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NBHM Sponsored  
Advanced Workshop on Partial Differential Equations  
and Applications (AWPDE2019)

December 16-30, 2019

Central University of Kerala, Periyar -671320, Kasaragod.



NBHM-DAE

**Report of the Workshop-AWPDE2019**

AWPDE 2019 is a National level "Advance Workshop on Partial Differential Equations and Applications" organized by Department of Mathematics in premises of Central University of Kerala during December 16-30, 2019. The aim of the workshop to bring the eminent experts in the field of partial differential equations to discuss advanced level topic with the young faculty and researches.

Aims of AWPDE2019

- *To provide opportunity for young University/College teachers and research scholars to learn a sound mathematical background for research in Applied Mathematics, in particular PDEs.*
- *To impart high quality teaching of concepts of PDEs with enough background of Analysis lectures by Eminent professors in the relevant field.*
- *To provide a good platform for the youngsters to start their research career in PDE.*

This workshop was financially supported by National Board for Higher Mathematics (NBHM), Department of Atomic Energy, Mumbai and organized by Central University of Kerala, Kasaragod.

**This was the first external funded programme of two week long in the Central University of Kerala organized by the Department of Mathematics .** This workshop consist of 50 Plenary lectures in the Advanced level PDE and 3 Special lectures on applications of PDE.

Around 229 applications were received ( 45 young Faculties, 95 Research Scholars, 72 M.Sc. Final Year/ Integrated M.Sc. Students) among 65 were selected and 56 were participated in the workshop.

The Workshop began as per the schedule at 8:00 a.m. with the registration of selected participants from reputed institutions followed by breakfast. We had a tightly packed schedule with a formal inaugural function honoured by our Vice-Chancellor Prof. (Dr.) G. Gopa Kumar. He nicely explained the importance of the workshop and the Mathematics in day-to-day life.



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Dr. K.A. Germina, Head of the Department, Department of Mathematics, Central University of Kerala, welcomed the invited speakers and participants. The theme of the conference was disclosed by Dr Gnanavel Soundararajan, Convener of AWPDE2019, Central University of Kerala. Dr. Prathapa Chanda Kurup, Dean of School of Physical Sciences, Central University of Kerala explained about the application of mathematics in applied sciences. The keynote address was delivered by Prof. M. Thamban Nair in which he expressed the importance of research in the area of the Partial differential Equations. The inaugural session winded up by Dr P.Shaini, assistant Professor in Mathematics, Department of Mathematics, Central University of Kerala with the vote of thanks in which he expressed his gratitude to everyone for being part of this grand intellectual gathering.

The inaugural session was followed by the first lecture of the workshop by Prof. M. Thamban Nair. He delivered basic concepts in functional analysis: Linear operators and Duality. In the afternoon two sessions were handled by Prof. Roopkumar, Central University of Tamil Nadu. He delivered talk in Multivariable calculus: Inverse and Implicit function theorem. The remaining training session were handling as per the following Schedule:

Date/Time	9.30 - 11.00	11.30 - 1.00	1.00 - 2.00	2.00 - 3.30	4.00 - 5.30
16.12.2019	Inaugural Function (9-11 am)	MTN	Lunch	RR	RR
17.12.2019	RR	RR		MTN	MTN
18.12.2019	MTN	SK		MTN	SK
19.12.2019	MTN	SK		Special Lecture RKG	SK
20.12.2019	SK	AA		PSD	AA
21.12.2019	AA	PSD		AA	PSD



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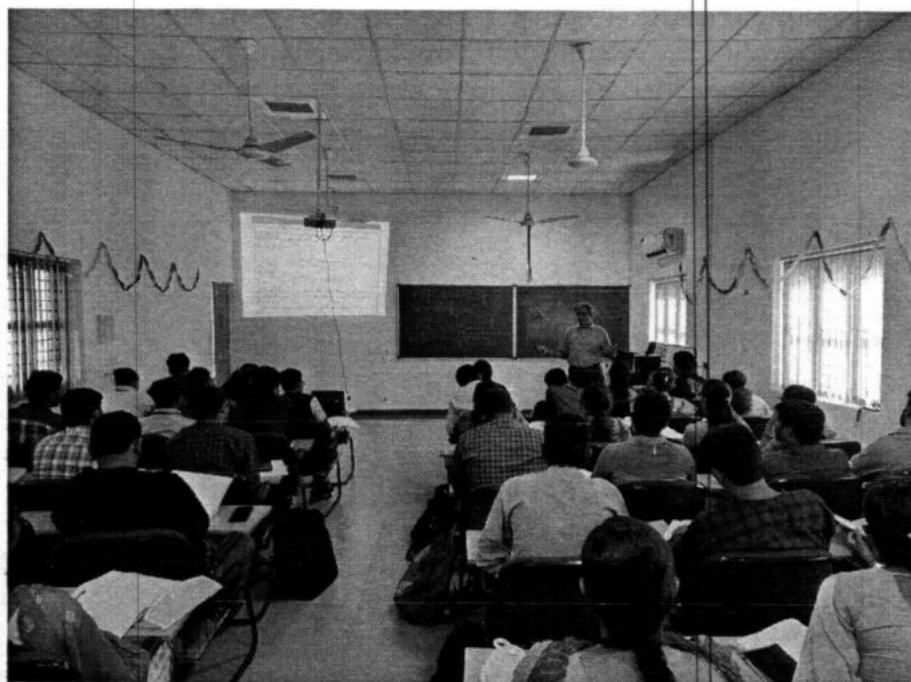


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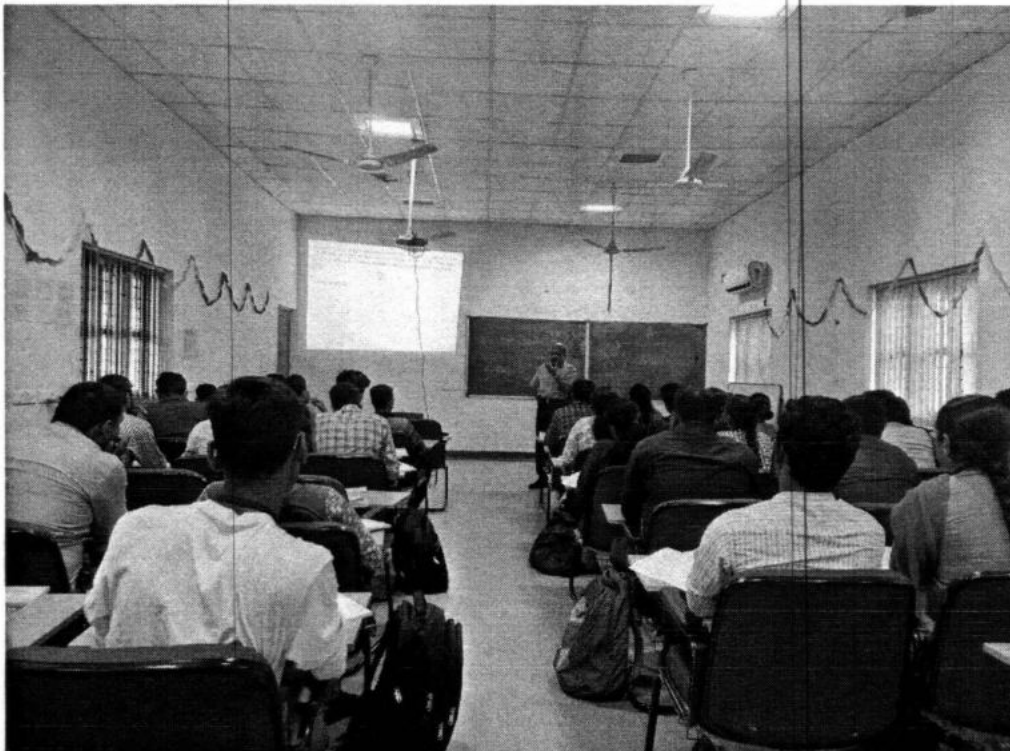
22.12.2019	AA	PSD		AA	KS
23.12.2019	KS	KRA		KS	KRA
24.12.2019	KS	KRA		KS	KRA
25.12.2019	Holiday (Christmas)				
26.12.2019	KRA	SG	Lunch	NB	SG
27.12.2019	SG	NB		SG	NB
28.12.2019	LS	SG		NB	LS
29.12.2019	NB	LS		NB	LS
30.12.2019	LS	Valedictory Function			



**Prof. M .Thamban Nair,IIT-Madras (MTN):** covered the topics:- Linear Operators and Duality; Compactness and Weak convergence; Riesz Representation Theorem; Hilbert spaces and Banach Spaces during 16-19 Dec 2019.



**Prof. R.Roopkumar (RR), Central University of Tamil Nadu:** covered the topics :-  
Multivariable Calculus: Inverse function theorem. Implicit function theorem, etc.



**S.Kesavan (SK) – IIT Madras:** covered the topics: Distribution Theory & Sobolev Spaces:  
Introduction; Calculus of Distributions; Sobolev Spaces; Traces, Compactness and  
Embeddings





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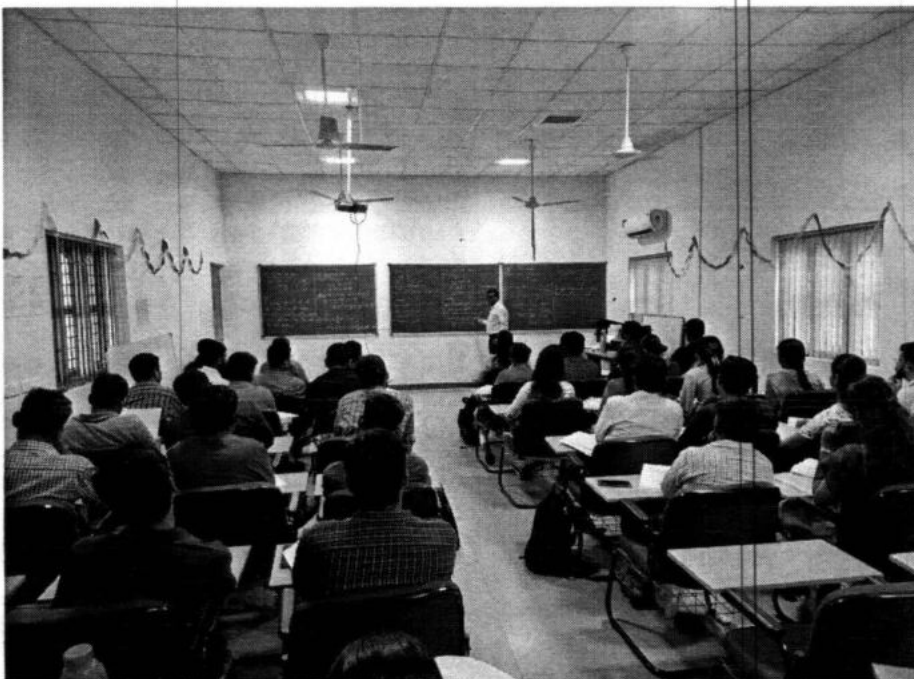
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**Prof. A. Adimurthi (AA), TIFR CAM- Bengaluru:-** Basic PDEs and their classifications, Linear and nonlinear equations of first order, Method of characteristics



**K.R. Arun (KRA), IISER, Thiruvananthapuram:** Covered the topics:- Heat and Wave equation: Fundamental Solution, Mean value formula, Solution by spherical means, Energy methods.



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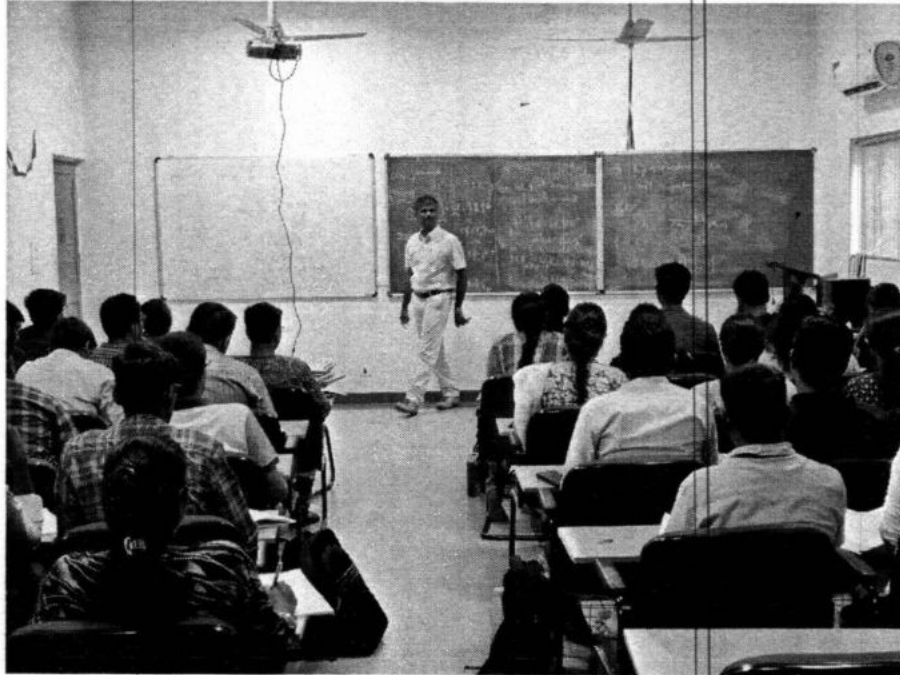
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**Dr. K. Sakthivel (KS), IIST, Thiruvananthapuram:** covered the topics:- Elliptic Equation: Weak Solution, Lax-Milgram Theorem, Energy estimates.

Other Speaker and the topics covered in AWPDE 2019 as per the above schedule:

<b>Raju K George (RKG),</b> IIST, Thiruvananthapuram.	<b>Introduction to controllability of dynamical systems.</b>
<b>P S Datti (PSD),</b> TIFR CAM - Bangaluru.	<b>Fundamental solutions, Mean value formulas, Harmonic functions, Green's function, Energy methods</b>
<b>S.Gnanavel (SG),</b> Central University of Kerala	<b>Elliptic Equation: regularity results, maximum principle, Eigen value and eigen functions</b>
<b>N. Barani Balan (NB),</b> Central University of Tamil Nadu	<b>Parabolic Equation: Weak Solution; Existence and uniqueness; Regularity; Maximum principles</b>
<b>L. Shangerganesh (LS),</b> National Institute of Technology, Goa.	<b>Hyperbolic Equation: Weak Solution; Existence and uniqueness; Regularity; Propagation of disturbances</b>



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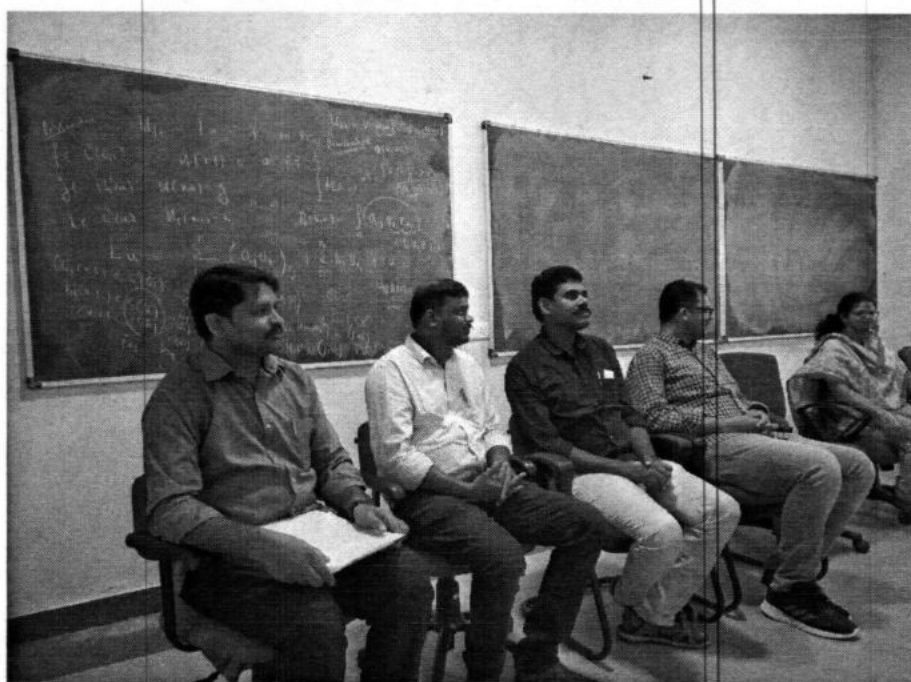
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Valedictory ceremony was honored by the distinguished speakers of the Last day. Dr S. Gnanavel, Convener of AWPDE 2019, Central University of Kerala, delivered the summary of the Workshop followed by the welcome address by Prof. K. A. Germina, Head of the Department of Mathematics, Central University of Tamil Nadu. Dr. Amruth G Kumar, Head of the Department, Department of Education, Central



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University of Kerala delivers a valedictory address and the participation certificates were distributed to each participant. Dr Gnanavel Soundararajan, the host convener, concluded the conference with the vote of thanks.



From the participants feedback, it was known that the workshop was organized successfully by the organizing committee. Moreover, participants appreciated all the invited lectures delivered by renowned mathematicians. The workshop fulfilled the objectives which were set. It is really a benchmark for the Department of Mathematics, Central University of Kerala in its profile.







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## REGISTRATION

S.No	NAME	NAME OF THE INSTITUTE	SIGNATURE
1	AGILAN K	VELLORE INSTITUTE OF TECHNOLOGY, CHENNAI	
2	ANJUNA DILEEP	INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY	
3	ANKIT SHARMA	DELHI TECHNOLOGICAL UNIVERSITY	 16/12/2019.
4	ANURAJ N V	M S RAMAIAH UNIVERSITY OF APPLIED SCIENCES, BANGALORE	 16/12/2019
5	ARIVAZHAGAN A	CENTRAL UNIVERSITY OF TAMIL NADU	
6	BHUVANESHWARI G	VELLORE INSTITUTE OF TECHNOLOGY	
7	CHANDRU PARAMASIVAM	PSG COLLEGE OF TECHNOLOGY	
8	DIVYA G	INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI	
9	GAURAV UPADHYAY	INDIAN INSTITUTE OF TECHNOLOGY - BHU, VARANASI	
10	GNANASEKAR M	RATHINAM COLLEGE OF ARTS AND SCIENCE COIMBATORE.	
11	GNANASEKARAN S	BHARATHIAR UNIVERSITY	
12	ILAVARASI R	ERODE ARTS AND SCIENCE COLLEGE, ERODE	
13	JENISH MERLIN V	ANNA UNIVERSITY	
14	KALAISELVI MYILSAMY	PSG COLLEGE OF TECHNOLOGY, COIMBATORE	
15	KARTIKAY KHARI	DELHI TECHNOLOGICAL UNIVERSITY	
16	KRITI YADAV	INDIAN INSTITUTE OF TECHNOLOGY - BHU, VARANASI	 16/12/2019.
17	MAHESH UDUPA	DAYANANDA SAGAR UNIVERSITY	 16/12/19.

Date: 16-12-2019

1



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**REGISTRATION**

18	MANIMARAN J	NATIONAL INSTITUTE OF TECHNOLOGY GOA	<i>J. Mani</i>
19	MAYAKANNAN E	DR.N.G.P ARTS AND SCIENCE COLLEGE	<i>E. Mayakannan</i>
20	MOHAMMED SHAFEEK M	GOVT ARTS AND SCIENCE COLLEGE, KONDOTTY	<i>M. Shafeek</i>
21	MUTHUSELVAN K	ALAGAPPA UNIVERSITY, KARAUKUDI	_____
22	NAMITHA C H	INSTITUTE OF MATHEMATICAL SCIENCES CHENNAI	<i>Namitha</i>
23	NAVANEETHA KRISHNAN K	CENTRAL UNIVERSITY OF TAMIL NADU	<i>Navaneetha</i>
24	NAVANEETHA KRISHNAN M	CENTRAL UNIVERSITY OF TAMIL NADU	<i>Navaneetha</i>
25	NAVEEN S	SRI VASAVI COLLEGE, ERODE	<i>S. Naveen</i>
26	NEENA A S	NATIONAL INSTITUTE OF TECHNOLOGY CALICUT	_____
27	RAGUL R	BHARATHIAR UNIVERSITY	<i>R. Ragul</i>
28	REVATHY J M	NATIONAL INSTITUTE OF TECHNOLOGY, KARNATAKA	<i>Revathy</i>
29	DR. SANDEEP NARAMGARI	CENTRAL UNIVERSITY OF KARNATAKA	<i>S. Sandeep</i>
30	SANGEETHA	NIT CALICUT	_____
31	SANGEETHA B N	RAMAIAH UNIVERSITY OF APPLIED SCIENCES	<i>Sangeetha B N</i>
32	SARANYA R	BHARATHIAR UNIVERSITY	<i>Saranya R</i>
33	SAROJ SI	INDIAN INSTITUTE OF TECHNOLOGY ROORKEE	<i>Saroj Si</i>
34	SAURABH KUMAR	THE LNM INSTITUTE OF INFORMATION TECHNOLOGY	<i>Saurabh Kumar</i>
35	SHUMAIRA P	GOV. COLLEGE KASARAGOD	_____





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## REGISTRATION

36	SIDHARTHA PATNAIK	INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY	<i>Sidhartha Patnaik</i>
37	SOWNDARRAJAN P T	NATIONAL INSTITUTE OF TECHNOLOGY GOA	<i>P.T. Soundarajan</i>
38	DR. SREENIVASULU BALLEM	CENTRAL UNIVERSITY OF KARNATAKA	<i>[Signature]</i>
39	SRIDEVI C. S.	BHARATHIAR UNIVERSITY	<i>[Signature]</i>
40	SURYANARAYANA MURTY PONNADA	IIT TIRUPATHI	<i>[Signature]</i>
41	SWETA SINHA	THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY	_____
42	PATTANSHETTI ANKITA KEDARNATH	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
43	MUKTASREE MAJHI	CENTRAL UNIVERSITY OF KERALA	<i>Muktasree Majhi</i>
44	MEGHA ROSE MANOJ	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
45	SUBHENDU MOHANTY	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
46	SUSHMITHA J	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
47	LAKSHMIPRIYA N	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
48	SREYA V V	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
49	HEMAND HARIKUMAR	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
50	ATHIRA E V	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
51	GREESHMA K	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
52	ANBARASAN S	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>
53	SAJIDHA P	CENTRAL UNIVERSITY OF KERALA	<i>[Signature]</i>



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## REGISTRATION

54	Aswathi Elizabeth	Central University of Kerala.	
55	Anoop V.V	Central University of Kerala	
56	Muhammed Safwan	Central University of Kerala	
57	Firoz Muhammed T	Central University of Kerala	
58	Ajmal - O	,,	
59	Soonyal P	Central University of Kerala	
60	Shijin T.V	Central University of Kerala	
61	Abdul Taled	,,	
62	Julia K. Abraham	Central University of Kerala	
63	ROSHNI T. ROY	"	
64	PADMAPRIYA V.P	"	
65	SHINE RAJ S.N.	"	