

# CURRICULAM VITAE

**C. S. LALITHA**

Professor

Department of Mathematics, University of Delhi South Campus

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## Academic Qualifications

1. **Ph.D.** in 1996, Department of Mathematics, University of Delhi under the supervision of Dr. S.K. Suneja and Prof. R.N. Kaul (Title of Thesis: Optimality and Duality Aspects in Mathematical Programming).
2. **M.Phil.** in 1990, Department of Mathematics, University of Delhi under the supervision of Prof. R.N. Kaul (Title of Dissertation: A Study in Multi-Objective Optimization).
3. **M.Sc. Mathematics** in 1988, Hindu College, University of Delhi (Third position in University)
4. **B.Sc. (H) Mathematics** in 1986, Sri Venkateswara College, University of Delhi

## Awards and Fellowships

1. Indian National Science Academy Teacher Award in 2016
2. Junior Research Fellowship (CSIR) in 1988
3. Senior Research Fellowship (CSIR) in 1990
4. National Scholarship by Delhi Administration for meritorious candidates of Delhi Sec. School Examination, 1981.

## Courses Taught

M.Phil. / Ph.D. Teaching

Multiobjective Optimization, Convex and Nonsmooth Analysis

Post Graduate Teaching

Mathematical Programming, Optimization Techniques & Control Theory,

Module Theory

## Areas of Specialization

Optimization, Variational Inequalities, Convex Analysis, Nonsmooth Analysis

## Supervision for Ph.D.

1. *Optimality and Higher-Order Duality in Certain Vector Optimization Problems*, submitted by Muskan Kapoor nee Manju Kalra in 2018.
2. *Vector Optimization Problems Involving Vector and Set-Valued Maps*, submitted by Megha Sharma in 2018.
3. *Unified Solutions, Stability and Optimality in Set Optimization*, Mansi Dhingra, 2018.

4. *Optimality and Duality for Some Vector Optimization Problems over Cones*, by Pooja Louhan, 2017.
5. *Stability and Well-Posedness in Vector Optimization*, by Prashanto Chatterjee, 2015.
6. *Well-posedness, Stability and Duality Aspects of Variational Inequality Problems*, by Guneet Bhatia, 2011.
7. *Set-Valued Optimization: Efficiency, Derivatives and Conjugate Duality* by Ruchi Arora, 2010.
8. *Certain Aspects of Variational Inequality Problems in terms of Bifunctions* by Monika Mehta, 2009.

### **Supervision for M.Phil.**

1. *Constraint Qualifications and Strict Constraint Qualifications in Scalar Optimization* by Shelly Khurana, 2018.
2. *Optimality Conditions in Scalar and Interval-Valued Optimization* by Shipra Chauhan, 2017.
3. *Unified Optimal Solution Concepts in Vector Optimization* by Vivek Kumar Sinha, 2016.
4. *Scalarization Methods and Characterizations of Solution Sets in Vector Optimization* by Shiva Kapoor, 2016.
5. *Optimality and Connectedness in Set-Valued Optimization* by Sweeti Yadav, 2015.
6. *Optimality and Numerical Aspects of Bilevel Programming* by Priyanka Sahni 2013.
7. *Regularity and Optimality Conditions in Vector Optimization* by Tamanna Yadav, 2013.
8. *Optimization Reformulations and Computational Methods of Generalized Nash Equilibrium Problems* by Khushboo, 2012.
9. *Image Space Analysis for Constrained Extremum Problems and Applications* by Deepti Kaur, 2011.
10. *Weak Sharp Minima for Optimization and Variational Inequality Problems* by Mansi Dhingra, 2011.
11. *On Solution Sets in Vector Optimization Involving Quasiconvex and Related Functions* by Monika Gupta, 2009.
12. *A Study of Certain Aspects of Mathematical Programming Problem with Equilibrium Constraints* by Ruchika Sethi, 2009.
13. *A Study of Certain Aspects of Semidefinite and Second Order Cone Programming Problems* by Tanu Gupta, 2008.
14. *A Study of Lagrange Multiplier Theory for Constrained Optimization Problems* by Neha Jain, 2007.

### **Editorial Board**

Associate Editor of **Asia-Pacific Journal of Operational Research**, an official Journal of the Association of Asian-Pacific Operational Research Societies within IFORS, published by World Scientific during 2011 to 2010.

### Member of Learned Bodies

1. Life member of the Operational Research Society of India (ID: 0463/C/93/MSL)
2. Life member of the Indian Mathematical Society (Membership No. L-09-036)
3. Life member of the Ramanujan Mathematical Society (Membership No. 868)
4. Member of the American Mathematical Society
5. Member of the Pacific Optimization Group
6. Representative member of Optimization Research Bridge (ORB) in 2002, an electronic newsletter of Pacific Optimization Research Activity Group, for reporting and promoting research activities in Optimization from India
7. Member of International Working Group of Generalized Convexity
8. Life member of the Society of Mathematical Sciences, Delhi
9. Member of Alumni Association of Mathematical Sciences

### Member of Committees

1. Nominated as member of the Subject Expert Committee (SEC) on Physical & Mathematical Sciences under Women Scientists Scheme-A (WOS-A) of Department of Science and Technology during 2016-18.
2. Member (VC nominee) of Departmental Research Council, Department of Operational Research, University of Delhi during 2016-18.
3. Member of Departmental Research Council, Department of Mathematics, University of Delhi during 2015-17.
4. Member of Board of Research Studies, Faculty of Mathematical Sciences, University of Delhi during 2015-17.

### Sponsored Project

1. MATRIC scheme of Department of Science and Technology, India during 2018-20 allocation of Rs. 6,60,000.
2. R&D Research Development Grant to University Faculty, University of Delhi 2015, ***Scalarization in Set-Valued Optimization.***
3. R&D Research Development Grant to University Faculty, University of Delhi 2014, ***On Set-Valued Optimization.***
4. R&D Research Development Grant to University Faculty, University of Delhi 2013, ***Scalarization and Optimality of Vector-Valued Optimization.***
5. R&D Research Development Grant to University Faculty, University of Delhi 2012, ***Reformulations for Generalized Nash Equilibrium Problems.***
6. R&D Research Development Grant to University Faculty, University of Delhi 2011, ***Stability and Well-Posedness in Vector Optimization.***
7. R&D Research Development Grant to University Faculty, University of Delhi 2010, ***Nonsmoothness and Well-Posedness in Optimization.***
8. R&D Research Development Grant to University Faculty, University of Delhi 2009, ***Optimality and Well-Posedness Aspects of Vector Optimization Problems.***

9. Minor Research Project to college teachers sponsored by University Grants Commission titled ***Optimisation and Nonsmooth Analysis*** during 2001-2003.

### **Visiting Positions**

1. Visiting Professor, Department of Economics, Università degli Studi dell' Insubria, Varese, Italy during November 7-20, 2016.
2. Visited Department of Industrial Engineering and Operations Research, Indian Institute of Technology Bombay for joint research collaboration with Dr. K.S. Mallikarjuna Rao during August 26-28, 2016.
3. Visited Department of Humanities and Social Sciences, Indian Institute of Technology Kanpur for joint research collaboration with Prof. J. Dutta during April 22-24, 2016.

### **Organised Symposium / Refresher course / School**

1. Coordinator of ***Pre-Entrance Summer School in Mathematics***, University of Delhi, June 5-16, 2018.
2. Convener of 33<sup>rd</sup> Annual Conference of the ***Ramanujan Mathematical Society***, University of Delhi, June 1-3, 2018.
3. Organised International Conference on ***Recent Advances in Optimization Theory and Applications***, University of Delhi, January 30-31, 2016.
4. Organised a scientific meeting on ***Indian Women and Mathematics*** 2015 at University of Delhi South Campus, April 2-4, 2015.
5. Organised ***CIMPA-UNESCO-INDIA Research School 2013***, Department of Mathematics, University of Delhi, November 25 to December 6, 2013.
6. Organised ***National Seminar for Research Scholars***, Department of Mathematics, University of Delhi, September 20-21, 2013.
7. Organised ***National Seminar for Research Scholars***, Department of Mathematics, University of Delhi, May 24-25, 2012.
8. Organised three weeks Refresher Course on ***Mathematics and Operational Research*** in Centre for Professional Development in Higher Education, University of Delhi from December 13, 2010 to January 4, 2011.
9. Organised five day Training Programme on ***Optimization Theory and Applications*** during February 10-14, 2010.
10. Organised two day Symposium on ***Recent Advances in Optimization Theory and Applications*** during October 27-28, 2006.

### **Summer School / Workshop attended**

1. Summer School on ***Generalized Convex Analysis: Advanced Theory and Applications*** held at Kaohsiung, Taiwan during July 15-19, 2008.
2. Instructional workshop on ***Convex Analysis, Optimization and Application*** held at Indian Institute of Technology, Kanpur during December 5-21, 2005.

## Book Published/Edited

1. D. Aussel and C.S. Lalitha, *Generalized Nash Equilibrium Problems, Bilevel Programming and MPEC*, Springer, 2018, ISBN 978-981-10-4773-2
2. Q.H. Ansari, C.S. Lalitha and M. Mehta, *Generalized Convexity, Nonsmooth Inequalities and Nonsmooth Optimization*, Chapman and Hall / CRC Press, Taylor and Francis Group, Florida, USA, 2013, ISBN 9781439868201
3. *Combinatorial Optimization: Some Aspects*, A commemorative volume containing papers of Prof. M.C. Puri, published by Narosa Publishers, New Delhi, India, 2007, Editors R. Malhotra, C.S. Lalitha, P. Gupta, A. Mehra and Sonia, ISBN 978173198151, 8173198152.

## Publications in Reviewed Journals

1. Karuna and C.S. Lalitha, *Continuity of approximate weak efficient solution set map in parametric set optimization*, J. Nonlinear Convex Anal. 19(7)(2018), 1247-1262. **[Impact Factor 0.642]**
2. G.P. Crespi, M. Dhingra and C.S. Lalitha, *Pointwise and global well-posedness in set optimization: A direct approach*, Annals of OR. 269(1-2)2018, 149-166. **[Impact Factor 1.709]**
3. Khushboo and C.S. Lalitha, *Scalarizations for a unified vector optimization problem based on order representing and order preserving properties*, J. Global Optim. 70(4) (208), 903-916. **[Impact Factor 1.733]**
4. M. Dhingra and C.S. Lalitha, *Approximate solutions and scalarizations in set optimization*, Optimization, 66(11)(2017), 1793-1805. **[Impact Factor 0.943]**
5. M. Dhingra and C.S. Lalitha, *Set optimization using improvement sets*, Yugosl. J. Oper. Res. 27(2)(2017), 153–167.
6. C.S. Lalitha and M. Dhingra, *Approximate Lagrangian duality and saddle point optimality in set optimization*, RAIRO-Oper. Res. 51(3)(2017), 819-831. **[Impact Factor 0.55]**
7. M. Dhingra and C.S. Lalitha, *Well-setness and scalarization in set optimization*, Optim. Lett., 10(8)(2016) 1657-1667. **[Impact Factor 1.310]**
8. C.S. Lalitha and P. Chatterjee, *Stability and scalarization in vector optimization using improvement sets*, J. Optim. Theory Appl., 166(3)(2015) 825-843. **[Impact Factor 1.289]**
9. P. Chatterjee and C.S. Lalitha, *Scalarization of Levitin-Polyak well-posedness in vector optimization problems using weak efficiency*, Optim. Lett. 9(2)(2015) 329-343. **[Impact Factor 1.289]**
10. C.S. Lalitha and P. Chatterjee, *Levitin-Polyak well-posedness for constrained quasiconvex vector optimization problems*, J. Global Optim. 59(1)(2014) 191-205. **[Impact Factor 1.733]**
11. C. Charita, J. Dutta and C.S. Lalitha, *Gap functions for vector variational inequalities*, Optimization. 64(7)(2015) 1499-1520. **[Impact Factor 0.943]**

12. C.S. Lalitha and M. Dhingra, *Optimization reformulations of the generalized Nash equilibrium problem using regularized indicator Nikaidô-Isoda function*, J. Global Optim. 57(3)(2013) 843-861. **[Impact Factor 1.733]**
13. J. Dutta and C.S. Lalitha, *Optimality conditions in convex optimization revisited*, Optim. Lett. 7(2)(2013) 221-229. **[Impact Factor 1.310]**
14. C.S. Lalitha and Prashanto Chatterjee, *Well-posedness and stability in vector optimization problem using Henig proper efficiency*, Optimization. 62(1)(2013) 155-165. **[Impact Factor 0.943]**
15. C.S. Lalitha and P. Chatterjee, *Stability and scalarization of weak efficient, efficient and Henig proper efficient sets using generalized quasiconvexities*, J. Optim. Theory Appl. 155(3)(2012) 941-961. **[Impact Factor 1.289]**
16. C.S. Lalitha and P. Chatterjee, *Stability for properly quasiconvex vector optimization problem*, J. Optim. Theory Appl. 155(2)(2012) 492-506. **[Impact Factor 1.289]**
17. C.S. Lalitha and G. Bhatia, *Levitin-Polyak well-posedness for parametric quasivariational inequality problem of the Minty type*, Positivity. 16(3)(2012) 527-541. **[Impact Factor 0.661]**
18. C.S. Lalitha and G. Bhatia, *Stability of parametric quasivariational inequality of the Minty type*, J. Optim. Theory Appl. 148(2)(2011) 281-300. **[Impact Factor 1.289]**
19. C.S. Lalitha and G. Bhatia, *Well-posedness for parametric quasi-variational inequality problems with set-valued maps and for optimization problems with parametric quasivariational inequality constraints*, Optimization. 59(7)(2010) 997-1011. **[Impact Factor 0.943]**
20. C.S. Lalitha, *A note on duality of generalized equilibrium problem*, Optim. Lett. 4(1)(2010), 57-66. **[Impact Factor 1.310]**
21. C.S. Lalitha, *A new augmented Lagrangian approach to duality and exact penalization*, J. Global Optim. 46(2)(2010), 223-245. **[Impact Factor 1.733]**
22. C.S. Lalitha and R. Arora, *Proper Clarke epiderivative in set-valued optimization*, Taiw. J. Math., 13(6A)(2009), 1695-1710. **[Impact Factor 0.749]**
23. C.S. Lalitha and G. Bhatia, *Well-posedness for variational inequality problems with generalized monotone set-valued maps*, Numer. Funct. Anal. Optim. 30(5-6)(2009), 548-565. **[Impact Factor 0.852]**
24. C.S. Lalitha and G. Bhatia, *Duality in  $\varepsilon$ -variational inequality problems*, J. Math. Anal. Appl. 356(1)(2009), 168-178. **[Impact Factor 1.064]**
25. C.S. Lalitha and M. Mehta, *Characterizations of solution sets of mathematical programs in terms of Lagrange multipliers*, Optimization. 58(8)(2009) 885-1007. **[Impact Factor 0.943]**
26. C.S. Lalitha and R. Arora, *Weak Clarke epiderivative in set-valued optimization*, J. Math. Anal. Appl. 342(1)(2008), 704-714. **[Impact Factor 1.064]**
27. C.S. Lalitha and R. Arora, *Conjugate maps, subgradients and conjugate duality in set-valued optimization*, Numer. Funct. Anal. Optim. 28(7&8)(2007), 897-909. **[Impact Factor 0.852]**

28. C.S. Lalitha and M. Mehta, *Characterization of the solution sets of pseudolinear programs and pseudoaffine variational inequality problems*, J. Nonlinear Convex Anal. 8(1)(2007), 87-98. **[Impact Factor 0.642]**
29. C.S. Lalitha and M. Mehta, *A note on pseudolinearity in terms of bifunctions*, Asia Pac. J. Oper. Res. 24(1)(2007), 83-91. **[Impact Factor 0.364]**
30. J. Dutta and C.S. Lalitha, *Boundedness of the set of KKT multipliers in vector optimization*, J. Global Optim. 36(3)(2006), 425-437. **[Impact Factor 1.733]**
31. C.S. Lalitha and M. Mehta, *On vector variational inequality problem in terms of bifunctions*, Aust. J. Math. Anal. Appl. 3(2)(2006), Article 11, 1-11.
32. C.S. Lalitha and M. Mehta, *Vector variational inequalities with cone-pseudomonotone bifunctions*, Optimization. 54(3)(2005) 327-338. **[Impact Factor 0.943]**
33. C.S. Lalitha, P. Garg and S. Khurana, *Duality for multiobjective fractional programming via linearization and scalarization approaches*, Opsearch. 42(1)(2005) 37-54.
34. C.S. Lalitha and R. Arora, *Proximal Proper efficiency for minimization with respect to normal cones*, Bull. Aust. Math. Soc. 75(2005) 215-224. **[Impact Factor 0.548]**
35. R. Arora and C.S. Lalitha, *Proximal proper efficiency in set-valued optimization*, Omega, Inter. J. Manag. Sc. 33(5)(2005) 407-411. **[Impact Factor 4.029]**
36. S. Chandra, J. Dutta and C.S. Lalitha, *Regularity conditions and optimality in vector optimization*, Numer. Funct. Anal. Optim. 25(5&6)(2004) 479-501 **[Impact Factor 0.852]**
37. C.S. Lalitha, *Strong efficiency in vector optimization of set-valued maps*, Asia Pac. J. Oper. Res. 20(2)(2003) 231-240. **[Impact Factor 0.364]**
38. C.S. Lalitha, J. Dutta and M.G. Govil, *Optimality criteria in set-valued optimization*, J. Aust. Math. Soc., 75(2003) 1-11. **[Impact Factor 0.656]**
39. C.S. Lalitha and S. Davar, *A note on quasiconvex set-valued maps*, Opsearch. 40(1)(2003) 52-61.
40. C.S. Lalitha, S.K. Suneja and S. Khurana, *Symmetric duality involving invexity in multiobjective fractional programming*, Asia Pac. J. Oper. Res. 20(1)(2003) 57-72 **[Impact Factor 0.364]**
41. S.K. Suneja, C.S. Lalitha and S. Khurana, *Second order symmetric duality in multiobjective programming*, Eur. J. Oper. Res. 144(3)(2003) 492-500. **[Impact Factor 3.297]**
42. S.K. Suneja, C.S. Lalitha and M.G. Govil, *Generalized E-convex functions in nonlinear programming*, Ind. J. Math. 45(2)(2003) 223-240.
43. S.K. Suneja, C.S. Lalitha and M.G. Govil, *E-convex and related functions*, Inter. J. Manag. Syst. 18(2)(2002) 193-206.
44. R.N. Kaul and C.S. Lalitha, *Convexity and arcwise connectedness approach to inequalities*, Ind. J. Pure Appl. Math. 33(7)(2002), 1087-1095. **[Impact Factor 0.325]**
45. S.K. Suneja, C.S. Lalitha and S. Khurana, *Saddle point type optimality criteria and duality relation for generalized fractional programming*, Opsearch. 38(2)(2001), 183-196.

46. R.N. Kaul and C.S. Lalitha, *A note on arcwise connected and related functions*, Ind. J. Pure Appl. Math. 31(11)(2000), 1443-1454. **[Impact Factor 0.325]**
47. S.K. Suneja, C.S. Lalitha and S. Khurana, *Optimality and duality theorems for nonsmooth multiobjective fractional programs*, Ind. J. Pure Appl. Math. 30(3) (1999), 243-257. **[Impact Factor 0.325]**
48. C.S. Lalitha, *Generalized nonsmooth invexity in multiobjective programming*, Inter. J. Manag. Sys. 11(2)(1995), 183-198.
49. R.N. Kaul, S.K. Suneja and C.S. Lalitha, *Generalized nonsmooth invexity*, J. Inf. Optim. Sc. 15(1)(1994), 1-17.
50. R.N. Kaul, S.K. Suneja and C.S. Lalitha, *Duality in pseudolinear multiobjective fractional programming*, Ind. J. Pure Appl. Math. 24(5)(1993), 279-290. **[Impact Factor 0.325]**
51. S.K. Suneja and C.S. Lalitha, *Multiobjective fractional programming involving  $\rho$ -invex and related functions*, Opsearch. 30(1)(1993), 1-14.
52. C.R. Bector, S.K. Suneja and C.S. Lalitha, *Generalized B-vex functions and generalized B-vex programming*, J. Optim. Theory Appl. 76(1993), 561-576. **[Impact Factor 1.289]**

### **Publications as Chapters in Books**

1. Muskan Kapoor and C.S. Lalitha, *A strict constraint qualification in vector optimization*, accepted in Springer Proceedings.
2. C.S. Lalitha and R. Arora, *Proximal proper saddle points in set-valued optimization*, Topics in Nonconvex Optimization Springer Optimization and its Applications (Ed.) S. K. Mishra, 2011, Vol. 50, 87-100.
3. M. Govil and C.S. Lalitha, *Cone preinvex vector valued optimization*, Operational Research and its Applications: Recent Trends (APORS-2003), Editors M.R. Rao and M.C. Puri, Allied Publishers, Vol.1, 110-117.

### **Research Papers Awarded Prize in Conferences**

1. C.S. Lalitha and R. Arora, *Weak Clarke epiderivative for set-valued maps*, Recent Advances in Optimization Theory and Applications, Symposium held at Delhi University, Delhi during October 27-28, 2006.
2. R. Arora and C.S. Lalitha, *Proximal proper efficiency in set-valued optimization*, 6<sup>th</sup> International Conference of the Association of Asia-Pacific Operations Research, APORS 2003 held at New Delhi, December 8-11, 2003.
3. C.S. Lalitha, P. Garg and S. Khurana, *Duality for multiobjective fractional programming via linearization and scalarization approaches*, International Conference on Quality, Reliability and Information Technology 2000 held at New Delhi, December 21-23, 2000.



## Research Papers Presented in Conferences

1. C.S. Lalitha and P. Chatterjee, *A study of well-posedness and stability in vector optimization using Henig proper efficiency*, International Symposium on Applied Optimization and Game Theoretic Models held at Indian Statistical Institute New Delhi during January 9-11, 2013.
2. C.S. Lalitha and M. Dhingra, *Constrained optimization reformulations and relaxation methods for generalized Nash equilibrium problem using nonmonotone inexact line search*, International Symposium on Applied Optimization and Game Theoretic Models held at Indian Statistical Institute New Delhi during January 9-11, 2013.
3. C.S. Lalitha and P. Chatterjee, *Levitin-Polyak well-posedness and certain characterizations in vector optimization*, International Conference on Optimization Modelling and Applications (OPTIMA) at University of Delhi during November 29 to December 1, 2012.
4. M. Dhingra and C.S. Lalitha, *Unconstrained optimization reformulation of generalized Nash equilibrium problem and its solution using gradient method*, International Conference on Optimization Modelling and Applications (OPTIMA) at University of Delhi during November 29 to December 1, 2012.
5. C.S. Lalitha and P. Chatterjee, *Stability for properly quasiconvex Vector optimization problem*, International Conference on Analysis and its Applications, Aligarh Muslim University, November 19-21, 2011.
6. C.S. Lalitha and G. Bhatia, *Well-posedness for parametric quasi-variational inequality problems*, 41<sup>st</sup> Annual Operational Research Society of India Convention held at Tirupati, Andhra Pradesh, December 15-17, 2008.
7. C.S. Lalitha, *A new augmented Lagrangian approach to duality and exact penalization*, at the 9<sup>th</sup> International Symposium on Generalized Convexity and Monotonicity held at Kaohsiung, Taiwan during July 21-25, 2008.
8. C.S. Lalitha and G. Bhatia, *On variational inequalities with generalized monotone set-valued maps*, 40<sup>th</sup> Annual Operational Research Society of India Convention held at New Delhi, December 4-6, 2007.
9. C.S. Lalitha and R. Arora, *Proper Clarke epiderivative in set-valued optimization*, 40<sup>th</sup> Annual Operational Research Society of India Convention held at New Delhi, December 4-6, 2007.
10. M. Mehta and C.S. Lalitha, *Strong vector variation like inequality problems with properly quasimonotone bifunctions*, 40<sup>th</sup> Annual Operational Research Society of India Convention held at New Delhi, December 4-6, 2007.
11. C.S. Lalitha and M Mehta, *Lagrange multiplier characterization of solution sets of optimization problems*, National Conference on Mathematical Modeling, Optimization and their Applications, held at New Delhi during April 23-27, 2007.
12. C.S. Lalitha and R. Arora, *Weak Clarke epiderivative for set-valued maps*, Recent Advances in Optimization Theory and Applications, Symposium held at Delhi University, Delhi during October 27-28, 2006.

13. C.S. Lalitha and R. Arora, *Conjugate duality in set-valued optimization*, 3<sup>rd</sup> Annual Operational Research Society of India Convention held at Bangalore, Karnataka, December 27-28, 2005.
14. C.S. Lalitha and M. Mehta, *Characterization of the solution sets of pseudolinear programs and pseudoaffine variational inequality problems* at the 8<sup>th</sup> International Symposium on Generalized Convexity and Monotonicity held at Varese, Italy during July 4-8, 2005.
15. C.S. Lalitha and M. Mehta, *Existence of solutions for a vector variational inequality problem in terms of bifunctions*, 37<sup>th</sup> Annual Operational Research Society of India Convention held at Ahmedabad, Gujarat, January 8-11, 2005.
16. C.S. Lalitha and M. Mehta, *A note on pseudolinearity in terms of bifunctions*, 6<sup>th</sup> International Conference of the Association of Asia-Pacific Operations Research, APORS 2003 held at New Delhi, December 8-11, 2003.
17. M. Mehta and C.S. Lalitha, *Existence of solution for a generalized variational like inequality problem in terms of bifunctions*, 6<sup>th</sup> International Conference of the Association of Asia-Pacific Operations Research, APORS 2003 held at New Delhi, December 8-11, 2003.
18. M. Govil and C.S. Lalitha, *Cone preinvex vector valued functions*, 6<sup>th</sup> International Conference of the Association of Asia-Pacific Operations Research, APORS 2003 held at New Delhi, December 8-11, 2003.
19. R. Arora and C.S. Lalitha, *Proximal proper efficiency in set-valued optimization*, 6<sup>th</sup> International Conference of the Association of Asia-Pacific Operations Research, APORS 2003 held at New Delhi, December 8-11, 2003.
20. R. Arora and C.S. Lalitha, *Proximal proper saddle points in set-valued optimization*, at 2<sup>nd</sup> International Conference on Quality, Reliability and Information Technology held at New Delhi, December 18-20, 2003.
21. C.S. Lalitha and R. Arora, *Proximal proper efficiency in multiobjective optimization*, at the International Conference on Operations Research for Development (ICORD 2002) and 35<sup>th</sup> Annual Operational Research Society of India Convention held at Chennai, Tamil Nadu, December 27-30, 2002.
22. M. Mehta and C.S. Lalitha, *Pseudomonotonicity and variational inequality problems*, at the 7<sup>th</sup> International Symposium on Generalized Convexity and Monotonicity held at Hanoi Institute of Mathematics, Hanoi, Vietnam during August 27 to August 31, 2002.
23. Monika Mehta and C.S. Lalitha, *A note on pseudomonotone vector variational inequality*, at the Symposium on Information and Optimization held at Calcutta University, Kolkata on December 31, 2001.
24. C.S. Lalitha and Sonia Davar, *A note on quasiconvex set valued maps*, 34<sup>th</sup> Annual Operational Research Society of India Convention at Kolkata, December 27-29, 2001.
25. C.S. Lalitha, P. Garg and S. Khurana, *Duality for multiobjective fractional programming via linearization and scalarization approaches*, International Conference on Quality, Reliability and Information Technology 2000 held at New Delhi, December 21-23, 2000.

26. C.S. Lalitha, J. Dutta and M.G. Govil, *Optimality criteria in set-valued optimization*, 33<sup>rd</sup> Annual Operational Research Society of India Convention held at Ahmedabad, Gujarat, December 14-16, 2000.
27. C.S. Lalitha, *Strong efficiency in vector optimization of set-valued maps*, 33<sup>rd</sup> Annual Operational Research Society of India Convention held at Ahmedabad, Gujarat, December 14-16, 2000.
28. C.S. Lalitha, S.K. Suneja and S. Khurana, *Symmetric duality involving invexity in multi-objective fractional programming*, 5<sup>th</sup> Conference of the Association of Asia-Pacific Operational Research Societies held at Singapore, July 5-7, 2000.
29. R.N. Kaul and C.S. Lalitha, *A note on arcwise connected and related functions*, 32<sup>nd</sup> Annual Operational Research Society of India Convention held at Tirupati, Andhra Pradesh, December 20-22, 1999.
30. S.K. Suneja, C.S. Lalitha and S. Khurana, *Second order symmetric duality in multiobjective programming*, 32<sup>nd</sup> Annual Operational Research Society of India Convention held at Tirupati, Andhra Pradesh, December 20-22, 1999.
31. S.K. Suneja, C.S. Lalitha and S. Khurana, *Saddle point type optimality criteria and duality relation for generalized fractional programming*, International Conference on Operational Research for Better Tomorrow organized by Delhi Chapter of Operational Research Society of India held at Delhi, December 24-26, 1998.
32. C.S. Lalitha and S. Aggarwal, *Duality in minmax programs using duality in multiobjective programs*, 28<sup>th</sup> Annual Operational Research Society of India Convention held at Delhi, December 27-29, 1995.
33. S.K. Suneja and C.S. Lalitha, *Multiobjective programming involving generalized B-vex programming*, Appeared in the Proceedings of First Annual Conference of Indian Society of Industrial and Applied Mathematics, Roorkee, February 4-7, 1993, pp. 291-295.
34. C.R. Bector, S.K. Suneja and C.S. Lalitha, *Generalized B-vex functions*, Appeared in the Proceedings of the Administrative Sciences Association of Canada held at Niagara Falls, Canada, June 1991, pp. 42-53.

### **Courses attended**

1. Refresher course in ***Analysis*** held by Centre for Professional Development in Higher Education, University of Delhi from April 2, 1993 to April 22, 1993.
2. Refresher course in ***Differential Equations*** held by Centre for Professional Development in Higher Education, University of Delhi from March 27, 1995 to April 15, 1995.
3. Refresher course in ***Computational Mathematics*** held by Centre for Professional Development in Higher Education, University of Delhi from April 27, 1998 to May 16, 1998.
4. Refresher course in ***Mechanics and Differential Equations*** held by Centre for Professional Development in Higher Education, University of Delhi from February 16, 2001 to March 8, 2001.

5. Training Course on **Web Designing** held by Delhi University Computer Centre, University of Delhi from November 3, 2003 to November 14, 2003.
6. **Computer Orientation** as a member of Teacher's forum conducted by CMCS Paschim Vihar for one week in March 1995.

### Resource Person

1. **Two** lectures on *Introduction to Vector Optimization*, in the Refresher Course in Mathematics & Statistics, UGC-Human Resource Development Centre, Pondicherry University, on September 15, 2018.
2. **Two** lectures on *Introduction to Vector Optimization*, in the Refresher Course in Computational & Mathematical Studies UGC-Human Resource Development Centre, Jamia Millia Islamia, New Delhi on September 1, 2018.
3. A lecture on *Fun in Mathematics*, in the Orientation Programme (OR-93), Centre for Professional Development in Higher Education, University of Delhi on August 16, 2018.
4. A lecture on *Puzzles in Mathematics*, in the Orientation Programme (OR-92), Centre for Professional Development in Higher Education, University of Delhi on June 20, 2018.
5. Series of **four** lectures on *Convex Sets and Convex Functions*, Short Term Training Programme on Nonlinear Analysis and Optimization Indian Institute of Technology (ISM), Dhanbad, December 1-5, 2017.
6. Series of **four** lectures on *Convex Sets and Convex Functions*, International Workshop on Convex Analysis and Optimization, Aligarh Muslim University, November 14-19, 2017.
7. A lecture on *Minimization and the Fundamental Theorem of Algebra*, in the Refresher Course in Centre for Professional Development in Higher Education, University of Delhi on September 7, 2016.
8. A lecture on *Stability Aspects in Vector Optimization* in the Workshop on Game Theory and Optimization, Indian Institute of Technology Madras, June 6-8, 2016.
9. A lecture on *Scalar and Vector Optimization* in Refresher Course in Mathematics, Panjab University, Chandigarh on March 21, 2015.
10. A lecture on *Solution Concepts in Vector and Set Optimization*, in the Workshop on Applied Optimization Models and Computation, Indian Statistical Institute, Delhi during January 28-30, 2015.
11. Series of **two** lectures on *Introduction to Optimization Theory*, in the Refresher Course in Centre for Professional Development in Higher Education, University of Delhi on January 12, 2013.
12. Lecture on *Optimality Conditions for Mathematical Programming Problems*, in the Training Programme on Optimization and its Applications at University of Delhi during November 26 to December 1, 2012.
13. Mentor/Resource person at INSPIRE internship programme-2012, organized by DST at Deshbandhu College, University of Delhi on *Some Solved and Unsolved Problems in Mathematics*, October 1-5, 2012.

14. Series of **two** lectures on *Introduction to Variational Inequality Problems*, in the Refresher Course in Centre for Professional Development in Higher Education, University of Delhi on December 20, 2011.
15. Series of **two** lectures on *Introduction to Optimization Theory*, in the Refresher Course conducted by UGC-Academic Staff College of B.P.S. Mahila Vishwavidyalaya, Khanpur Kalan on January 8, 2011.
16. Series of **two** lectures on *Augmented Lagrangian Approach to Duality*, Advanced Training Program on Nonconvex Optimization and its Application at Banaras Hindu University, Varanasi during March 22-26, 2009.
17. Series of **five** lectures on *Generalized Convexity and Nonlinear Programming*, Training Program held at Apaji Institute of Mathematics and Applied Computer Technology, Banasthali University, Rajasthan during December 24-29, 2008.
18. Series of **two** lectures on *An Introduction to Vector Optimization*, Research Workshop in Optimization Theory and Applications, held at Indian Institute of Technology Kanpur during September 3-6, 2008.
19. A lecture on *An Introduction to Variational Inequality Problems*, International Workshop on Advanced Mathematical Programming Techniques for Young Teachers and Researchers, held at Dravidian University, Kuppam, Andhra Pradesh during March 24-April 1, 2008.
20. A lecture on *Convex and Generalized Convex Optimization*, Workshop on Mathematical Modeling Optimization and their Applications, held at Bharati Vidyapeeth University, Institute of Computer Applications and Management, New Delhi during April 23-27, 2007.

### **Invited Talks Delivered**

1. *Pointwise and Global Well-Posedness in Set Optimization: A Direct Approach*, International Symposium on Operations Research and Game Theory : Modeling and Computation, Indian Statistical Institute, Delhi Centre, January 9-11, 2018.
2. *Approximate Weak Efficient Solutions and Continuity in Parametric Set Optimization*, International Conference on Analysis and its Applications, Aligarh Muslim University, November 20-22, 2017.
3. *Convergence of Solution Sets in Vector Optimization*, National Conference on Advances in Applied Mathematics and Statistics, September 7-8, 2017 at Mata Sundari College for Women, University of Delhi.
4. *Stability Aspects in Set Optimization*, 32nd Annual Conference of Ramanujan Mathematical Society, Rani Channamma University, Belagavi, June 23-25, 2017.
5. *Mathematics of CT Scans*, National Seminar on Recent Developments in Mathematics, Kalindi College, January 12-13, 2017.
6. *Can Mathematics Save Life?*, PGDAV(E) College, University of Delhi, September 21, 2016.
7. *Well-Posedness in Set Optimization from a Different Viewpoint*, Conference on Game Theory and Optimization, IIT Madras, June 9-10, 2016.

8. *Mathematics of Tomography*, State Level Seminar, *Mathematics and Its Applications*, Kamla Nehru College, University of Delhi, March 4, 2016.
9. *Set-Criterion for Set-Valued Problems*, National Conference on *Analysis and Applications*, Banaras Hindu University, February 5-7, 2016.
10. *Well-Posedness in Set Optimization*, International Conference on *Recent Advances in Mathematical Biology, Analysis and Applications*, Aligarh Muslim University, June 4-6, 2015.
11. *On Set-Valued Optimization*, National Conference on *Optimization Modelling and Machine Learning Technique*, Panjab University, Chandigarh, March 20-21, 2015.
12. *Henig Proper Subdifferential of Set-Valued Maps*, International Conference on *Modeling, Simulation and Optimizing Techniques*, DAV College, Jalandhar, Punjab, February 12-14, 2015.
13. *Optimality Conditions in Convex Optimization*, National Seminar on *Optimization and its Applications*, Lakshmi Bai College, University of Delhi, January 15-16, 2015.
14. *Approximate Solutions in Set-Valued Optimization*, International Conference on *Operational Research in conjunction with 47<sup>th</sup> Convention of Annual Operational Research Society of India* held at Tirupati, December 1-3, 2014.
15. *Stability Aspects in Vector Optimization*, International Conference on *Recent Trends on Materials and Devices (ICRTMD-2013)* at Amity University during October 30-31, 2013.
16. *Subgradients Using Henig Proper Efficiency in Set-Valued Optimization*, International Symposium on *Applied Optimization and Game Theoretic Models* held at Indian Statistical Institute New Delhi during January 9-11, 2013.
17. *Optimization Reformulations of Generalized Nash Equilibrium Problems*, National Conference on *Advances in Mathematical Sciences*, Kadi Sarva Vishwa Vidhyalaya, Gujarat, December 7-8, 2012.
18. *Mathematics of Sudoku*, St. Stephen's College, University of Delhi on August 22, 2012.
19. *Modelling in Graph Theory*, Daulat Ram College, University of Delhi on February 16, 2012.
20. *Mathematics of Sudoku*, Miranda House, University of Delhi on February 1, 2012.
21. *Applications of Game Theory in Wireless Networks*, National Workshop on *Applications of Mathematics in Industrial Research*, Lakshmi Bai College, University of Delhi, January 19-20, 2012.
22. *Levitin-Polyak Well-Posedness for Parametric Quasivariational Inequality Problem of the Minty Type*, International Conference on *Analysis and its Applications*, Aligarh Muslim University, November 19-21, 2011.
23. *Mathematics of Sudoku*, Gargi College, University of Delhi on September 14, 2011.
24. *Modeling in Graph Theory*, Seminar on *Mathematical Modelling and its Applications* at Kamla Nehru College, University of Delhi on March 25, 2011.
25. *Introduction to Vector Optimization*, National Conference, *Mathematics Meet-2011* organized by Department of Mathematics, Gujarat University, Ahmedabad during February 3-5, 2011.

26. *Duality of Generalized Equilibrium Problem*, Satellite Conference of International Congress of Mathematicians (ICM-2101), on Mathematics in Science and Technology during August 14-17, 2010 at India Habitat Centre \ India Islamic Culture Centre, New Delhi.
27. *Optimality Criteria in terms of Weak Clarke Epiderivative for Set-Valued Optimization Problem*, Indian Mathematical Society Conference, Kalasalingam University, Krishnankoil, Virudhnagar, Tamil Nadu during December 27-30, 2009.
28. *Mathematics of Sudoku*, Deen Dyal Upadhyay College, University of Delhi, January 31, 2009.
29. *Insight into Certain Optimization Problems*, Dyal Singh College, University of Delhi, December 4, 2007.
30. *Variational Inequality in Terms of Bifunction*, National Symposium on Functional Analysis, Optimization and their Applications held at Deen Dayal Upadhyay College, University of Delhi during January 19-20, 2007.
31. *Characterization of Solution Sets of Pseudolinear Programs*, International Symposium on Mathematical Programming for Decision Making: Theory and Applications held at Indian Statistical Institute New Delhi during January 8-9, 2007.
32. *Some Aspects of Variational Inequalities* at Deen Dayal Upadhyay College, University of Delhi, December 3, 2005.
33. *Note on Variational Inequality Problem in Terms of Bifunctions*, National Conference on Tools and Techniques for Quality and Productivity Improvement, NCQP 2005 held at Indian Statistical Institute New Delhi, February 8-9, 2005.
34. *Generalized Directional Derivatives in Terms of Bifunctions: Extension to Pseudolinear and Bipseudomonotone Maps* at Indian Institute of Technology, Kanpur, October 7, 2004.

### **Participation in Conferences**

1. Attended International Conference on Mathematics & Applications at Ramjas College, University of Delhi, April 2017.
2. Attended the Anniversary General Meeting at National Institute of Science Education and Research (NISER), Bhubaneswar during 28-30 December, 2016.