

Be Happy and Let others be



RACHNA ASTHANA

Professor, Department of Electronics Engineering, HBTU Kanpur, 208002

Specialization: Survivability of Optical Networks, p -Cycles based protection and restoration in Optical Networks, Resource utilization and Reliability issues of Optical Networks

Qualifications: Doctor of Philosophy (PhD), Indian Institute of Technology, Kanpur

Master of Technology, Indian Institute of Technology, Roorkee

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Rachna Asthana is Professor in Electronics Engineering Department of Harcourt Butler Technical Institute, Kanpur, India. She teaches Optical Communication and Satellite Communication, at Post Graduate level and Optical Networks, Optical Communication, Satellite Communications, Digital Communication, Analog Integrated Circuits, Solid State Devices and Circuits Digital Electronics at undergraduate level. Her research focuses on protection and restoration in optical networks. She has worked extensively on p -Cycle based survivability in optical networks with efficient use of resources. She has completed a research project titled “**Design of Optimum Survivable All Optical Networks**” sponsored by Department of Science and Technology, Government of India. She is HBTU Coordinator RUSA (Rashtriya Uchchar Shiksha Abhiyan), National Higher Education Mission, Ministry of Human Resource Development, Government of India. She is also a member of Research Degree Committee (RDC) of Electronics Engineering discipline of Dr APJ Abdul Kalam Technical University, Lucknow. Presently she is Head of the

Department of Electronics Engineering, HBTU, Kanpur. She received a Ph.D. from Indian Institute of Technology Kanpur. Received M. Tech. degree in Electronics and Communication Engineering from IIT Roorkee (Then UOR) in 1990.

Teaching Areas

- Optical Communications
- Optical Networks
- Satellite Communication

Research Areas

- Survivability of Optical Networks,
- p -Cycles based protection and restoration in Optical Networks,
- Resource utilization and Reliability issues of Optical Networks

Recent Publications,

National and International Journals

- **Rachna Asthana, Y.N. Singh, Wayne D. Grover***, “ p -Cycles: An Overview,” *IEEE Communications Surveys and Tutorials*, vol. 12, no. 1, First Quarter 2010, pp. 97-111.
- Rachna Asthana, Y.N. Singh, “Distributed Protocol for Removal of Loop Backs and Optimum Allocation of p -Cycles to Minimize the Restored Path Lengths,” *IEEE J of Lightwave Technology*, vol. 26, no. 5, pp. 616-627, March 2008.
- Rachna Asthana, Y.N. Singh, “Second Phase Reconfiguration of Restored Path for Removal of Loop Back in P -Cycle Protection” *IEEE Communication Letters*, vol. 11, no. 2, pp. 201 – 203, Feb 2007.
- Rachna Asthana, Prof Y.N. Singh, “Protection and Restoration in Optical Networks”, *IETE Journal of Research*, vol. 50, no. 5, September-October, 2004, pp 319-329.

*** Chief Scientist, Network Systems, T.R. Labs, and Professor, Electrical and Computer Engineering, University of Alberta, Canada, a person who has introduced the concept of p -cycles**

Peer-Reviewed Conference Papers

- Rachna Asthana, Y.N. Singh, “The Effect of Removal of Loop Back on the Reliability of the Restored Paths Provided by p -Cycles”, in Proc of *IEEE International Conference TENCON 2008* held at Hyderabad, during Nov. 18, to 21, 2008 paper no. 1569125570.
- Rachna Asthana, Y.N. Singh, “Removal of Loop Back in p -cycle Protection: Second Phase Reconfiguration” in *Proc. of 10th IEEE International conference on*

Communication Systems (IEEE ICCS 2006), held at Singapore, during Oct 30, to Nov 1, 2006.

- Rachna Asthana, Y.N. Singh, “Reliability Improvement with Critical Span Protection using Modified Algorithm of Pre-configured (P) Cycles”, in the *Proc. of International Conference on Optics and Optoelectronics ICOL 2005* held at Dehradun during Dec 12, to Dec 15, 2005.
- Rachna Asthana, Taru Garg, Y.N. Singh, “Critical Span Protection with Pre-configured (P) Cycles” in the *Proc. of International conference Photonics 2004* held at Cochin during Dec 9, to Dec 11, 2004.
- Rachna Asthana, Y.N. Singh, “Survivability in all Optical Networks”, in the *International Conference on Optical Communication and Networks 2003 (ICOON 2003)* held at Bangalore during Oct 20, to Oct 22, 2003.

Curriculum Vitae

Dr. Rachna Asthana

Contact Information

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Employment

Lecturer, Electronics Engineering Department, HBTU, Kanpur (From 21/10/1991 to 10/03/1997)

Senior Lecturer, Electronics Engineering Department, HBTU, Kanpur (From 11/03/1997 to 10/03/2002)

Assistant Professor, Electronics Engineering Department, HBTU, Kanpur (From 11/03/2002 to 31/12/2005)

Associate Professor, Electronics Engineering Department, HBTU, Kanpur (From 01/01/2006 to 10/03/2010)

Professor, Electronics Engineering Department, HBTU, Kanpur (From 11/03/2010 to till date)

Education

Doctor of Philosophy (Ph.D) in Study of p -Cycle based Protection in Optical Networks and Removal of its Shortcomings, Indian Institute of Technology, Kanpur, India.

M.Tech., Electronics and Communication Engineering from Indian Institute of Technology, Roorkee (Then University of Roorkee) in 1990, India.

Research Interest

Survivability of Optical Networks, p -Cycles based protection and restoration in Optical Networks, Resource utilization and Reliability issues of Optical Networks.

Teaching Interest

Optical Communications, Optical Networks, Satellite Communication

Research projects

A project titled “**Design of Optimum Survivable All Optical Network**” was successfully completed in 2006. The R & D project was sponsored by Department of Science and Technology, Government of India.

Significant Contributions, Awards Received etc.

- **Completed PhD from IIT Kanpur in 2008 with CPI of 10**
- Listed in the Who's Who in Science and Engineering 2011, 2012, 2013, 2014 Editions
- An Optical Network Simulator tool has been developed in java during Ph.D, The simulator has been used in several B.Tech Projects and M.Tech Dissertation
- Departmental Laboratories have been modernized and strengthened during the implementation of World Bank Project TEQIP Phase I as Head of the Department and as faculty. Equipment worth about Rs. 0.75 crore have been purchased for modernization and strengthening of laboratories of the Department during the tenure of Headship.
- Contributed significantly in preparing and getting sanctioned an amount of ` 55 Crores in the RUSA (Rashtriya Uchchar Shiksha Abhiyan), National Higher Education Mission, Ministry of Human Resource Development, Government of India, project under component one "Creation of Universities by way of Up-gradation of Existing Autonomous Colleges"

Research Publication in Journals

- R.C.S. Chauhan, Rachna Asthana, and Y.N. Singh, " A survey to optical CDMA systems - Part I: optical orthogonal encoding," *Journal of Computing Technologies*, vol. 5, Issue 5, pp. 5-19, May 2016.
- R.C.S. Chauhan, Rachna Asthana, and Y.N. Singh, " A survey to optical CDMA systems - Part II: performance improvement schemes," *Journal of Computing Technologies*, vol. 5, Issue 5, pp. 20-26, May 2016.
- Surendra Kr Sriwas, M K Shukla, R Asthana, J P Saini, "Performance Analysis of Optical Interleave Division Multiple Access Using Solitons", *Journal of Computing Technologies*, Volume 5, Issue 1, pp. 90-95, Jan 2016.
<http://www.advanceresearchlibrary.com/temp/downloads/jct/January2016/v15.pdf>
- S. K. Sriwas, M. Shukla, R. Asthana and J. P. Saini, "Fix the Nonlinear Effect and Dispersion in Optical-interleave Division Multiple Access System for Long Distance", *Indian Journal of Science and Technology*, Vol 9(35), September 2016. (Indexed in Thomson Reuters Master Journal List)
<http://www.indjst.org/index.php/indjst/article/viewFile/97888/73496>
- S. K. Sriwas, M. Shukla, R. Asthana and J. P. Saini, "High-Speed Detection with Avalanche Photo diode in Optical Interleave Division Multiple Access Scheme", *Indian Journal of Science and Technology*, Vol 9(38), Oct. 2016. (**Indexed in Thomson Reuters Master Journal List**)
<http://www.indjst.org/index.php/indjst/article/view/101632/74249>
- R.C.S. Chauhan, Rachna Asthana, and Y.N. Singh, " A Search Algorithm to Find Multiple Sets of One Dimensional Unipolar (Optical) Orthogonal Codes with same Code-length and Low Weight," *Journal of Computing Technologies*, vol. 2, Issue 9, pp. 12-19, Sept 2013.
- R.C.S. Chauhan, Rachna Asthana, and Y.N. Singh," Design of Two Dimensional Unipolar (Optical) Orthogonal Codes Through One Dimensional Unipolar (Optical) Orthogonal Codes, *Journal of Computing Technologies*, vol. 2, Issue 9, pp. 20-24, Oct 2013.
- **Rachna Asthana, Y.N. Singh, Wayne D. Grover***, "***p*-Cycles: An Overview,"** *IEEE Communications Surveys and Tutorials*, vol. 12, no. 1, First Quarter 2010, pp. 97-111.
- Rachna Asthana, Y.N. Singh, "Distributed Protocol for Removal of Loop Backs and Optimum Allocation of *p*-Cycles to Minimize the Restored Path Lengths," *IEEE J of Lightwave Technology*, vol. 26, no. 5, pp. 616-627, March 2008.
- Rachna Asthana, Y.N. Singh, "Second Phase Reconfiguration of Restored Path for Removal of Loop Back in *P*-Cycle Protection" *IEEE Communication Letters*, vol. 11, no. 2, pp. 201 – 203, Feb 2007.
- Rachna Asthana, Prof Y.N. Singh, "Protection and Restoration in Optical Networks", *IETE Journal of Research*, vol. 50, no. 5, September-October, 2004, pp 319-329.

* **Chief Scientist, Network Systems, T.R. Labs, and Professor, Electrical and Computer Engineering, University of Alberta, Canada, a person who has introduced the concept of *p*-cycles**

Peer-Reviewed Conference Papers

- RCS Chauhan, Rachna Asthana, and MK Shukla, “Representation and Calculation of Correlation Constraints of One Dimensional Uni-polar Orthogonal Codes”, *IEEE International Conference on Communication Systems and Network Technologies*, held at SMVDU, Jammu, June 03-05, 2011.
- RCS Chauhan, Rachna Asthana, and Y.N. Singh, “General Algorithm to Design Sets of All Possible One Dimensional Unipolar Orthogonal Codes of Same Code Length and Weight”, *IEEE International Conference on Computing Intelligence and Computing Research*, held at Tamilnadu College of Engineering, Coimbatore, Dec 28-29, 2010
- RCS Chauhan, Rachna Asthana, and Y.N. Singh, “Unipolar Orthogonal Codes: Design Analysis and Application” *Student Research Symposium, at International Conference on High Performance Computing* held at Goa, India, Dec 19-22, 2010
- Rachna Asthana, Y.N. Singh, “The Effect of Removal of Loop Back on the Reliability of the Restored Paths Provided by p -Cycles”, in Proc of *IEEE International Conference TENCON 2008* held at Hyderabad, during Nov. 18, to 21, 2008 paper no. 1569125570.
- Rachna Asthana, Y.N. Singh, “Removal of Loop Back in p -cycle Protection: Second Phase Reconfiguration” in *Proc. of 10th IEEE International conference on Communication Systems (IEEE ICCS 2006)*, held at Singapore, during Oct 30, to Nov 1, 2006.
- Rachna Asthana, Y.N. Singh, “Reliability Improvement with Critical Span Protection using Modified Algorithm of Pre-configured (P) Cycles”, in the *Proc. of International Conference on Optics and Optoelectronics ICOL 2005* held at Dehradun during Dec 12, to Dec 15, 2005.
- Rachna Asthana, Taru Garg, Y.N. Singh, “Critical Span Protection with Pre-configured (P) Cycles” in the *Proc. of International conference Photonics 2004* held at Cochin during Dec 9, to Dec 11, 2004.
- Rachna Asthana, Y.N. Singh, “Survivability in all Optical Networks”, in the *International Conference on Optical Communication and Networks 2003 (ICO CN 2003)* held at Bangalore during Oct 20, to Oct 22, 2003.

Technical Reports

- R. Asthana, “A distributed protocol for second phase reconfiguration and p -cycle allocation to minimize the restored path lengths in p -cycle protected networks,” *ACES/EE Departmental Library*, IIT Kanpur, Tech. Rep. 2007/2295/TR, July 2007.
- R. Asthana, “Second phase reconfiguration of restored path for removal of loop back in p -cycle based protection in optical networks,” *ACES/EE Departmental Library*, IIT Kanpur, Tech. Rep. 2006/2294/TR, March 2006.

Ph.D supervised

- Ramchandra Singh Chauhan, “Design of Unipolar (Optical) Orthogonal Codes and their Maximal Clique Sets”, Teacher Fellow in UPTU, since 2007 and completed in July 2015.

Ph.D being supervised

- Surendra Kumar Sriwas, “Optical IDMA”, Teacher Fellow in UPTU, since 2008.
- Deo Chandra Jaiswal, “Protection and Restoration in Optical Networks using p -Cycles”, UPTU, since May 2014 Under TEQIP-II as Teacher Fellow.
- Prerna, “Study and Development of Fault Restoration Techniques in WDM Networks”, UPTU, since 2014 Under TEQIP-II as Teacher Fellow.

M. Tech Thesis Guided

- Anjali Sharma, " Power Efficiency in Optical Networks with p -Cycle (Pre-Configured) Protection", Nov 2016
- Kundan Singh Bisht," Power Aware Self-Fault Isolation in Preconfigured-Cycle (p -Cycle) Networks without Separate Monitoring Cycles (m-cycles)", Nov 2016
- Surveshwar Tiwari, “Pre-Configured Ball (p -Ball) for the Protection against Multiple Link Failure in Optical Mesh Network”, Oct 2015.
- Arun Kumar Tiwari, “ p -Cycles with self fault isolation,” UP Technical University, Oct 2014.
- Ankita, “Comparison of distributed p -cycle protection schemes for multi domain optical networks,” UP Technical University, Oct 2014
- Arti, “Study of p -Cycle Based Protection of Multicast Connections with Quality of Transmission Considerations,” UP Technical University, Oct 2014
- Sujeet Kumar, “A Protection Structure based on pre-configured regular polyhedron (PRP) for Multi-link Failures in Optical Networks,” UP Technical University, Oct 2014
- Rishi Kumar, “ p -Trail Designs for Protection of Networks with and without Shared Risk Link Groups(SRLGs)”, G.B. Technical University Lucknow, Aug 2013.
- Sudheer Kumar Rajput, “Protection for Dynamic Multicast Sessions in WDM Networks using Intelligent P Cycles” G.B. Technical University Lucknow, Aug 2013.
- Ajeet Kumar Singh, “Protection Model for WDM Networks having SRLGs using P - Cycles” G.B. Technical University Lucknow, Aug 2013
- Jitendra Kumar Pathak, “Fault recovery in MPLS network using p -cycles with QoS protection”, G.B. Technical University Lucknow, Oct 2012.
- Akansha Pandey, “A heuristic approach for p -cycle configuration in WDM optical networks”, G.B. Technical University Lucknow, Oct 2012.
- Deo Chandra Jaiswal, “Anycast protection in optical networks using p -cycles”, G.B. Technical University Lucknow, Aug 2012.
- Navneet Singh, “Multicast protection in optical networks using p -Cycles”, G.B. Technical University Lucknow Sept. 2011.
- Manoj Kumar, “Path segment protection in optical networks using p -Cycles”, G.B. Technical University Lucknow Dec. 2011.
- Amit Kumar Katiyar, “Application of p -Cycle protection methods under dynamic traffic scenario”, G.B. Technical University Lucknow Dec. 2011.
- Ritika Tripathi, “Node Failure Protection through p -Cycles in WDM Networks”, UP Technical University, 2010
- Amit Kumar Verma, “Dual-Failure Restoration in Optical Networks using p -Cycles”, UP Technical University, 2010

- Rupali Agarwal, “Placement of Wavelength Converters in WDM Networks” UP Technical University, 2010
- Anubhav Saxena, “Reliability Analysis of Paths with Dedicated p -Cycle Protection”, UP Technical University, 2009
- Manoj Tiwari, “Design of I/O Buffer (Slew Rate Controlled) in 65 nm CMOS Process,” UP Technical University, 2007, Co-guide: Ms. Rajani Bisht
- Ajay Srivastava, “Study and Analysis of Opto Chip, the High Speed Polymeric Electro-Optic Modulator”, UP Technical University, 2005.
- Taru Garg, “Critical Path Restoration using p -Cycles in WDM Meshed Networks”, UP Technical University, Jan 2005.
- Noopur Gupta, “Study of EDFA Parameters & Analytical Model for the Calculation of Signal to Noise Ratio of EDFA Chain”, UP Technical University, Jan 2005.

Details of Administrative Work performed in the institute:

- Presently working as Head of the Department since Oct 2015 till date
- Worked as Head of the Department from Nov' 03 to Jan' 07.
- Working as **RUSA Coordinator**
- Assistant Dean Planning and Resource Generation 2013 - 2016
- Worked as Lab in charge of Communication Lab
- Worked as Lab in charge of Electronics Labs
- Worked as Proctor 2002-03, 2008-2009
- Worked as warden Girls Hostel 1993-1995, 2008-till date
- Worked as Assistant Superintendent of Examination 2008
- Worked as member of Central Evaluation committee HBTU
- Worked as Convener Hobby Club 2001-2004
- Worked as Member, Institute Time Table Committee several times
- Worked as Member in Various Physical Verification Committees several times
- Worked as Member, Anti-Ragging Squad.
- Worked as Educational Tour In charge
- Worked as Faculty Advisor of Association of Electronics Engineers 2002-2003, 2007-2015
- Working as member of various committee related with TEQIP purchase, Web Site Development, WiFi connectivity of Campuses, etc..

Contribution to Academic Development:

- Offered various courses of Electronics Engineering at UG and PG Level
- New electives have been introduced at both UG and PG levels
- Supervised Projects and Seminars at UG and PG Level
- Acted as Seminar and Project in charge of the Department many times
- Lab manuals have been developed for various UG labs taken time to time
- Completed PhD from IIT Kanpur in 2008 with CPI of 10
- An Optical Network Simulator tool has been developed in java during Ph.D, The simulator has been used in several B. Tech Projects and M. Tech Dissertation
- Member of Board of Studies Committee of Electronics Engineering Department of HBTU, Kanpur, UIET (Engineering College) of CSJMU, Kanpur, Electronics and Communication Engineering Stream” of Uttar Pradesh Technical University, “Institute of Research Development & Training” of Uttar Pradesh Technical Board, Govt. of UP, time to time
- Syllabus of B. Tech and M. Tech Electronics and Communication stream courses have been developed as member of BoS Committees of UPTU, Lucknow, BoS of Electronics Engineering Department of HBTU
- Member of Central Evaluation committee HBTU (2009-2013)
- Acted as Head Examiner for the evaluation of essential course of UPTU “Human Values and Professional Ethics” from Feb 2010, to Jan 2014
- Acted as External Examiner for evaluation of PhD Dissertations at AKTU, Lucknow,
- Acted as External Examiner for evaluation of M. Tech Dissertations at UPTU, IIIT Allahabad, PSIT Kanpur
- Acted as External Examiner for evaluation of B. Tech Projects and various Labs of AKTU Exams, time to time

- Acted as reviewer in various national conferences
- Reviewed many papers of International Journals as IEEE Journal of Lightwave Technology, IEEE Communication Letters, and IET optoelectronics

Co-curricular, Extension and Professional Development Activities

- Syllabus of B. Tech and M. Tech Electronics and Communication stream courses have been developed as member of BoS Committees of UPTU, Lucknow, BoS of Electronics Engineering Department of HBTU
- Member of Board of Studies Committee of Electronics Engineering Department of HBTU, Kanpur, UIET (Engineering College) of CSJMU, Kanpur, Electronics and Communication Engineering Stream” of Uttar Pradesh Technical University, “Institute of Research Development & Training” of Uttar Pradesh Technical Board, Govt. of UP, time to time.
- Acted as subject Expert in Selection Committees of various Engineering Colleges / Institutions and in recruitment committees of electronics based Industries and in Selection Committee for selection of Scientist B of Defense Research and Development Organization (DRDO)
- Several invited talks, of faculty of IITs and persons from Industries like ST Microelectronics and Workshops from Industries have been organized for students during various Tech ERAs and otherwise also
- Lectures have been delivered time to time in the Short term Courses for Polytechnic Teachers, Organized by IRDT Kanpur
- Worked as member of organizing committee and delivered lectures in the short term courses (faculty development programs) organized by the department
- Invited lectures have been delivered in Institution of Engineers, IETE Centers etc
- Member of organizing committee of International Conference & Exposition on Communication & Computing, held at IIT Kanpur, Feb 4-6, 2005 organized jointly by IETE Kanpur Center and IIT Kanpur
- Member of organizing committee of International Conference INDICON 2008, held at IIT Kanpur, during 11-13 Dec 2008 organized by IEEE Uttar Pradesh Section, jointly with IEEE India council and IIT Kanpur.
- Published many papers in National and International Journals and Conferences
- A paper titled, “p-Cycles: An Overview”, is published along with Prof W.D. Grover (Chief Scientist, Network Systems, T.R. Labs, and Professor, Electrical and Computer Engineering, University of Alberta, Canada), a person who has introduced the concept of *p*-cycles.

Details of participation in extra-curricular activities of Students:

- Acted as Faculty Advisor IETE Students` Forum for many years
- Acted as Faculty Advisor Association of Electronics Engineers.
- Annual National level student technical festival Tech ERAs have been organized as Head of the department in 2004 - 2006, and 2015 and as Faculty Advisor in 2001-2003, 2008, 2014
- Convener Hobby Club 2001-2004
- Acted as Judges in various student technical festivals

Membership of Professional Bodies

- Member of IEEE
- Fellow Member of IETE
- Member of Executive Body of UP section of IEEE
- Member of Executive Committee of IETE Kanpur Local centre
- Listed in the Who's Who in Science and Engineering 2011-12 Edition
- Member, Curriculum Development Committee of IRDT

Skills

- Computer Skills: MATLAB, OptiSim, CPLEX Optimization Software, programming in JAVA, MS Word, Excel etc.
- Language Skills: English (Fluent), Hindi (Native)