

## CURRICULUM VITAE

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5. Academic and Professional Qualifications:

| <u>Examination</u>   | <u>Board/University</u>            | <u>Year</u> | <u>Division/Class</u>        |
|--|------------------------------------|-------------|------------------------------|
| High School Leaving Certificate Examination  | Secondary Education Board of Assam | 1966        | 1st Division                 |
| Pre-University   | Gauhati University                 | 1967        | 1st Division<br>4th position |
| B.Sc.(Hons.)<br>in Physics   | Gauhati University                 | 1970        | 1st Class<br>4th Position    |
| M.Sc. (Physics)<br>Spln. Solid State Physics   | Delhi University                   | 1972        | 1st Division                 |
| Doctorate  | Oxford University                  | 1977        |                              |
| Title of the doctoral thesis: <u>Design Consideration of Scanning Optical Microscope</u> |                                    |             |                              |

6. Present Position :Professor, Department of Physics  
Tezpur University  
Tezpur 784 028, Assam , India

(Formerly Coordinator, M.Sc. programme  
Nanoscience and Technology)

7. Field of Specialization :Nanoscience and technology, Condensed Matter Physics,  
Photonics and Optoelectronic Instrumentation

8. Professional Experiences:

| <u>Sl. no.</u> | <u>Post held</u>       | <u>Organization</u>           | <u>From</u> | <u>To</u> |
|----------------|------------------------|-------------------------------|-------------|-----------|
| 01.            | Lecturer in<br>Physics | Jorhat Engineering<br>College | 1972        | Feb. 1973 |
| 02.            | Research<br>Staff      | IIT, Madras                   | Feb. 1973   | Dec. 1973 |
| 03.            | Research<br>Scholar    | Oxford University             | 1974        | 1977      |
| 04.            | Pool Officer           | Gauhati University            | 1977        | 1979      |
| 05.            | Lecturer in<br>Physics | Cotton College                | 1979        | Aug. 1983 |

|     |  |                              |            |            |
|-----|--|------------------------------|------------|------------|
| 06  | Assistant Professor                    | BITS, Pilani                 | Aug. 1983  | Dec. 1983  |
| 07. | Lecturer in Physics                    | Cotton College               | 1983       | 1986       |
| 08. | Reader, USIC                           | Gauhati University           | 1986       | 1994       |
| 09. | Professor, USIC                        | Gauhati University           | Jun. 1994  | Jul. 1994  |
| 10. | Professor and Head, Electronic Science | Gauhati University           | Jul. 1994  | Oct. 1997  |
| 11. | Professor and Head, Physics            | Tezpur University            | Nov. 1997  | Nov. 2002  |
| 12. | Visiting Professor                     | University of Florence       | Nov. 2002  | Oct. 2003  |
| 13. | Visiting Professor                     | Nuclear Science Centre Delhi | Nov. 2003  | Jul. 2004  |
| 14. | Professor & Head (Physics)             | Tezpur University            | Aug. 2004  | Nov2006    |
| 15. | Vice Chancellor                        | Gauhati University           | Nov 2006   | May22.2008 |
| 16. | Professor                              | Tezpur University            | May23,2008 | till date  |

9. Academic and Professional Honours Abroad:

1. Doctoral work was done at the Department of Engineering Sciences, Oxford University. Offered scholarship by the Govt. of Assam and later by the British Council to pursue doctoral research in the University of Oxford from 1974 to 1977.
2. Invited speaker at International Seminar on Computer applications, University of Greece, 1979.
3. Provided consultancy to KLA Corporation, San Jose, of USA on Scanning Optical Microscopy in 1984.
4. Visiting scientist at P. N. Lebedev Institute, Moscow, 1989 for six weeks for the period from October to November 1989 under cultural exchange scheme of scientists.
5. Invited to deliver key note paper in the inaugural plenary session of International Conference on Confocal Microscopy and 3D-Image Processing, University of Sydney, February 8 to 11, 1993.
5. Selected International Centre for Theoretical Physics fellow to attend University of Florence to work on Scanning Microscopy in 2001.
6. Invited as Scanning Microscope expert to address a series of seminars at University of Bucharest (Potehnica), Romania from May to June, 2002.
7. Appointed a visiting professor at European Laboratory for Nonlinear Spectroscopy, University of Florence for the period from November 2002 to October 2003.

10. Brief Outline of Research Work Carried Out:

- (i) Design of scanning laser microscope and 3d processing of biological and semiconductor specimens in confocal microscopy formed the area of research in my doctoral and subsequent period. Here a scanning probe of laser light is made to scan a specimen point by point by mechanically by moving the specimen with a pair of vibrators and the image is generated by displaying the intensity of each pixel in synchronization with the vibrators that drive the specimen. The imaging characteristic of such a microscope is shown to be equivalent to that of a conventional microscope. However, in confocal arrangement with point source and point detector, the imaging characteristic including resolution is substantially improved. Further it was found to pave the way for 3d imaging and sectioning. This was a significant research finding that led to confocal

microscopes entering the market. Other areas of research in this direction were identifying areas of application of scanning laser microscopy in thin films, biological tissues and semiconductor characterization. Further application of second harmonic and Raman imaging in scanning microscopy was probed in detail.

(ii) Another part of my research was on design of laser based monitor of air quality that synthesized the design principles of a transmissionmeter and nephelometer. Data on extinction and volume scattering coefficients over known size distribution of concerned medium were coupled to a microprocessor/pc based data acquisition system and effectively used to arrive at size distribution from fresh data. By conducting test measurements of water vapour droplet, the monitoring system was found to be an effective device. The experimental results which revealed characteristic details of water vapour droplet size distribution in air having different levels of O<sub>2</sub> or CO<sub>2</sub> have a direct bearing on the formation of rain clouds and thus form important indicators of climate.

(iii) Design of integrated PC based tea process instrumentation formed the third front of my research. Measurements on moisture content of green leaves, withering percentage and relative humidity provide important parameters for control of tea processes. The device thus designed is further fortified with provisions for (i) automated fan direction reversal during withering (ii) programmable indicator for sequential timing of rolling machines and (iii) three level temperature indicator for tea dryer. Further a mathematical modeling of withering process was identified for theoretical modeling of the desorption behaviour of green tea leaves.

(iv) Multiphoton multifocal microscopy (MMM) has usually been achieved through a combination of galvo-scanners, with rotating disks of microlens arrays, and cascaded beam splitters with asynchronous rastering of scanning mirrors. We achieved a neat and compact MMM by use of high diffraction efficiency diffractive optic element that a multiple spot grid of uniform intensity to achieve higher fidelity in imaging of live cells at adequate speeds.

(v) In nanotechnology related research, fabrication of nanoparticles and its application in photonic switching, one electron transistor and four frequency mixing have been my recent area of research. Here we have identified efficient chemical routes for synthesis of semiconductor quantum dots. Effective synthesis has also been achieved with shining of pulsed laser beam. We have arrived at increasing luminescent efficiency of semiconductor nanoparticles under swift heavy ion radiation of adequate flux. Similar irradiation has also led to grain growth in ZnS:Mn/PVOH nanoparticles. We have demonstrated suitable and sustainable photocurrent in the external circuit as a result of quantum charge within arrayed quantum dots excited by high power laser photons. We have also reported on experimental evidence of many discrete energy levels in polymer embedded CdS quantum dots using optical absorption spectroscopy. We have also noted frequency dependent electrical properties of nano Cds/Ag junctions which promise application in nanoelectronic devices at a desirable frequency of operation.

#### 11. Details of Research Contribution:

1. D. Kakati and A. Choudhury, "Molecular beam acceleration by alternate gradient focussing", Journal of Vacuum Science and Technology, Vol.10, No.6, 1973
2. C. J. R. Sheppard and A. Choudhury, Image Formation In Scanning Microscope, Optica Acta, Vol.24, No.7, 1977(cited by 267)
3. C. J. R. Sheppard, A. Choudhury and J. Gannaway, The Scanning Optical Microscope, Technical Report of Oxford University, No.1, 183/77
4. C. J. R. Sheppard, A. Choudhury and J. Gannaway, "E-m field at the focus of a wide

- angular lens and mirror system", Journal of microwave, optics and Acoustics, Vol. No.3, 1977
5. A. Choudhury, "Design Study of scanning optical Microscope, thesis for doctoral degree of Oxford University", '77
  6. CJR Sheppard and A. Choudhury, "Response to bar pattern in SOM", Optik October 1978
  7. A. Choudhury "Sources of aberration in electron bunching of an optical klystron" National Conference on Luminescence, IIT, Kharagpur, 1978
  8. A. Choudhury, "Computer aided image processing in SOM in harmonic mode" Presented at the International Seminar on Computer applications, University of Greece, 1979
  9. A. Choudhury, "Design consideration of adapting a SOM in harmonic mode" Silver Jubilee Physics Symposium, BARC, December 1979
  10. A. Choudhury and K. Pathak, "Adoption of SOM to Optical Beam Induced Conductivity study", DAE Symposium held in Varanasi, December '82
  11. A. Choudhury and K. Pathak, "V(z) response as effect of defocus in confocal scanning", Proceedings of Advanced Study in Science and Technology, Vol. 1, March 25, 1983
  12. A. Choudhury and U. Purkayastha, "Image Performance by coded apertures in SOM", Proceedings of International Conference on Applications of Lasers And Electrooptics, Los angeles, Nov. 14-17, 1983
  13. A. Choudhury, K. Pathak And U. Purkayastha, "Index Profiling of optical fibres, National Conference on Electronics", Gauhati University 1983
  14. A. Choudhury and U. Purkayastha, "Image Processing by coded apertures in scanning microscopy with uniform and Gaussian Laser Illumination", International Conference on light and Electro-optics, June 1984
  15. A. Choudhury, "Imaging in scanning image processor using a reference beam", Proceedings of annual convention of IEEE, Indian Council, December 86
  16. A. Choudhury, "Design Consideration of scanning image processor exploiting Resonant Raman Emission", National Symposium of Instrumentation, 1987
  17. A. N. Putin and A. Choudhury, "Application of substrate mode hologram in optical computing", Technical Report, P. N. Lebedev Institute, Moscow, 1989
  18. H. Chaliha and A. Choudhury, "Design of a laser based analog/digital rotationmeter" National Symposium on Instrumentation, IISC, Bangalore 1990
  19. H. Chaliha and A. Choudhury, "Investigation of heat generation in microscopic specimens in scanning laser microscope geometry", Journal of Assam Science Society, Vol. no. 33, June 1991
  20. H. Chaliha and A. Choudhury, "Performance characteristics of coded apertures in scanning laser processor" National Symposium on Instrumentation, Guwahati 1992
  21. A. Choudhury and S. Saikia, "Design consideration of microprocessor based visibility monitoring system" National Symposium on Instrumentation, Guwahati 1992
  22. A. Choudhury & S. Ibungoton Singh, "Investigation in the design of microprocessor based system adapted for processing and recording of signals", National Symposium on Instrumentation, '92
  23. A. Choudhury, "Image Signal Processing in confocal system" International Conference on Confocal and 3D Image Processing", University of Sydney, February 8-11, 1993
  24. M. Bhuyan, V. Dutta, P. K. Sarma & A. Choudhury, "A microprocessor based relative humidity measuring technique using a piecewise linearised model of psychometric chart", Proceedings of International Conference on trends in Industrial measurement, 1996, Madras
  25. M. Bhuyan, S. Gogoi and A. Choudhury, "A novel technique in moisture content measurement in green tea leaves" Proceedings of International Conference on Trends in

Industrial Measurement, 1996, Madras

26. K.Baruah,A.Choudhury and K.Sarma, Design consideration of SOM in monitoring thickness and quality of thin film surface in transmittance/reflectance,Journal of Instrumentation,164,1997
27. G.A.Ahmed,A.Choudhury and G.K.D.Mazumdar,"Investigation on design of a laser based air quality monitoring system"Proceedings of International Conference on Instrumentation, Bangalore,pp734-738,1996
28. K.Barua, A.Choudhury and K.Sarma, "Design Consideration of SOM for finding thickness and quality of thin films as well as for characterization of semiconductor devices, Romanian Journal of Opto-electronics,Vol.5,No.1, January-March1997,ISSN,1458-60
29. K.Barua,A.Choudhury and K.Sarma,"Design study of SOM for optoelectronic devices characterization",Journal of Optics, Vol.26,No.3,page117-122,1997
30. A.Choudhury,S.K.Dolui,T.Majhi,K.Sunar and YVGS Murti,"Studies on CdS quantum dots on Polymer Matrix", National Seminar on Polymer research in Industry and Academy, June26-27,1998, Calcutta
31. A.Choudhury, G.A.Ahmed and D.Das, "Measurement of Carbon dioxide and water vapour with an improved laser based air-quality monitoring system"National Symposium on Instrumentation, BITS, Mesra, October7-10,1998
32. A.Choudhury, G.K.D.Mazumdar,G.A.Ahmed and D.Das,"Design consideration and fabrication of laser based air-quality monitoring system",Regional Conference on Physics Research of the NorthEast, October17,1998
33. A.Choudhury, K.Sarma and K.Barua, "Design of scanning optical microscope and its manifold uses", Regional Conference on Physics Research of the North East, October17,1998
34. A.Choudhury, S.K.Dolui, T.Majhi and YVGS Murti, "Research on quantum dots on Polymer Matrix", Regional Conference on Physics Research of the North East, October17,1998
35. A.Choudhury, K.Sarma and K.Barua, "Application for laser based SOM for imaging photocurrent generation pattern in semiconductors", Proceedings of International Conference on Optics and Optoelectronics,Australia
36. A.Choudhury, K.Barua and K.Sarma, "Application of SOM in surface studies of semiconductor material",pp7-11,Gauhati University Journal of Science, Golden Jubilee Volume,1998
37. A.Choudhury, D.Mohanta,D.Behera and N.C.Mishra,"Qualitative microstructural study in diffused composite 123 superconducting thick film",National Conference on thermal Physics,March 12-13,1999
38. A.Choudhury, D.Mohanta and S.K.Dolui, "Production of semiconductor quantum dots on Polymer matrix by chemical routes and their size control", Condensed Matter Days'99,August 26-28,1999,Jadavpur University
39. A.Choudhury,G.A.Ahmed,G.K.D.Mazumdar,"Investigations on atmospheric humidity profile at varying oxygen levels with a laser based monitoring system", International Conference on Optics within Life Sciences,February22-24,2000,Sydney(an article on the instrument thus designed appeared in the electronics journal "Optics org"of Institute of Physics)
40. A.Choudhury,K.Barua,K.Sarma,"Application of SOM in semiconductor and thin film characterization",International Conference on Optics Within Life Sciences",February22-24,2000 Sydney
41. D.Mohanta,S.K.Dolui and A.Choudhury,"Production of semiconductor quantum dots on Polymer matrix by chemical method and their size control",Indian Journal of Pure and

Applied Physics,75A(1),53-56(2001)

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45. D.Mohanta and A.Choudhury"Swift heavy ion induced effects of polymer embedded binary semiconducting particle", International workshop on Nanotubes and Nanostructures,September15-19,2003

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58. A.Choudhury,SHI Induced modification of nanostructures embedded in polymer Indo German workshop on “Modification of nanostructures by SHI,Nuclear science center, New Delhi , Feb20-24,2005

59. D.Mohanta,D.K.Avasthi ,A.Choudhury “Luminescence from irradiated Cadmium sulphide quantum dots” Indo German workshop on “Modification of nanostructures by SHI,Nuclear science center, New Delhi , Feb20-24,2005

60. D.Mohanta, A.Choudhury,Laser induced photocurrent measurement in quasi arrayed ZnS quantum dots,Physica E 27,176-182,2005

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62. D.Mohanta and A.Choudhury,Frequency dependent electrical properties of nano Cds/Ag junction”European Physical Journal B 45,65-68,2005

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65. S.Chowdhury, G.A.Ahmed, D.Mohanta, S.K.Dolui, D.K.Avasthi and A.Choudhury, Luminescence study of bare and coated CdS quantum dots: Effect of SHI irradiation and ageing, Nuclear Instrum. and Meth. B Vol 240 ,pp 690(2005)

66. D. Mohanta and A.Choudhury, Measurement of third order susceptibility by nonresonant nondegenerate four wave mixing in polymer embedded cadmium sulfide quantum dot systems, Optical Materials, 29(2/3),342-347(2006)

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- 99 Ankur Gogoi, Pritom Rajkhowa, Amarjyoti Choudhury, Gazi A. Ahmed. Development of TUSCAT: A software for light scattering studies on spherical, spheroidal and cylindrical particles, *Journal of Quantitative Spectroscopy and Radiative Transfer* 112, 2713-2721, 2011.
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108. P. Chetry, A.Choudhury,Investigation of optical properties of SnO2 nanoparticles Physica E, 47 (2013) 257.
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- 110.B. Choudhury, A. Choudhury,Tailoring Luminescence properties of Tio2 nanoparticles by Mn doping, Journal of Luminescence , 136 (2013) 339–346
111. S. Paul, A. Choudhury, Effect of Ni doping on the optical property and photocatalytic activity of TiO<sub>2</sub> nanoparticles, Micro & Nano letters (accepted)
112. P.Basyach,Structural and optical properties of core-shell Ag2S/HgS Nanostructures (accepted by Materials Research Bulletin)
113. B.Choudhury and A.Choudhury,Structural, optical and ferromagnetic properties of Cr doped TiO2 nanoparticles , (accepted by Materials Science and Engineering B
114. A. Gogoi, A.Choudhury and G.Ahmed, Laboratory measurements of the light scattering properties of bentonite clay particles embedded in cylindrical polymer matrix" ( accepted for publication by Journal of Modern Optics)
- 115.P.chetry,A.Choudhury,Structural and optical properties of Cu doped SnO2 nanoparticles: An experimental and DFT study(Accepted by Journal of Applied Physics)
- 116.P.Nath,I.Hussein , A.Choudhury"fiber optic volumetric sensor based on Beer-Lambert principle(accepted by IEEE sensor journal)

### **Paper accepted in International Conferences**

1. P. Chetri, P. Basyach, A. Choudhury, Structural and Optical property of core-shell TiO<sub>2</sub>/SnO<sub>2</sub>nanocomposites exhibiting photocatalytic behavior, Int. J. Innovative res. development 1 (7) 56 2012.
2. P. Basyach, A. Choudhury, Structural and optical properties of core-shell TiO<sub>2</sub>/MgO nanostructures at different annealing temperatures, Int. J. Innovative res. Development 1 (7) 175 2012.
3. S. Paul, A. Choudhury, Visible light photocatalytic activity of Mn doped TiO<sub>2</sub> nanoparticles, Int. J. Innovative res. development 1 (7) 211 2012.

### **12. Patent Application:**

- (i) For Indian patent on microwave drier of tea leaves(Accepted)
- (ii) For UK patent on synthesis of coupled quantum dots

13. Number of Ph.D. Produced : Ten

| <u>Ph.D. candidate</u>     | <u>Title of the thesis</u>   |
|----------------------------|--|
| 1. Hiranya Chaliha         | :Optoelectronic image processing in scanning laser microscope  |
| 2. Manabendra Bhuyan       | :An Integrated PC based Process Monitoring and control system  |
| 3. Kishor Kumar Barua      | :Design Considerations of Scanning microscope for application of thin films and semiconductor characterization                           |
| 4. Gazi Ameen Ahmed        | Design Considerations of laser based Air quality monitoring system coupled to A microprocessor linked data recording And processing unit |
| 5. Dambarudhar Mohanta     | Synthesis of semiconductor quantum dots on polymer matrix and applications in nonlinear optics /electronics                              |
| 6. Dilip Das               | Design study of a Laser based air-quality monitoring system with pc based data acquisition system  |
| 7. Siddhartha Sanka Nath   | Synthesis of quantum dots and their applications in electronics, photonics and nonlinear optics  |
| 8. Shyamalima Chowdhury    | Fabrication of quantum dots and its applications in DFWM and its corresponding application for Optoelectronic devices                    |
| 9. Anjali Sarmah (Goswami) | Design of an improved scanning optical microscope (SOM) and adaptation of second harmonic generation                                     |
| 10. Arun Kumar Bordoloi    | Synthesis of quantum dots on polymer matrix and Study of their electrical properties for various Device applications                     |
| 11. Nabanita Dutta         | Optical properties of semiconductor quantum dots, interacting quantum dots and nanomaterial filled SHI induced ion tracks                |
| 12. Ajanta Deka            | Density functional studies on structural and Electronic properties of bare and supported gold Nanocluster                                |

14. Specifics of Administrative Experiences:

1. Acted as Vice chancellor of Gauhati University for the period Nov13,2006 to May 22, 2008
2. Acted as Dean of Academic Affairs of Tezpur University from August, 1999 for a period of two years.
3. Acted As Head of the Department of Electronics Science, Gauhati University for the period from 1994 to 1997 and as the Head of the Department of Physics, Tezpur University for the period from 1997 to 2002.

4. Acted as member of the Board of Management, Finance Committee and Planning and Academic Council of Tezpur University.
5. Acted as member of the Board of Director of Assam Electronics Development Corporation and Board of Directors of Assam State Text Book Production and Publication Corporation.
6. Acted as member of Executive Council of Gauhati University, Gauhati University Court and its Academic Council.
7. Was part of the team that prepared the vision document of Tezpur University.
8. Member, Academic Council and Research Council, Tezpur University.
9. Member, Council of Institute of Advanced Study in Science and Technology, Guwahati.
10. Member, Executive Subcommittee, Assam Science, Technology and Environmental Council, Guwahati.
11. Member, Governing body, Darrang College
12. Currently member of Board of Management, Academic Council, Research Council Finance Committee and Building Committee of Tezpur University

15. Specifics of Academic Experiences:

1. As Dean of Academic Affairs, Tezpur University, I was the catalyst for drawing up a comprehensive plan for (i) relative grading of performances and (ii) pursuit of Ph.D. programmes in Tezpur University.
2. Was involved with the formulation of academic schemes in Tezpur University as Professor in charge of interdisciplinary and inter-institutional collaboration.
3. Principal Investigator of an ISRO sponsored project on “Fabrication of quantum dots on polymer matrix and its application in photonic switching, one electron transistor and four wave mixing”.
4. Involved with consultancy contract with Demoja Associates on development of microwave based tea drier.
5. Associated in introducing quality circle in departmental administration and classroom teaching.
6. Associated with development of curriculum as Head of Electronics Science, Gauhati University and Head of Physics, Tezpur University.
7. Member, Board of Studies in Physics, Dibrugarh University.
8. Member, Board of studies in Electronics, Guwahati University.
9. Member, Governing Council, SLET COMMISSION, Guwahati.
10. Member, Academic Council, Tezpur University
11. Member, Research Council, Tezpur University

16. Membership of Professional Bodies:

Life Member of

- (i) Indian Physics Association
- (ii) Indian Chapter of International Centre for Theoretical Physics
- (iii) Laser and Spectroscopy Society, India
- (iv) North East Physics Academy
- (v) Assam Science Society

17. Special Reviewing Honours:

Reviewed papers for

- (i) European Physical Journal B and
- (ii) Nuclear Instruments and Methods B
- (iii) Journal of modern optics

- (iv) Microscopy research and Techniques
- (v) Vacuum
- (v) Journal of Microscopy
- (vi) Journal of optics
- Member of Editorial Board:  
International Journal of Applied Mathematics and Engineering Sciences

18. Contribution to Art, Literature and Culture:

1. An anthology of Assamese poetry of mine entitled “Etiya Tezat” received literary acclaim.
2. Plays “Bhoy”, “Tongighar”, “Merghar”, “Jatinga” and “Sanketik” authored by me has received rave reviews. A trilogy of plays has been published as “Bhoyor tongigharat tora”
3. Vast experience of organizing and extra curricular activities for youth in the arena of debate, quiz, cultural events and staging of plays.
4. Hailed as innovator of new style of reciting in Assamese “Agnibinar Taan” and “Maat” are two of his popular cassettes of recitation.
5. I am involved in popularization of science through regular contribution to the science column of Assamese daily “Agradoot” for a period of 6 years and later to another Assamese daily called “Amar Asom”. Besides I also contributed to well-known journals “Gorioshi”, “Prakash” and to a column in Assamese daily “Dainik Janasadharan” on the cultural and academic aspects of Italy during my stay in Italy for the period of my stay at University of Florence, Italy as a visiting professor in Physics. Total collection of such articles would be around 200.
6. Assamese translations of English publications of National Book Trust (NBT), namely, “Satyendra Nath Basu”, “Ramanujan” and “The Shrinking World” has been published by the NBT.

19. Contribution Through Serious Articles:

1. Author of a number of articles in the English daily “The Assam Tribune” on the ideal dynamics of a university in various fronts such as teaching, research, administration and funding.
  2. Author of a number of articles those high lighted internal coherence between the creative activities in science and arts.
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