademe	Research Scholar	Africa Center of Excellent for Water Management in Addis Ababa University, Ethiopia	251918125907	demelashade@gmail.com
19	Dornaphisha Dkhar	PG Student	Sam Higginbottom University of Agriculture Technology & Sciences, Prayagraj	7706099324	dkhardornaphisha@gmail.com
20	Dr Kumar Abhishek	Private Sector	Sowil Ltd	9971103337	abhiwrdm@gmail.com

21	Dr. Abhinav	Faculty	Shobhit University, Saharnpur, UP	9693644232	abhinav.gangoh@shobhituniversity.ac.in
22	Himadri Devang Shah	PG Student	L.D. College of Engineering, Ahmedabad	9978984159	himadrishah98@gmail.com
23	Kashifa Iqbal	Research Project Staff	Babasaheb Bhimrao Ambedkar University, Lucknow	7860825041	kaishsiddiqui786@gmail.com
24	Kindie Engdaw	Research Scholar	Addis Ababa University, Ethiopia	251910269490	kindietadesse@gmail.com
25	Kshetrimayum Monika Devi	Research Scholar	Indian Institute of Technology, Kharagpur	6009657241	kshmonika1994@gmail.com
26	Lakshmi Ram Kiran Padilam	PG Student	NIT Warangal	9553311247	plramkiran036@gmail.com
27	Lakshmiprasadrao Maddu	Research Scholar	APSAC	9490271148	mlpraohydrology@gmail.com
28	Manish Khatri	Private Sector	M.K. Associates	9425325422	manish_jal@rediffmail.com
29	Manisha Singh	Research Scholar	Indian Institute of Forest Management, Bhopal	9910550778	singhmanisha.1201@gmail.com
30	Mir Feroze U Din	Govt Employee	Jal Shakti department (Irrigation and Flood control)J&K	7006257269	mirferoze3537@gmail.com
31	Mohd Akeeb Dar	Govt Employee	Jammu and Kashmir Water Resources Regulatory Authority.	9596419672	akeeb32@yahoo.com
32	Ms. Sneha Ramu Weladi	Govt Employee	Krishi Vigyan Kendra Sindewahi, Maharashtra	9405156251	snehaweladi82@gmail.com
33	Neethin Visakh V. R	PG Student	NIT Warangal	9746413783	neethinvisakh1729@gmail.com
34	Nishi Kant	Research Scholar	IIT ISM Dhanbad	8292510960	nishikant1490@gmail.com
35	Padam Singh	Research Scholar	College of Forestry, VCSG UUHF, Ranichauri, Tehri Garhwal, Uttarakhand	9719679420	erpadamsinghbabra@gmail.com
36	Prabhat Dwivedi	Research Scholar	Sarabhai Bhavan, SVNIT	8770639541	prabhat20011996@gmail.com
37	Ramesh Kumar	PG Student	Indira Gandhi National Tribal University Amarkantak, Madhya Pradesh	7667233095	singhramesh7153718@gmail.com
38	Resmi S R	Research Project Staff	Sardar Vallabhbhai National Institute of Technology, Surat	9537632196	iiresmii@gmail.com
39	Ruchir Patidar	Research Project Staff	NIH Roorkee	9424079380	rpatidar@wr.iitr.ac.in
40	Shivani Parmar	Research Project Staff	G.B. Pant National Institute of Himalayan Environment, Almora	918860056958	shvaniparmar@gmail.com
41	Shivansh	PG Student	Sardar Vallabhbhai National Institute of Technology Surat	9470038555	shivanshtiwary55@gmail.com
42	Shraddha Yadav	Research Scholar	MNIT Allahabad	7376959962	shraddhayadavabc@gmail.com

43	Sudhanshu Sekhar Mishra	PG Student	Sam Higginbottom University of Agriculture Technology & Sciences, Prayagraj	9863174280	s.s.mishra070@gmail.com
44	Suteja Kasi	PG Student	NIT Warangal	919010477448	kasisuteja@gmail.com
45	Tanveer Ali Dar	Research Scholar	Indian Institute of Technology Roorkee	7006253914	tdar@es.iitr.ac.in
46	Thallam Prashanth	Research Scholar	Indian Institute of Technology, Ropar	7995844806	thallam.prashanth@iitrpr.ac.in
47	Vidhyashri Hosamani	Research Scholar	SGBIT Belgavi	9035026596	vidhyashri13@gmail.com
48	Vishal Thakur	Research Scholar	AIT, Thailand	919584938444	st121729@ait.asia
49	Yepeto K. Yepthomi	PG Student	Sam Higginbottom University of Agriculture Technology & Sciences, Prayagraj	7705942363	vielmaya@gmail.com

Annexure-II

TRAINING SCHEDULE

Schedule for 5-day Training (Virtual-Mode) on

ADVANCED TOOLS & TECHNIQUES FOR HYDROLOGICAL INVESTIGATIONS

(ATTHI-2021)

22 – 26 February, 2021

National Institute of Hydrology, Roorkee

Time	10:15 - 10:30	10:30 - 11:30	11:30 – 12:30		02:30 - 03:30	03:30 - 04:30	04:30 – 05:30
22 Feb 2021	**INAUGURATION & OPENING REMARKS**	Hydrological and geophysical Investigations & it's need **(Lecture)**	Field instrumentation for hydrological investigations **(Lecture)**		Introduction of Remote Sensing & GIS **(Lecture)**	Introduction of Remote Sensing & GIS **(Hands-on)**	Introduction to isotopes & it's applications to water resources monitoring & assessment **(Lecture)**
	SK		**SDK**		**SMP**		**SK**
23 Feb 2021	Introduction to Hydrological Modelling **(Lecture)**		Water quality: parameters, monitoring techniques, standards and sampling procedures **(Lecture)**		Application of GIS in water quality data processing **(Lecture)**	Application of GIS in water quality data processing **(Hands-on)**	Groundwater modelling **(Lecture)**
	JVT		**MK**		**PKS**		**SK**
24 Feb 2021	Hydrological techniques for mapping, measurement and revival of mountain springs **(Lecture)**		Soft computing techniques for hydrological analysis **(Hands-On)**		Laboratory instruments and data analysis of isotopic samples for various hydrological processes **(Lecture)**	Laboratory instruments and data analysis of isotopic samples for various hydrological processes **(Demonstration)**	Soil erosion measurement and modelling **(Lecture)**
	SSR		**SMP**		**MSR**		**SSR**
25 Feb 2021	SWAT Model and it's application **(Lecture)**		Application of google earth & google earth engine for water resources projects **(Hands-on)**		Demonstration on Groundwater flow modelling **(Hands-on)**	Demonstration on Groundwater flow modelling **(Case-study)**	Sedimentation studies using isotopic techniques **(Lecture)**
	JVT		**SMP**		**AN**		**SDK**
26 Feb 2021	Demonstration of SWAT **(Hands-On)**		Demonstration of SWAT **(Hands-On)**		Estimation of spring aquifer recharge & dynamic storage **(Lecture)**	Estimation of spring aquifer recharge & dynamic storage **(Hands-On)**	**FEEDBACK AND VALEDICTORY FUNCTION**
	SMP		**SMP**		**SSR**		

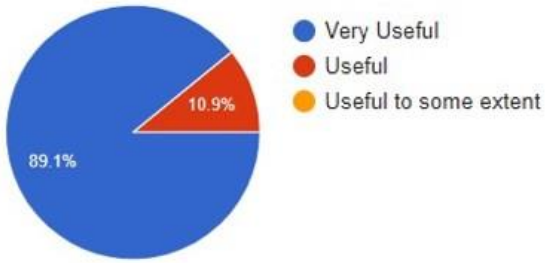
LUNCH BREAK

Experts: JVT: Dr. Jaivir Tyagi, Director, NIHR; SK: Dr. Sudhir Kumar, HID; SDK: Dr. SD Khobragade, HID; MSR: Dr. M.S. Rao; MKS: Dr. Mukesh Sharma, EHD; PKS: Dr. Pradeep Kumar Sachan, EHD; SSR: Dr. Soban Singh Rawat, HID; SP: Dr. Santosh M. Pingale, HID; AN: Er. Anjali, EHD

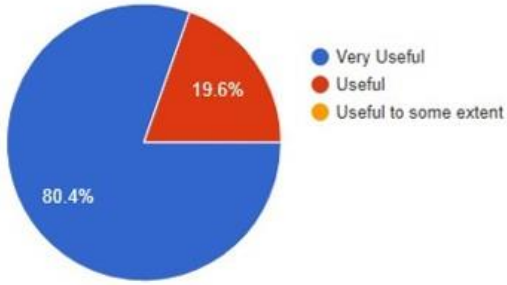
Annexure-III

SAMPLE OF FEEDBACK RECEIVED

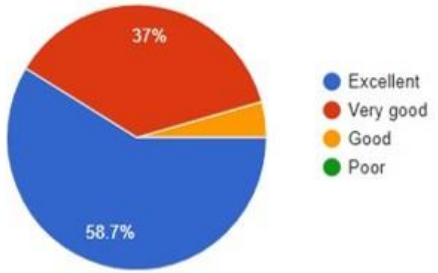
Usefulness of the course in improving your knowledge?



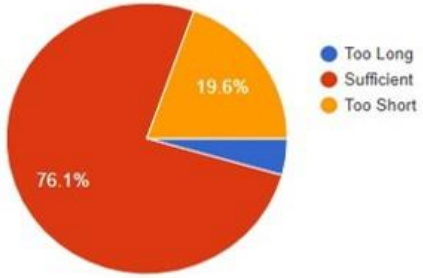
Your impression about lectures delivered in the training course.



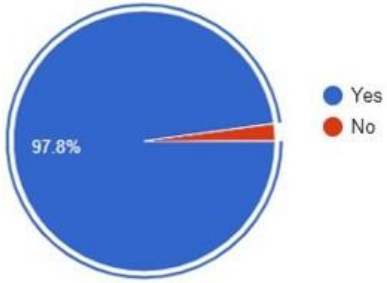
Overall organization and management of the course?



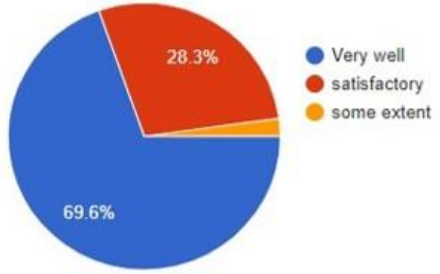
What do you feel about the duration of the course?



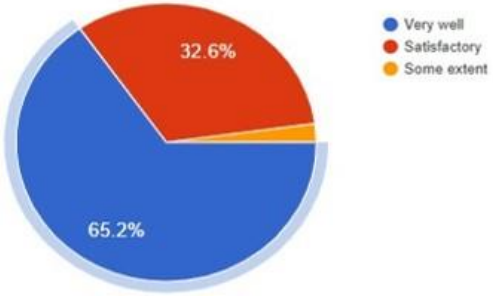
Will this training help you directly in your job/profession?



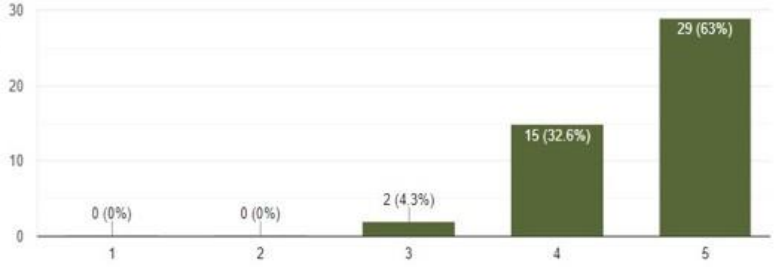
Whether your queries addressed by the experts?



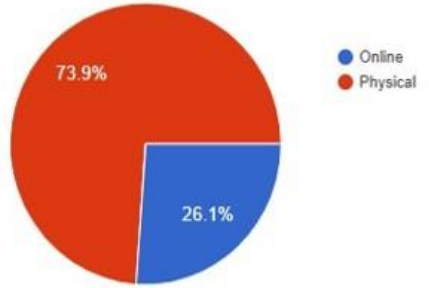
Whether your expectation fulfilled or not



How would you overall rate the training program? [Scale: 1 to 5 represents poor to excellent]



Which mode do you like to prefer such training program in future?



Annexure-IV

FORMAT OF CERTIFICATE

Certificate No.: NIH/HID/Training/ATTHI-2021/T-1

NATIONAL INSTITUTE OF HYDROLOGY
ROORKEE, INDIA

CERTIFICATE

This is to certify that

Mr. Aariz Ahmed

National Institute of Advanced Studies, IISc campus Bengaluru, India

has participated in a 5-day training program on

"ADVANCED TOOLS & TECHNIQUES FOR HYDROLOGICAL INVESTIGATIONS"

organized by National Institute of Hydrology, Roorkee during 22 to 26 February, 2021

The participants have been imparted knowledge about the advanced tools and techniques for hydrological investigations for water resources planning and management.

(Santosh M. Pingale)	(S.S. Rawat)	(Sudhir Kumar)	(Dr. J.V. Tyagi)
Scientist-C & Coordinator	Scientist-D & Coordinator	Scientist-G & Head	Director, NIH