



Deen Dayal Upadhyaya College (University of Delhi)



Hands-on Workshop in Partial Differential Equations & Applications

(For B.Sc. Physical science/Mathematical science students)

Organized by

Department of Mathematics

(4th Dec. 2023)

REPORT

Under

DBT Star College Scheme



सत्यमेव जयते

DEPARTMENT OF BIOTECHNOLOGY
GOVERNMENT OF INDIA

DEEN DAYAL UPADHYAYA COLLEGE
(UNIVERSITY OF DELHI)

Department of Mathematics

Organizing

Hands – on Workshop in

Partial Differential Equations & Applications

(4th Dec. 2023)

Under

DBT Star College Scheme

The program was to encourage the students of program courses to explore various applications of partial differential equations using Mathematica. The goal of this program was to give the basic knowledge of Mathematica which is used to solve mathematical and scientific problems. Participants had access to computing facilities with this software and had an opportunity to do hands-on exercises with the same.

Overview:

Mathematica is a modern technical computing system spanning all areas of technical computing—including neural networks, machine learning, image processing, geometry, data science, visualizations, and others. The system is used in many technical, scientific, engineering, mathematical, and computing fields.

Topics covered in the workshop:

- Basic concepts, classification, construction, and geometrical interpretation; Method of characteristics and general solutions, Cauchy problem for a first-order PDE, Canonical forms of first-order linear equations.
- Classification (hyperbolic, parabolic, and elliptic), reduction to canonical forms, and general solutions of second-order linear PDEs.
- Mathematical models: The vibrating string, vibrating membrane, conduction of heat in solids, the gravitational potential, conservation laws and the Burgers equation, Traffic flow; Cauchy problem and wave equations.
- PRACTICALS USING MATHEMATICA SOFTWARE
 1. General solution of first and second order partial differential equations.
 2. Solution and plotting of Cauchy problem for first order PDEs.
 3. Plotting the characteristics for the first order partial differential equations.
 4. Solution of vibrating string problem using D’Alembert formula with initial conditions.
 5. Solution of heat equation $u_{tt} = k u_{xx}$ with initial conditions.
 6. Solution of one-dimensional wave equation with initial conditions: i. $u(x, 0) = f(x)$, $u_t(x, 0) = g(x)$, $x \in \mathbb{R}, t > 0$ ii. $u(x, 0) = f(x)$, $u_t(x, 0) = g(x)$, $u(0, t) = h(t)$

$= 0, xx \in \mathbb{R}, tt > 0$ iii. $uu(xx, 0) = ff(xx), uutt(xx, 0) = gg(xx), uuxx(0, tt) = 0, xx \in \mathbb{R}, tt > 0$

Organizing Committee:

Chairman: Prof. Hem Chand Jain

**Co-ordinator,
DBT-Star College Scheme:** Prof. Manoj Saxena

Program Coordinator: Dr. Mamta A. Wagh

Program Coordinator: Dr. Poonam Garg

Resource Persons:

Dr. Aparna, Dr. Rashmi Gupta, Dr. Poonam Garg,

Dr. Mamta Amol Wagh

SOME PICTURES FROM THE WORKSHOP







ATTENDANCE OF THE PARTICIPANTS

Hands-on Workshop: Partial Differential equations
and its application Seminar - 2 / 04-12-2023

S.No.	Name	Course	Roll No	email.	Sign
1.	Vivek Kumar	B.Sc (PSCS)	21PCS5140	Vivek.21PCS5140@ddu.ac.in	<i>[Signature]</i>
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9.	Atanksha Singh	BSc Maths (H)	21HMT3107	Atanksha.21HMT3107@ddu.ac.in	<i>[Signature]</i>
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14.	Ayushi	BSc (H) Maths	21HMT3117	ayushi.21HMT3117@ddu.ac.in	<i>[Signature]</i>
15.	Raksha	BSc(H) Maths	21HMT3171	raksha.21HMT3171@ddu.ac.in	<i>[Signature]</i>
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18.	Shikha	BSc(H) Maths	21HMT3186	shikha.21HMT3186@ddu.ac.in	<i>[Signature]</i>
19.	Priyanku	BSc (PSCS)	21PCS5127	Priyanku.21PCS5127@ddu.ac.in	<i>[Signature]</i>
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21.	Ishant	BSc (PSCS)	21PCS5117	Ishant.21PCS5117@ddu.ac.in	<i>[Signature]</i>

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24.25	Poachi	"	21HMT3163	poachi.21hmt3163@ddu.du.ac.in	
26.	Davyan	"	21HMT3120	davyan.21hmt3120@ddu.du.ac.in	
27.	Senal	"	21HMT3192	senal.21hmt3192@ddu.du.ac.in	
28.	Diksha Kaur	BSc (PSCS)	21PCS5111	diksha.21pcs5111@ddu.du.ac.in	
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32	Haseeb K Yadav	BSc (PSCS)	21PCS5114	HaseebK.21PCS5114@ddu.du.ac.in	
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35.	Ankaj Chauhan	BSc M (H)	21HMT3111	theankajji@gmail.com	
35.	Sunny Bhagat	BSc Maths	21HMT3195	sunny.21hmt3195@ddu.du.ac.in	
36.37	Yashwardhan Jha	BSc MTS	21MTS5738	yashwardhan.21mts5738@ddu.du.ac.in	
38.7	Dipansh Aggarwal	BSc MTS	21MTS5713	dipansh.21mts5713@ddu.du.ac.in	
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40)	Gitanjali yadav	BSc MTS	21MTS5714	gitanjali.21mts5714@ddu.du.ac.in	
41)	Mayank Sharma	BSc MTS	21MTS5722	mayankme2409@gmail.com	

Hands-on Workshop: Partial differential equations and its application Session - I 104-12-2023

Attendee

S.No.	Name	Course	Roll no.	email	Sign
1.	Yashveer	B.Sc Mathematics (H)	21HMT3207	yashveer.maharaj@ddu.ac.in	Yashveer
2.	Asun Verma	B.Sc maths (H)	21HMT3115	asun.21HMT3115@ddu.ac.in	Asun
3.	Gopal Verma	B.Sc maths (H)	21HMT3114	gopal.21HMT3114@ddu.ac.in	Gopal
4.	Ashay Pandey	B.Sc (H) Mathematics	21HMT3102	ashay.21HMT3102@ddu.ac.in	Ashay
5.	Deepanshi	B.Sc (H) Maths	21HMT3123	deepanshi.21HMT3123@ddu.ac.in	Deepanshi
6.	Anoushe Singh	B.Sc (H) Maths	21HMT3113	anoushe.21HMT3113@ddu.ac.in	Anoushe
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15.	Pratant Sakhani	B.Sc (H) Maths	21HMT3165	pratant.21HMT3165@ddu.ac.in	Pratant
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18.	Hemant Kumar Meena	B.Sc (H) Maths	21HMT3159	hemant.21HMT3159@ddu.ac.in	Hemant
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20.	Manjeet Saini	B.Sc (H) Maths	21HMT3151	manjeet.21HMT3151@ddu.ac.in	Manjeet
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25. Rashmi	B.Sc (H) Maths	21HMT3173	rashmi.21HMT3173@ddu.ac.in	Rashmi
26. Rahul	B.Sc (H) Maths	21HMT3170	rahul.21HMT3170@ddu.ac.in	Rahul
27. Jayant Tanwar	"	21HMT3208	jayant.21HMT3208@ddu.ac.in	Jayant
28. Aniket Sarda	B.Sc (MTS)	21MTS5708	aniket.21MTS5708@ddu.ac.in	Aniket
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30. Anuj Mishra	B.Sc. (PSCS)	21PES5106	anuj.21PES5106@ddu.ac.in	Anuj
31. Ushan	B.Sc. (PSCS)	21PES5138	ushan.21PES5138@ddu.ac.in	Ushan
32. Nitin Nair	B.Sc. (MTS)	21MTS5726	nitin.21MTS5726@ddu.ac.in	Nitin
33. Harish Kumar	B.Sc (MTS)	21MTS5715	harish.21MTS5715@ddu.ac.in	Harish
34. Sudhanshu Malik	B.Sc (MTS)	21MTS5737	sudhanshu.21MTS5737@ddu.ac.in	Sudhanshu
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36. Sanjeet	B.Sc (PHS)	21PHS6126	sanjeet.21PHS6126@ddu.ac.in	Sanjeet
37. Yagn	B.Sc. (PH)	21PHS6137	yagn.21PHS6137@ddu.ac.in	Yagn
38. Shradha	B.Sc (PHS)	21PHS6130	shradha.21PHS6130@ddu.ac.in	Shradha
37. Samiksha	B.Sc (PHS)	21PHS6125	samiksha.21PHS6125@ddu.ac.in	Samiksha
38. Satyam Gupta	B.Sc (PS) Chem	21PHS6128	satyam.21PHS6128@ddu.ac.in	Satyam

Hands on Workshop - Partial Differential Equations and its application

Session - 1

04/12/23

Attendance

S.N	Name	Course	Roll no	Email	Sign
01	Harsh Vardhan Mathur	BSc Maths(H)	21HMT3137	harsh.21hmt3137@ddu.du.ac.in	Harsh
02	Gagan Meena	B.Sc MATHS(H)	21HMT3132	gagan.21hmt3132@ddu.du.ac.in	Gagan
03	Bhavika Bhardwaj	BSc (H) Math	21HMT3118	bhavika.21hmt3118@ddu.du.ac.in	Bhavika
04	Rinku	BSc(H) math	21HMT3175	rinku.21hmt3175@ddu.du.ac.in	Rinku
05	Susant	BSc(H) Math	21HMT3196	susant.21hmt3196@ddu.du.ac.in	Susant
06	Priya Vato	BSc (H) Maths	21HMT3167	priya.21hmt3167@ddu.du.ac.in	Priya
07	Dwraj	BSc PCS	21PCS5146	dwraj.21pcs5146@ddu.du.ac.in	Dwraj
08	Kushal	BSc Pcs	21PCS5121	kushal.21pcs5121@ddu.du.ac.in	Kushal
09	Aakir Kauri	BSc Pcs	21PCS5107	aakir.21pcs5107@ddu.du.ac.in	Aakir
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11	Gangji Kishore	BSc (H) Math	21HMT3199	gangji.21hmt3199@ddu.du.ac.in	Gangji
12	Yash Sharma	BSc (H) Math	21HMT3206	yash.21hmt3206@ddu.du.ac.in	Yash
13	Shivam Arora	BSc (H) Math	21HMT3187	shivam.21hmt3187@ddu.du.ac.in	Shivam
14	Bhavani Sanghi	BSc (H) Maths	21HMT3157	bhavani.21hmt3157@ddu.du.ac.in	Bhavani
15	Ayushi Kumbhar	BSc (PHS) CHEM	21PHS6108	ayushi.21phs6108@ddu.du.ac.in	Ayushi
16	Khushi	BSc MTS	21MTS5719	khushi.21mts5719@ddu.du.ac.in	Khushi
17	Apay Kumar	BSc (PHS) CHEM	21PHS6101	apay.21phs6101@ddu.du.ac.in	Apay

Total Students 38 + 41 + 16 = 95

BUDGET

Sl. No.	Budget Head	Expenditure (in Rs. Approx.)
1	Refreshment boxes (80 students @50/-)	4000
2	Honorarium to speakers (2 session x1 person)	3000
3	Miscellaneous	1000
	TOTAL EXPENDITURE TO BE INCURRED	8000/