DEPARTMENT OF ELECTRICAL ENGINEERING

Sub: Internal Review Report of the department for the academic review.

1) Curriculum

1.1. List of degree programme offered – UG + PG – and enrollment.

S.No.	Name of the Degree Programm	Current Enrollement	Remarks
	PG: PhD		
1.	Ph.D.	168	
	PG: M.S.(R)		
1.	M.S. (R)	33	
	PG: M.Tech.		
1.	Control Engineering (EEA)	28	
2.	Communication Engineering (EEE)	34	
3.	Integrated Electronics & Circuit (EEN)	25	
4.	Power Electronics & Electrical Machine Drives (EEP)	32	
5.	Power Systems (EES)	35	
6.	Computer Technology (EET)	38	
	PG: Interdisiplinary Program		
1.	VLSI Design Tools & Technology (JVL)	33	
2.	Optoelectronics & Optical Communication (JOP)	38	
	UG		
7.	B.Tech in Electrical Engineering [EE1]	277	
8.	B.Tech in Electrical Engineering (Power) [EE2]	101	Admission to these two programs was done till 2012.
9.	B.Tech in Electrical Engineering and M.Tech in Information & Communication Technology [EE5]	102	
10.	B.Tech in Electrical Engineering (Power and Automation) [EE3]	32	This program is introduced in 2013 and data is therefore accordingly.

1.2. Consistency of curricula with academic vision of the department.

The curriculum is made in accordance with the mission and vision of the Department.

Mission Statement

a. Maintaining Excellence in Teaching and Research
b. A focus on product development

Vision Statement

c. Pioneering research in new fields
d. Research work specific to Indian problems

1.3 Quality of programmes:

(a) Periodicity of curriculum review UG and PG (*relevant documents*).

The curriculum review is conducted every ten years. Please see ***appendix No. 01*** for more details.

(b) Mechanism for review at UG and PG level (*relevant documents*).

The curriculum review is conducted every ten years, first a committee, comprising of faculty members from all the departments, called '*Curriculum Review Committee'* is formed under the Chairmanship of Dean (Academic Affairs). Based on feedback from Industry, faculty members, Alumni and other stake holders, this committee prepares a concept paper which is finalized by having extensive discussions with the departments. Once the *'Concept Paper'* is finalized, the departments are asked to frame the different programmes in tune with the concept paper. The concept paper for the recent curriculum review process and the document prepared by the EE Department are attached as ***appendix No.01*** to provide a complete picture of the process.

(c) Coursework for each UG, PG andPh.D programme – Core/Elective.

Coursework for each UG, PG programme are attached as ***appendix No. 02.*** For Ph.D programme 12 credits for students with M.Tech and 24 credits for students with B.Tech/M.Sc.

(d) Pre Ph.D courses offered (in last 5 yrs).

There are no exclusively identified Pre-Ph.D courses in the department. Depending on the background strength of the candidate the students are advised to register for courses from the list of PG courses.

(e) New advanced Masters / Pre-Ph.d courses introduced in last 5 yrs.

S.No.	Course No.	Course Title	Faculty
1.	EEL862	Micro & Nanophotonics	Dr. Anuj Dhawan
2.	EEL863	Nanophotonics and Plasmonics	Dr. Anuj Dhawan
3.	EEL839	Special Topics in IEC II: System-on-chip Design and Test	Dr. Turbo Majumder
4.	EEL851	Selected Topics in Computers I: Signals and Systems in Biology	Dr. Kushal Shah Dr. Sumeet Agarwal
5.	EEL790	Selected Topics: Plasma, Plasmonics and NIMs	Dr. Kushal Shah
6.	EEL839	Selected Topics in IEC II: Compact modeling of semiconductor devices	Dr. Abhisek Dixit
7.	EEL838	CMOS RF IC Design	Prof. G.S.Visweswaran
8.	EEL839	Selected Topics in IEC II: Solid State Imaging	Dr. Mukul Sarkar
9.	EEL847	Selected Topics in Machines & Drives: Advanced topics in Electrical Drives	Dr. Amit Kumar Jain
10.	EEL722	Applied and Numerical Linear Algebra in Engineering	Dr. S. Janardhanan

(f) Overlap between courses (c) and (d) & (e), including opening latter to UG.

There is no overlap between courses under (c) (d) and (e). UG students are permitted to register for PG courses as electives.

(g) Seminar series (weekly/regular) held each semester (provide list).

- Facutly Seminar: Each faculty when they go and present a paper in a conference abroad, gives a seminar in the department on their return.
- Each Ph.D student gives a seminar on his/her research work every semester before the member of SRC.
- Seminars given by Visiting Faculty Scientists.
- Seminars organized by IEEE held in the department. (List attached as ***appendix No. 03***).

List except for IEEE seminar is not maintained in the department.

(h) Placement details (*as per format at Annexure- 1*).
Attached as ***appendix No. 4.***

(i) Relevance of UG and programmes to recruiters, potential and on-campus recruiters (*as per format at Annexure- 2*).

Prog. Type	Prog. Name	No. of graduating students	Given details of surveys done	
B.Tech	B.Tech in Electrical Engineering [EE1]	231	No survey done. However, feedback is saught from the Alumni working in the Industry regularly to update the course.	
B.Tech	B.Tech in Electrical Engineering (Power) [EE2]	105		
Dual Degree	B.Tech in Electrical Engineering and M.Tech in Information & Communication Technology [EE5]	88		
M.Tech	Control Engineering (EEA)	44		
M.Tech	Communication Engineering (EEE)	65		
M.Tech	Integrated Electronics & Circuit (EEN)	75		
M.Tech	Power Electronics & Electrical Machine Drives (EEP)	81		
M.Tech	Power Systems (EES)	61		
M.Tech	Computer Technology (EET)	75		
Interdisciplinary program				
M.Tech	VLSI Design Tools & Technology (JVL)	43		
M.Tech	Optoelectronics & Optical Communication (JOP)	84		

(j) Benchmarking of curriculum (*as per format at Annexure-3*).
Attached as ***appendix No. 05.***

2) Teaching environment

2.1. Student-Teacher ratio separately and total for UG, PG, Ph.D (based on *gross numbers and on class size basis*)

UG- 512: 44 (11.63 : 1)**;**
PG- 296:44 (6.73 : 1);
Ph.D- 168:44 (3.82 : 1);
Total: 976 : 44 (22.18 : 1)

2.2. No. of students

976 students

2.3. Student-TA (or student-hours/T.A.) ratio

8:1 (approx.)

2.4. No. of skilled technical staff

Technical staff: 15

2.5. Gross laboratory space; break-up of lab space for core UG/ PG teaching.

Gross laboratory space: 36102.5 sq. ft.
UG Teaching Lab: 12481 sq. ft.
PG Teaching Lab: 3648.5 sq. ft.
Purely Research Lab: 5865 sq. ft.
Overlapping Research Labs with Teaching Labs: 14108 sq. ft.

2.6. Laboratory modernization performed in last 5 years for (i) UG core, (ii) PG core, (iii) elective courses (*attach data before and after modernization*),

Equipments are updated in the laboratories. The following are the list of updates in the UG and PG laboratories.

1. Integrated Electronics and Circuits lab:
   UG Core: New FPGA based experiments introduced (jointly).
   PG Core: Analog programmable boards, new design stations, new VLSI design software.
   Elective courses: New simulators for machine learning and neural systems.

2. Power electronics lab at both UG and PG levels:
   1. Several voltage source converters (10 and 20 kVA rating)
   2. Matrix converters
   3. Current source converters
   4. Multi level converter
   5. Power analyzer - 1 -phase- at least 5 of them
   6. Three-phase power analyzer -1 no
   7. DSP kits - Texas instruments/ ADMC/ DSpic
   8. Dspace real time control platform
   9. Many DSP and microprocessor kits and modules for running lab classes

10. Power converter kits like DC-DC converter, 1-phase and 3-phase inverters, 1-phase and 3 phase controlled, semi-controlled and uncontrolled rectifiers, ac voltage controllers - along with pulse generation modules.
11. Many digital storage oscilloscopes
12. High quality measuring instruments like Wattmeters, ammeters and multi-meters ; Single-phase and three-phase variacs of slightly higher ratings; various electronic loads.
13. Software PSIM for simulating PE and Drives
14. PSPICE software - 1 license

3. PG machines and Drives lab.
   1. Several voltage source converters (10 and 20 kVA rating)
   2. Matrix converters
   3. Current source converters
   4. Multi level converter
   5. Power analyzer - 1 -phase- at least 5 of them
   6. Three-phase power analyzer -2 nos
   7. DSP kits - Texas instruments/ ADMC/ DSpic
   8. Dspace real time control platform - 2 of them
   9. Opal-RT real time controller - 1 no
   10. PMSM and PMBLSC motor drive, controller and aasociated dsp kits
   11. V/f controlled drive from ABB
   12. Synchronous reluctance motor and PMSM motors
   13. Many DSP and microprocessor kits and modules for running lab classes
   14. 1-phase and 3 phase controlled, semi-controlled and uncontrolled rectifiers, ac voltage controllers - along with pulse generation modules.
   15. Many digital storage oscilloscopes
   16. High quality measuring instruments like Wattmeters, ammeters and multi-meters ; Single-phase and three-phase variacs of slightly higher ratings; various electronic loads.
   17. Maxwell and Simplorer software
   18. Magnet and SPEED software

4. UG Machine lab
   1. Several voltage source converters (10 and 20 kVA rating)
   2. Matrix converters
   3. Single phase power analyser- 4 of them
   4. Single-phase power quality meters - 5 of them
   5. Hand held power quality analyzers - 2 of them
   6. Software like PSIM and NI Labview for control and analysis
   7. DSP kits - Texas instruments/ ADMC/ DSpic
   8. Dspace real time control platform - 2 of them
   10. PMSM and PMBLSC motor drive, controller and aasociated dsp kits
   11. V/f controlled drive from ABB
   12. Synchronous reluctance motor and PMSM motors
   13. Many DSP and microprocessor kits and modules for running lab classes
   14. Twenty sets of Two DC machines, one induction and one synchronous machine couple together each of 1 kW rating; also twenty 1-phase and 3-phase transformers for conducting UG lab
   15. Many digital storage oscilloscopes

16. High quality measuring instruments like Wattmeters, ammeters and multi-meters ; Single-phase and three-phase variacs of slightly higher ratings; various electronic loads.

5. Embedded Lab:
   UG Core: Upgraded microcontrollers to latest ARM, Cortex, Arduino and Power PC (QUICC) architectures.
   PG Core: Upgraded Digital Systems Lab to the latest VHDL (Xilinx ISE & Altera Quartus0 development environments.

6. Computer Technolgoy lab:
   UG Core: Provides lab support at UG level to the bulk of the Design Lab activity. Provides extensive lab support to the UG Computer Architecture course.

7. IT Lab:
   UG Core: Provides lab support on latest software development tools to UG/ Dual students with special emphasis on Open Source.

2.7. Course files for each course for last 5 years

Course Files for last semester is available in the Department.

2.8. Study materials (monographs, notes, books, videos, web-based materials, etc.) prepared, course-wise,

Books:

1. Prof. S. Prakriya: One Book on Signals and Systems Tata McGraw-Hill, EEL205.
2. B. Bandyopadhyay, S. Janardhanan and S. Spurgeon (Eds.), "Advances in Sliding Mode Control - Concept, Theory and Implementation", Ser. Lecture Notes in Control and Information Sciences, Vol. 440, p. 380, Springer-Verlag, Heidelberg, 2013, ISBN 978-3-642-36985-8
3. Yaduvir Singh and S. Janardhanan, "Modern Control Engineering", 638 p., Cengage Learning, 2010, ISBN 978-9-814-31920-1
4. Prof. Devi Chadha, "Terrestrial Wireless Optical Communications", McGraw-Hill Professional; 1 edition, March 26, 2013.
5. Dr. Kushal Shah: Prepared lecture slides for the UG course on 'Signals and Systems': http://web.iitd.ac.in/~kkshah/eel205.html
6. Prof. Jaydeva**:** Material is uploaded on the Sakai website each semester, and is changed all the time. Some of this restricted by copyright requirements and cannot be openly shared.
7. Prof. Subrat Kar:
   (a) One Book- Optical Fiber Communication: Principles and Systems; Authors: A. Selvaragan, S.Kar, T.Srinivas; Publisher: Tata McGraw Hill Education; First Publication Date: 2003 (reprinted every year till current year).
   (b) One monograph being negotiated with Springer Verlag on Optical Free-space Communication.

2.9. Research and Innovations in teaching-learing processes

1. IIT Delhi started participating in the national MHRD ICT based learning initiative through the pedagogy project. (About 11 teams from IIT Delhi participating).
2. NPTEL courses are developed.
3. For large classes like EEL102 new course material with design problems together with their solutions were kept on website http://beta.eduposse.com/ . The site was also used for posting tutorial problems and their solutions. There was also a mechanism for interaction between students, teacher and teaching assistants on technical problems.
4. Class consultation with students through webex based video conferencing is now frequently used by students (even after office hours and from home-hostel).
5. Simulations are conducted in their class room to demonstrate the working of power electronic circuits and drives. Students are taken for industrial visits to understand what is going on in the field.
6. Project component in the courses.

2.10. No. of students (UG and PG separately) who have spent at least a semester at another university/institute (overseas or Indian).

1. PG Student – Abhijit Mitra spent 1 semester at British Telecom Ipswich UK in 2012. He has again gone to BT Ipswich Uk for six month till March 12, 2014.
2. UG Students:

S.No.	Name	Entry No.	Period	Place
1.	Sachin Jain	2009EE50415	1st sem 2011-12	Taiwan
2.	Mohit Kumar	2009EE10399	1st sem 2011-12	France
3.	Arnab Dutta	2009EE10379	1st sem 2011-12	Taiwan
4.	Saurabh Gupta	2007EE10341	2009-10	France
5.	Avinash Kumar	2007EE10060	1st sem 2009-10	France
6.	Varun Gupta	2007EE10349	1st sem 2009-10	France
7.	Ridhi Chaudhury	2007EE10111	1st sem 2009-10	Sweeden
8.	Manish Bansal	2007EE50502	1st sem 2009-10	France
9.	Priyanka Raina	2007EE10322	1st sem 2009-10	Canada
10.	Abhishek Upadhyay	2007EE50402	2009-10	France
11.	Rishabh Garg	2007EE50417	1st sem 2009-10	France

2.11. No. of students from overseas universities who have taken classes, done project work or internship, UG & PG separately, in the department.

S.No.	Name & Qualification	Entry No.	Coming place	Period
1.	Aditya Gupta	2012EE19094	Garnegie Mellon Univ. USA	25/5/13 to 7/8/13

2.12. Course feedback.

Available in the internal web of the Insitute website.

2.13. Industry experts who have delivered lecture(s), seminars, discussions as part of a core/elective course – UG and PG separately.

The group-wise Industry experts who have delivered lecture(s), seminars, discussions as part of a core/elective course is given below:

A. *Power Group*:

Mostly for UG one credit special module courses – sometimes for PG students in Electric Drives course:

1. Mr. Meenu Singal from Rockwell Automation
2. Mr. Ranajay Malik from ST Micro Electronics
3. Dr. Bohori from GE R&D Centre Bangalore
4. Ms. Srilatha from GE R&D Centre Bangalore
5. Dr. Arvind Tiwari from GE R&D Centre Bangalore
6. Dr. Kannan Tinnium from GE R&D Cnetre NY USA.
7. Mr. Bhata from BHEL Bhopal
8. Dr. Joshi from GE R&D Centre Bangalore
9. Dr. Ravindra Bhide from GE R&D Centre Bangalore

B. *Communcation Group*:

1. Dr. A. K. De from ST Microelectronics taught
   EEL860 Wireless Communications twice
   EEL818 Telecom Technologies twice
2. Dr. A. K. Srivastava of C-DOT taught EEL817 twice

C. *Computer Group*:

1. Dr. Hiranmay Ghosh from PCS Innovation Lab.
   Pattern Recognition
2. Dr. Mona Mathur from ST Microelectonics
   Internet Technology, Video Coding
3. Dr. Anand Srivastava has co-taught Access Networks

D. *IEC Group:*

1. Dr. Kaushik Saha (formerly of ST Microelectronics and at present with Samsung) has been teaching an elective course every semester for PG students in the last 6 yeas and is continuing to do so.
2. Mr. Atul Gupta of Freescale has been teaching an elective course for PG students every alternate semester since last 6 years.

2.14. Industry exposure to students – course-related visits to factories, sites, industry exhibitions, field trips, etc. – UG and PG separately.

The group-wise details are given below:

1. *Power Group:*
   (i) For 1st year students for Introduction to the Dept. course
      a) Badarpur NTPC thermal power station
      b) ABB Faridabad Machine manufacturing facility
   (ii) For students from Electric Drives course (both UG and PG) and also for Power Electronics Course
      a) Dadri Power Station – NTPC and Power Grid – HVDC facility at Dadri
      b) ABB Faridabad Induction machine manufacturing facility
      c) UPS industries like – Microtek, Instapower and Sukam.
   (iii) For M.Tech. Power Systems, and EE(Power) students
      a) Dadri Power Station – NTPC and Power Grid – HVDC facility at Dadri
      b) Northern Regional Load Despatch Centre, Katwaria Sarai

c) 400/220 kV GIS substation, Maharani Bagh, Delhi

2. *IEC Group:*
   (i) As part of SURA project students have been facilitated to intern at ST Microelectronics in the summer of the second year.
   (ii) As part of the course on IC Processing laboratory, students have visited and undergone traning at CEERI Pilani.
3. *Computer Group:*
   (i) Field trips: PowerGrid Ballabhgarh – field trip for UP students.
   (ii) Industry exhibitions: NI T&M Seminar for PG students

3) Research

3.1. No. of Masters and Ph.D students supported – (i) by Institute Assistantship, (ii) on sponsored projects/consultancies, (iii) other sources and (iv) sponsored by external organizations.

Ph.D (current statistics)

S.No.	Institute Assistantship	On sponsored projects/ consultancies	Other sources	Sponsored by external organizations
1.	54	29 (FT) 01 (PT)	08 (QIP) 03 (Foreign)	07 (FT Spon) 62 (PT)

M.Tech/M.S.(R)(current statistics)

S.No.	Institute Assistantship	On sponsored projects/ consultancies	Other sources	Sponsored by external organizations
1.	148	01	03 (QIP) 02 (Foreign)	24 (FT Spon) 16 (PT)

3.2. No. of Ph.D.s enrolled, graduated per faculty for last 5 years.

Enrolled : 3.82 students per faculty (total 168);
Graduated : 1.45 students per faculty (total 64).

The details are given below:

S.No.	Year	Enrolled	Graduated	Per Faculty	
				Enrolled	Graduated
1.	2009	21	10	0.54	0.26
2.	2010	43	06	1.10	0.15
3.	2011	25	08	0.64	0.21
4.	2012	54	18	1.26	0.42
5.	2013	25	22	0.57	0.50

3.3. Areas of research (e.g. areas listed in Prospectus, and others) by (i) Volume (quantifiable parameters), (ii) Breadth, and (iii) Years these have been research areas *(as per format at Annexure-4)*

Please see ***appendix No. 06***.

The detail information about research area is given below:

The department offers a Doctoral programme with a view to push the frontiers of knowledge and to explore new and emerging areas. Teachers in engineering colleges are particularly encouraged to enroll for the Ph.D programme.
The various research acitivites are coordinated by different research groups within the department. These groups also represent a broad classification of the research interests of the faculty. The different research areas covere by these groups are given below:

Communication Engineering Group
Perfromance Analysis of Communication Systems, Cooperative Communications, Cognitive Radio, Information theory and Coding, Communication Networks, Secrecy & High speed wireless and wireline communications, MIMO, Image/Video coding, Multirate Signal Processing, Broadband wireless access, Optical Communication and Networks, FSO, Micro and nano photonics, Photonics & Switching, Electromagnetics, Plasmonics & Plasma sicence.

Computer Technology Group
Computer Vision, Multimedia Systems, Image Processing, Computer Networks, Computer Networks, Computer Architecture, Embedded Systems, Parallel Computation, Neural Computation, Pattern Recognitions, Artificial Intelligence and Information Technology, Music Information Retrieveal, Bioinformatics, Machine Learning.

Control Engineering Group
Robust Control, Intelligent Control, Robotics, Optimal Control, System Identification, Neuro-Fuzzy Control, Reinforcement Learing Control, Nonlinear Systems and Control, Flight Control and Navigation, Adaptive Control, Cooperative Control and Path Planning, Sensor Fusion, guidance, Navigation and Flight Control, Sliding Mode Control, Interval Analysis in Control Design, Computational Methods for Simulation and Control, Modeling and model order reduction, Attitude Control and Structural Control, Numerical Modeling and Simulation, Embedded Control Systems.

Integrated Electronics and Circuits Group
Adaptive self-powered systems for healthcare and environment monitoring. Circuits, Devices and Systems, VLSI Design and CAD, Microelectronics, Digital Signal Processing, Neural Networks, Biological Neural Networks forVision, Information Technology, Chaos, Microprocessors, Computational Neuroscience and Analog VLSI Design, RF CMOS Integrated Circuits, Mixed Signal Circuits, Flexible/printable Electronics and PVs, devices and materials, Network-on-Chip.

Power Engineering Group
Electrical Machines, Energy Conversion, Special Machines, Power Electronics, Power Quality, Drives, Electrical Vehicles, Power and Energy Systems, Protection, Stability, Optimization, Energy Conservation, HVDC and FACTS, Applications of Microprocessors and

Computers in Power and Drives, Renewable Energy Systems (Small Hydro, PV, Wind), and Energy Audit and Efficiency, Solar Inverters and Power Supplies.

3.4. Publication per faculty (average per year for last five years) in academic journals and Conference.

Average journal publication per year: 106 papers;
Average conference publication per year: 123 papers;
List attached as ***appendix No. 07.***

3.5. Publications (journal and conference) total and per (a) Ph.D student, (b) Masters student, (c) UG student.

(a) Ph.D Students

Journal Papers : Total: 187 papers

1. C.Singhal, S.De, R.Trestian and G.M.Tuntean, "Joint optimization of user-experience and energy-efficiency in wireless multimedia broadcast", (accepted, IEEE Trans. Comput., Oct. 2013).
2. C.Singhal, S.Kumar, S.De, N.Panwar, R.Tonde and P.De, "Class-based Shared Resource Allocation for Cell-Edge Users in OFDMA Networks," (accepted, IEEE Trans. Mob.Comput. Sept. 2012).
3. B.Panigrahi, S.De, B.S.Panda and J.D.Lan Sun Luk, "Network lifetime maximizing forwarding strategies in ad hoc wireless sensor networks," IET Commun., Volt.6, no.14, pp. 2128-2137, Sept. 2012.
4. B.Panigrahi, A.Sharma and S.De, "Interference aware power controlled forwarding for lifetime maximization of wireless ad hoc networks", IET wireless Sensor Systems, vol.2, no.1, pp. 22-30, Mar. 2012.
5. P.Mandal, S.De and S.S. Chakraborty, "A receiver synchronized slotted Aloho for underwater wireless networks with imprecise propagation delay information ad hoc networks," Elsevier Ad Hoc Networks, Spl. Issue on Wireless Communication in Challenged Environments, (accepted, Feb. 2011). Doi: 10.1016/j.adhoc.2011.01.019. [4 Google citations]
6. S.De, P.Mandaland S.S.Chakraborty, "On the characterization of Aloha in underwater wireless networks", Elsevier J. Matematical and Computer Modeling, Spl. Issue on Wireless Networks, vol.53, no.11-12, pp.2093-2107, June 2011. [7 Google citations].
7. Shahkar Ahmad Nahvi, Mashuq un Nabi and S. Janradhanan, "Nonlinearity-aware sub-model combination in trajectory based methods for nonlinear MOR", Mathematics and Computers in Simulation, Vol.94, pp.127-144, Aug.2013. doi : 10.101.1016/ j.matcom.2013.07.001.
8. Neeli Satyanarayana and S. Janardhanan, "Multirate output sampling linear functional observer based state feedback for systems with delay in state variables", International Journal of Modeling, Identification and Control, Vol. 20, No.1, pp.47-55, Sep.2013. doi : 10.1504/IJMIC.2013.055912.

9. Shahkar Ahmad Nahvi, Mashuq-un-Nabi, S. Janardhanan, "Trajectory Piece-wise quasi-linear approximation of large nonlinear dynamic systems", International Journal of Modeling, Identification and Control, Vol. 19, No. 4, pp. 369-377, Aug. 2013. doi : 10.1504/IJMIC.2013.055655
10. Manjusha Bhave, S. Janardhanan and Lillie Dewan, "An Efficient Control of Rigid Robotic Manipulator with Uncertainties using Higher Order Sliding Mode Control", International Journal of Modeling, Identification and Control, Vol. 19, No. 2, pp. 179-185, May 2013. doi : 10.1504/IJMIC.2013.054322.
11. Shahkar Ahmad Nahvi, Mashuq-un-Nabi, S. Janardhanan, "AFAS - Adaptive Fast Approximate Simulation for nonlinear model reduction", International Journal of Modeling, Identification and Control, Vol. 19, No. 2, pp. 113-124, May 2013. doi : 10.1504/IJMIC.2013.05431510.1504/IJMIC.2013.054315.
12. Mohammad Abid Bazaz, Mashuq-un-Nabi and S Janardhanan, "Automated and Efficient Order Selection in Krylov based Model Order Reduction", International Journal of Modeling, Identification and Control, Vol. 18, No. 4, pp. 332-340, 2013, doi : 10.1504/IJMIC.2013.053538
13. Mohammad Abid Bazaz, Mashuq un Nabi and S Janardhanan, Modelling and Simulation Strategy for Parametric Transient Electromagnetic Simulations", International Journal of Modeling, Identification and Control, Vol. 18, No. 3, pp. 251-260, 2013, doi : 10.1504/IJMIC.2013.052819
14. Pyare Mohan Tiwari, S. Janardhanan and Mashuq-un-Nabi, "Spacecraft Attitude Control using Non-singular Finite Time Convergence Fast Terminal Sliding Mode", International Journal of Instrumentation Technology, Vol. 1, No. 2, pp. 124-142, 2012 doi : 10.1504/IJIT.2012.053289.
15. Shahkar Ahmad Nahvi, Mashuq un Nabi and S. Janardhanan, "Piece-wise Quasi-linear Approximation for Nonlinear Model Reduction", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, Vol.32, No. 12, pp. 2009-2013, Dec. 2013.
16. Bhim Singh, P Jayaprakash, T R Somayajulu and D P Kothari, "Reduced Rating VSC with a Zig-Zag Transformer for Current Compensation in Three-Phase Four-Wire Distribution System," IEEE Trans. on Power Delivery,vol.24, no.1, pp.249-259, January 2009.
17. B. Singh, R. Saha, A. Chandra and K. Al-Haddad, "Static synchronous compensators (STATCOM): a review," IET Power Electronics, vol.2, no. 4, pp.297-324, July 2009.
18. V. Garg, B. Singh, and G. Bhuvaneswari, "24-Pulse AC-DC converter for harmonic mitigation," IET Power Electronics, vol.2, no. 4, pp.364-374, July 2009.
19. D. Madhan Mohan, Bhim Singh and Bijaya K Panigrahi, "Harmonic optimised 24-pulse voltage source converter for high voltage DC systems," IET Proc. on Power Electronics, vol.2, no.5, pp.563-573, September 2009.
20. Vishal Verma and Bhim Singh, "Design and Implementation of a Current Controlled Parallel Hybrid Power Filter," IEEE Transactions on Industry Applications, vol. 45, no.5, pp.1910-1917, September/October 2009.
21. Stuti Shukla, Sukumar Mishra and Bhim Singh, "Empirical Mode Decomposition with Hilbert Transform for Power Quality Assessment," IEEE Transactions on Power Delivery, vol. 24, no. 4, pp.2159-2165, October 2009.
22. Bhim Singh, S. S. Murthy and Sushma Gupta, "A Stand-Alone Generating System Using Self-Excited Induction Generators in the Extraction of Petroleum Products," IEEE Transactions on Industry Applications, vol. 46, no.1, pp.94-101, January/February 2010.
23. B. Singh and S. Singh, "Single Phase Power Factor Controller Topologies for Permanent Magnet Brushless DC Motor Drives," IET Power Electronics, vol. 3, no.2, pp.147-175, March 2010.

24. Vishal Verma, Bhim Singh, Ambrish Chandra and Kamal Al-Haddad, "Power Conditioner for Variable-Frequency Drives in Offshore Oil Fields," IEEE Transactions on Industry Applications, vol. 46, no.2, pp.387-739, March/April 2010.
25. Yogesh K. Chauhan, Sanjay K. Jain, and Bhim Singh, "A Prospective on Voltage Regulation of Self Excited Induction Generators for Industry Applications," IEEE Transactions on Industry Applications, vol. 46, no.2, pp.720-730, March/April 2010.
26. R. Saha and Bhim Singh, "Improved 48-pulse static synchronous compensator for high-voltage applications," IET Power Electronics, vol. 3, no.3, pp.355-368, May 2010.
27. Bhim Singh, Sanjeev Singh and S.P. Hemanth Chender, "Power quality improvement in load commutated inverter-fed synchronous motor drives," IET Power Electronics, vol. 3, no.3, pp.411-428, May 2010.
28. Bhim Singh, Sanjeev Singh, and S.P. Hemanth Chender, "Harmonics Mitigation in LCI Fed Synchronous Motor Drives," IEEE Transactions on Energy Conversion, Vol. 25, No. 2, pp. 369-380, June 2010.
29. Bhim Singh, G. Bhuvaneswari and Kalpana Ramesh, "Autoconnected Transformer based 18-pulse AC-DC Converter for Power Quality Improvement in Switched Mode Power Supplies," IET Power Electronics, vol.3, no.4, pp.525-541, July 2010.
30. Bhim Singh, Madhusudan Singh and A.K. Tandon, "Transient Performance of Series Compensated Three-Phase Self-Excited Induction Generator Feeding Dynamic Loads," IEEE Transactions on Industry Applications, Vol. 46, No. 4, pp. 1271-1280, July/August 2010.
31. Vishal Verma and Bhim Singh, "Genetic Algorithm Based Design of Passive Filters for Offshore Applications," IEEE Transactions on Industry Applications, Vol. 46, No. 4, pp. 1295-1303, July/August 2010.
32. R. Kalpana, G. Bhuvaneswari, B. Singh and S. Singh, "Harmonic Mitigator Based on 12-Pulse ac-dc Converter for switched mode power supply," IET Power Electronics, vol. 3, no. 6, pp. 947-964, November 2010.
33. V. Rajagopal, Bhim Singh and Gaurav Kumar Kasal, "Electronic load controller with power quality improvement of isolated induction generator for small hydro power generation," IET Renewable Power Generation, Vol. 5, No.2, pp. 202-213, March 2011.
34. Puneet Goel, Bhim Singh, SS. Murthy and Navin Kishore, "Isolated Wind–Hydro Hybrid System Using Cage Generators and Battery Storage," IEEE Transactions on Industrial Electronics, vol. 58, no. 4, pp. 1141-1153, April 2011.
35. Gaurav Kumar Kasal and Bhim Singh, "Voltage and Frequency Controllers for an Asynchronous Generator-Based Isolated Wind Energy Conversion System," IEEE Transactions on Energy Conversion, vol.26, no.2, pp.402-416, June 2011.
36. Puneet K. Goel, Bhim Singh, S. S. Murthy and Navin Kishore, "Parallel Operation of DFIGs in Three Phase Four Wire Autonomous Wind Energy Conversion System," IEEE Transactions on Industry Applications, Vol. 47, No. 4, pp. 1872-1883, July/August 2011.
37. Bhim Singh, P Jayaprakash, Sunil Kumar and D P Kothari, "Implementation of Neural Network Controlled Three Leg VSC and a Transformer as Three Phase Four Wire DSTATCOM," IEEE Transactions on Industry Applications, Vol. 47, No. 4,pp. 1892-1901, July/August 2011.
38. S. Sharma and B. Singh, "Voltage and Frequency Control of Asynchronous Generator for Stand Alone Wind Power Generation," IET Power Electronics, Vol. 4, No. 7, pp. 816 - 826, August 2011.
39. V. Rajagopal and Bhim Singh, "Neural Network Based Integrated Electronic Load Controller for Isolated Asynchronous Generators in Small Hydro Generation," IEEE Transactions on Industrial Electronics, Vol. 58, No. 9, pp. 4264-4274, September 2011.
40. Bhim Singh, Sanjeev Singh, Ambrish Chandra and Kamal Al Haddad, "Comprehensive Study of Single-Phase AC-DC Power Factor Corrected Converters with High Frequency

Isolation," IEEE Transactions on Industrial Informatics, Vol. 7, No. 4, pp. 540-556, November 2011.
41. Shailendra Sharma and Bhim Singh, "Performance of Voltage and Frequency Controller in Isolated Wind Power Generation for a Three-Phase Four-Wire System," IEEE Transactions on Power Electronics, Vol. 26, No. 12, pp. 3443-3542, December 2011.
42. S. S. Murthy, Bhim Singh and Vuddanti Sandeep, "A Novel and Comprehensive Performance Analysis of Single-Phase Two-Winding Self-Excited Induction Generator," IEEE Transactions on Energy Conversion, Vol. 27, No. 1, pp. 117-127, March 2012.
43. Sanjeev Singh and Bhim Singh, "A Voltage-Controlled PFC Cuk Converter-Based PMBLDCM Drive for Air-Conditioners," IEEE Transactions on Industry Applications, Vol. 48, No. 2, pp. 832-838, March/April 2012.
44. Shailendra Sharma and Bhim Singh, "Control of PMSG Based Stand-alone Wind Energy Conversion System," IET Power Electronics, Vol. 5, pp. 1-8, 2012.
45. Jeevanand S, Bhim Singh and B K Panigrahi, "Single Turn Fault Detection in Induction Machine using Complex Wavelet Based Method," IEEE Transactions on Industry Applications, Vol. 48, No. 6, pp.1846-1854, November/December 2012.
46. Bhim Singh and Shailendra Sharma, "Stand-alone Single-Phase Power Generation Employing Three-Phase Isolated Asynchronous Generator," IEEE Transactions on Industry Applications, Vol. 48, No. 6, pp.2414-2423, November/December 2012.
47. Bhim Singh and Shailendra Sharma, "Design and Implementation of Four-Leg Voltage Source Converter Based VFC for Autonomous Wind Energy Conversion System," IEEE Transactions on Industrial Electronics, Vol. 59, No. 12, pp. 4694-4703, December 2012.
48. Bhim Singh and Sabha Raj Arya, "Composite observer-based control algorithm for distribution static compensator in four-wire supply system," IET Power Electronics, Vol. 6, No. 2, pp. 251 - 260, February 2013.
49. Sandeep Madishetti, G. Bhuvaneswari and Bhim Singh, "Improved power quality converter for direct torque control-based induction motor drives," IET Power Electronics ,Vol. 6, No. 2, pp. 276 - 286, February 2013.
50. Bhim Singh and Vashist Bist, "An Improved Power Quality Bridgeless Cuk Converter Fed BLDC Motor Drive for Air Conditioning System," IET Power Electronics, Vol. 6, No. 5, pp. 902 - 913, May 2013.
51. Sabha Raj Arya and Bhim Singh, "Performance of DSTATCOM Using Leaky LMS Control Algorithm," IEEE Journal of Emerging and Selected Topics in Power Electronics, Vol. 1, No. 2, pp. 104 - 113, June 2013.
52. S. S. Murthy, Bhim Singh and Vuddanti Sandeep, "Design-based computational procedure for performance prediction and analysis of single-phase self-excited induction generator," IET Electric Power Applications, Vol. 7, No. 6, pp. 477 - 486, July 2013.
53. Bhim Singh and Sabha Raj Arya, "Implementation of Single-Phase Enhanced Phase Locked Loop Based Control Algorithm for Three-Phase DSTATCOM," IEEE Transactions on Power Delivery, Vol. 28, No. 3, pp. 1516 - 1524, July 2013.
54. Bhim Singh and Sabha Raj Arya, "Adaptive Theory-Based Improved Linear Sinusoidal Tracer Control Algorithm for DSTATCOM," IEEE Transactions on Power Electronics, Vol. 28, No. 8, pp. 3768-3778, August 2013.
55. R. Kalpana, G. Bhuvaneswari, Bhim Singh, Shikha Singh and Sanjay Gairola, "Autoconnected-Transformer-Based 20-Pulse AC-DC Converter for Telecom Power Supply," IEEE Transactions on Industrial Electronics, Vol. 60, No. 10, pp. 4178-4190, October 2013.
56. Yogesh K. Chauhan, V. K Yadav and Bhim Singh, "Optimum Utilization of Self-Excited Induction Generator," IET Electric Power Applications, Vol. 7, No. 9, pp. 680 - 692, November 2013.
57. B. Singh, B.P. Singh and Sanjeet Dwivedi, "A Review of Sensor Reduction Techniques in

Permanent Magnet Synchronous Motor Drives," International Journal of Power and Energy Systems, vol. 29, no.1, pp. 10-18, January 2009.

58. Gaurav Kasal and Bhim Singh, "A STATCOM based voltage regulator for parallel operated isolated asynchronous generators feeding three-phase four-wire loads," International Journal of Power Electronics, vol. 1, no.3 pp. 318 - 332,January 2009.
59. D. Madhan Mohan, Bhim Singh and B.K. Panigrahi, "Power quality improvement in HVDC systems using 18-pulse voltage source converter," International Journal of Power Electronics, vol. 1, no.3, pp. 333 - 346, January 2009.
60. Bhim Singh and Sanjeev Singh, "State of art on permanent magnet brushless dc motor drives," Journal of Power Electronics, vol. 9, no. 1, pp.1-17, January 20, 2009.
61. Gaurav Kumar Kasal and Bhim Singh, "H-Bridge VSC with a T-Connected Transformer for a 3-Phase 4-Wire Voltage and Frequency Controller of an Isolated Asynchronous Generator," Journal of Power Electronics, vol. 9, no. 1, pp.43-50, January 20, 2009.
62. S. Gairola and B. Singh, "Power Quality Improvement in Vector Controlled Induction Motor Drive Employing Multipulse AC DC Converters," International Journal of Industrial Electronics and Drives (IJIED), vol. 1, no. 1, pp.52-63, January, 2009.
63. Gaurav Kumar Kasal and Bhim Singh, "VSC with Zigzag Transformer Based Electronic Load Controller for a Stand-Alone Power Generation," International Journal of Power and Energy Conversion, vol.1, no.1, pp.1-14, February 25, 2009.
64. Bhim Singh, P. Jayaprakash and D.P. Kothari, "Star-hexagon transformer and non-isolated three-leg VSC based three-phase four-wire DSTATCOM," International Journal of Power and Energy Conversion, Vol. 1, No.2/3, pp. 198-214, 2009.
65. Bhim Singh and Gaurav Kumar Kasal, "Voltage and Frequency Controller for Stand Alone Pico Hydro Generation," Journal of Power Electronics, vol. 9, no. 2, pp.267-274, March 20, 2009.
66. Bhim Singh, P Jayaprakash and D P Kothari, "Adaline Based Control of Capacitor Supported DVR for Distribution System," Journal of Power Electronics, vol.9, no.3, pp.386-395, May 20, 2009.
67. Gaurav Kumar Kasal and Bhim Singh, "Three-Phase 4-Wire Isolated Wind Energy Conversion System," Journal of Electrical Engineering & Technology, vol.4, no.2, pp. 211-218, June 2009.
68. Bhim Singh, P Jayaprakash and D P Kothari, "Three Leg VSC Integrated with T Connected Transformer as Three Phase Four Wire DSTATCOM for Power Quality Improvement," International Journal on Electric Power Components and Systems, vol. 37, no. 8, pp. 817 – 831, August 2009.
69. Gaurav Kumar Kasal and Bhim Singh, "DSP Based Voltage Controller for an Isolated Asynchronous Generator Feeding Induction Motor Loads," International Journal on Electric Power Components and Systems, vol. 37, no. 8, pp.914 – 935, August 2009.
70. Bhim Singh and Gaurav Kasal, "Independent voltage and frequency controller for a parallel operated isolated three-phase asynchronous generators," European Transactions on Electrical Power, vol.19, no.6, pp. 839-853, September 2009.
71. Bhim Singh and V Rajagopal, "Battery Energy Storage Based Voltage and Frequency Controller for Isolated Pico Hydro System," Journal of Power Electronics, vol.9, no.6, pp.874-883, November 2009.
72. Puneet K. Goel, Bhim Singh, S. S. Murthy and Shailendra K. Tiwari, "Three-phase Four-wire Autonomous Wind Energy Conversion System Using Permanent Magnet Synchronous Generator," International Journal on Electric Power Components and Systems, vol. 38, no. 4, pp. 367-386, January 2010.
73. Rakesh Saxena, Bhim Singh and Yogesh Pahariya, "Measurement of Flux Linkage and Inductance Profile of SRM," International Journal of Computer and Electrical Engg

(IJCEE), Vol.3, No.3, pp.731-739, April 2010.

74. Sanjeev Singh and Bhim Singh, "Single-Phase SEPIC Based PFC Converter for PMBLDCM Drive in Air-Conditioning System," Asian Power Electronics Journal, Vol. 4, No.1, pp. 16-21, April 2010.
75. Gaurav Kumar Kasal and Bhim Singh, "Voltage source converter with a transformer as an electronic load controller for a standalone power generation," International Journal of Energy Technology and Policy, vol.7, no.3, pp. 275-287, May 2010.
76. Bhim Singh and V. Rajagopal, "Integrated Electronic Load Controller with T- Connected Transformer for Isolated Asynchronous Generator," Asian Power Electronics Journal, Vol. 4, No.2, pp. 74-79, August 2010.
77. R. Kalpana, G. Bhuvaneswari, Bhim Singh, Shikha Singh, and Sanjay Gairola, "A 28-Pulse AC-DC Converter Based SMPS for Telecom Power Supply," International Journal of Emerging Electric Power Systems, Vol. 11, No.4, Article-2, pp. 1-25, August 2010.
78. R. Kalpana, Bhim Singh, G. Bhuvaneswari, "Direct Single stage Power Converter with Power Factor Improvement for Switched Mode Power Supply," Journal of Electrical Engineering & Technology, Vol. 5 No. 3, pp.468-476, September 2010.
79. Gaurav Kumar Kasal and Bhim Singh, "Harmonic Elimination, Voltage Control and Load balancing in an Isolated Power Generation," European Transactions on Electrical Power, Vol. 20, No.6, pp. 771-784, September 2010.
80. Veeramalla Raja Gopal and Bhim Singh, "Decoupled Electronic Load Controller for Offgrid Induction Generators in Small Hydro Power Generation," International Journal of Emerging Electric Power Systems, vol.12, No.1, pp.1-14, Article-4, January 2011.
81. P Jayaprakash, Bhim Singh, and D P Kothari, "Digital Signal Processor Implementation of Isolated Reduced-rating Voltage Source Converter Using a Zig-zag Transformer for Three-phase Four-wire Distribution Static Compensator", International Journal on Electric Power Components and Systems, vol. 39, no. 1, pp. 15-30, January 2011.
82. Bhim Singh and K. Venkata Srinivas, "Two-level 24-pulse Voltage Source Converter Based Static Synchronous Compensator with Constant DC Bus Voltage", International Journal on Electric Power Components and Systems, vol. 39, no. 3, pp. 237-253, January 2011.
83. Yash Pal, A. Swarup and Bhim Singh, "Flexible control of different power quality problems using UPQC," Journal of Elect. System, vol. 7, No.1, pp.40-53, March 2011.
84. Sanjeev Singh and Bhim Singh, "PFC buck-boost converter based voltage controlled adjustable speed PMBLDCM drive for air-conditioning," European Transactions on Electrical Power, Vol. 21, No. 1, pp. 424-438, January 2011.
85. V. Rajagopal and Bhim Singh, "Instantaneous Symmetrical Component Theory Based Voltage and Frequency Controller for Isolated Small Hydropower Generation", International Journal on Electric Power Components and Systems, vol. 39, no. 4, pp. 367-386, February 2011.
86. Yash Pal, A. Swarup and Bhim Singh, "A Control Strategy Based on UTT and I CosΦ Theory of Three-Phase, Four-Wire UPQC for Power Quality Improvement," International Journal of Engineering Science and Technology, vol.no.3,No.3, pp.30-40, March 2011.
87. Yash Pal, A. Swarup and Bhim Singh, "Star-hexagon transformer supported UPQC," International Journal of Electrical and Electronics Engineering, vol.5.No.1, pp.105-110, March 2011.
88. Sanjeev Singh and Bhim Singh, "PFC bridge converter for voltage-controlled adjustable-speed PMBLDCM drive," Journal of Electrical Engineering & Technology, Vol. 6, No.2, pp.215-225, March 2011.
89. Yash Pal, A. Swarup and Bhim Singh, "A novel Control strategy of UPQC for Power Quality Improvement," Journal of Electrical Engineering, Vol. 11, Edition 2, pp.1-7, Article No. 19, 2011.

90. R. Saha and Bhim Singh, "Three-level 24-pulse STATCOM with optimised magnetics to regulate voltage in transmission system," International Journal of Power Electronics (IJPEle), Vol. 3, No.2 pp. 134 - 155, April 2011.
91. Sanjeev Singh and Bhim Singh, "An adjustable speed PMBLDCM drive for air conditioner using PFC Zeta converter," International Journal of Power Electronics (IJPElec), Vol. 3, No.2, pp. 171 - 188, April 2011.
92. Bhim Singh, Gaurav Kumar Kasal, Ambrish Chandra and Kamal Al Haddad, "Electronic Load Controller for a Parallel Operated Isolated Asynchronous Generator Feeding Various Loads," Journal of Electromagnetic Analysis and Applications(JEMAA), Vol. 3, No.4, pp. 104-114, April 2011.
93. S. Gairola and B. Singh, "Power quality improvements employing multipulse full-wave AC-DC converters," International Journal of Power Electronics (IJPElec), Vol. 3, No. 3 pp. 240 – 298, April 2011.
94. Yash Pal, A. Swarup and Bhim Singh, "A 3P-3W UPQC with scott-connected transformer for 3P-4W Distribution System," Journal of Electrical and Electronics Engineering, Vol.4, No.1, pp. 147-152, May 2011.
95. Gaurav Kumar Kasal and Bhim Singh, "VSC with a T-connected transformer-based electronic load controller for an isolated asynchronous generator feeding three-phase four-wire loads in a micro hydro system," International Journal of Power Electronics (IJPElec), Vol. 3, No.5, pp. 496-508, June 2011.
96. Bhim Singh, P Jayaprakash and D P Kothari, "New control approach for capacitor supported DSTATCOM in three phase four wire distribution system under non ideal supply voltage conditions based on synchronous reference frame theory," International Journal of Electrical Power & Energy Systems, Vol. 35, No.5, pp. 1109-1117, June 2011.
97. Bhim Singh, P. Jayaprakash, D P Kothari, Ambrish Chandra and Kamal Al Haddad, "New Control Algorithm for Capacitor Supported Dynamic Voltage Restorer," Journal of Electromagnetic Analysis and Applications, Vol. 03, No. 07, pp. 277-286, Jul. 2011.
98. Yash Pal, A. Swarup and Bhim Singh, "Control Strategy for Selective Compensation of Power Quality Problems through Three-Phase Four-Wire UPQC," Journal of Power Electronics, Vol. 11, No. 4, pp. 576-582, July 2011.
99. Yash Pal, A. Swarup and Bhim Singh, "A Control Strategy Based on UTT and PBT of Three-Phase, Four-Wire UPQC for Power Quality Improvement," Journal of Electrical Engineering,Vol.11, no. 3, pp.10-17, 2011.
100. Bhim Singh and Venkata Srinivas Kadagala, "A new configuration of two-level 48-pulse VSCs based STATCOM for voltage regulation," Electric Power Systems Research, Vol. 82, no. 1, pp.11-17, January 2012.
101. Arun Kumar Verma, Bhim Singh and D.T. Shahani, "Grid to Vehicle and Vehicle to Grid Energy Transfer using Single-Phase Half Bridge Boost AC-DC Converter and Bidirectional DC-DC Converter," International Journal of Engineering, Science and Technology, Vol. 4, No. 1, pp. 46-54, 2012.
102. Shikha Singh, G. Bhuvaneswari and Bhim Singh, "Power quality improvement in switched mode power supplies using two stage DC-DC converter," International Journal of Engineering, Science and Technology, Vol. 4, No. 1, pp. 55-64, 2012.
103. Bhim Singh and Shailendra Sharma, "PMBLDCG Based Stand-alone Wind Energy Conversion System for Small Scale Applications," International Journal of Engineering, Science and Technology, Vol. 4, No. 1, pp. 65-72, 2012.
104. Bhim Singh and Sabha Raj Arya, "Design and Control of a DSTATCOM for Power Quality Improvement Using Cross Correlation Function Approach," International Journal of Engineering, Science and Technology, Vol. 4, No. 1, pp. 73-85, 2012.

105. Ashish Shrivastava and Bhim Singh, "Improved Power Quality Based High Brightness LED Lamp Driver," International Journal of Engineering, Science and Technology, Vol. 4, No. 1, pp. 135-141, 2012.
106. Puneet K. Goel, Bhim Singh, S.S. Murthy, and Navin Kishore, "Modeling and Control of Isolated Hybrid System Using Wind driven DFIG and Hydro driven SCIG," European Transactions on Electrical Power Engineering, vol.22, no.2, pp.121-139, March 2012.
107. Shailendra Sharma and Bhim Singh, "Solid State Controller for an IAG Based Standalone Wind Energy Conversion System," International Journal of Sustainable Engineering, vol.5, no.2, pp.97-108, June 2012.
108. Venkata Srinivas Kadagala and Bhim Singh, "Two-level 24-Pulse Double-Way Voltage Source Converter Based STATCOM," Int. J. Power Electronics, vol. 4, no. 5, pp.433-446, 2012.
109. Gaurav Kumar Kasal and Bhim Singh, "Zig-zag Transformer for Neutral Current Compensation in an Isolated Wind Energy System," International Journal of Power and Energy Conversion (IJPEC), vol. 3, no.3/4, pp. 220-234, 2012.
110. Ashish Shrivastava and Bhim Singh, "Improved Power Quality Based Electronic Ballast for a Fluorescent Lamp with Constant DC Link Voltage," Asian Power Electronics Journal, vol. 6, no.1, pp. 11-16, October 2012.
111. Neha Adhikari, Bhim Singh and A.L. Vyas, "Design and Control of Small Power Standalone Solar PV Energy System," Asian Power Electronics Journal, vol. 6, no.1, pp. 17-24, October 2012.
112. Bhim Singh and Vashist Bist, "An Improved Power Quality IHQRR-BIFRED Converter Fed BLDC Motor Drive," Journal of Power Electronics (JPE), Vol. 13, No. 2, pp. 256-263, March 2013.
113. Vashist Bist and Bhim Singh, "A Reduced Sensor PFC BL-Zeta Converter Based VSI Fed BLDC Motor Drive," Electric Power Systems Research, vol. 98, pp.11-18, May 2013.
114. Yash Pal, A. Swarup and Bhim Singh, "A Comparative Analysis of Different Magnetics Supported Three-Phase Four-Wire Unified Power Quality Conditioners - a simulation study," International Journal of Electrical Power and Energy Systems, vol. 47, pp. 436-447, May 2013.
115. Bhim Singh and Vashist Bist, "Power Quality Improvement in PFC Bridgeless SEPIC Fed BLDC Motor Drive," International Journal of Emerging Electric Power Systems (DGIJEEPS), pp.1-12, June 2013.
116. Yogesh K. Chauhan, Sanjay K. Jain and Bhim Singh, "Operating Performance of Static Series Compensated Three-Phase Self-Excited Induction Generator," International Journal of Electrical Power and Energy Systems, vol.49, pp. 137–148, July 2013.
117. Yash Pal, A. Swarup and Bhim Singh, "Flexible Control of Single-Phase UPQC Using Frequency Domain Approach," International Journal on Electric Power Components and Systems, vol. 41, no. 11, pp. 401–412, August 2013.
118. Bhim Singh and Vashist Bist, "A Reduced Sensor Power Factor Corrected Bridgeless Flyback Converter Fed Brushless DC Motor Drive," International Journal on Electric Power Components and Systems, vol. 41, no. 11, pp. 1114–1128, August 2013.
119. Ashish Shrivastava and Bhim Singh, "Power factor-corrected DCM-based electronic ballast International Journal of Electrical Engineering, Springer-Verlag Berlin Heidelberg., Volume 95, Issue 4, pp 403-411, December 2013.
120. Gaurav Kumar Kasal and Bhim Singh, "Design and Control of Voltage Regulators for a Stand-alone Power Generation," IETE Technical Review, vol. 26, no.2, pp.115-136, March/April 2009.

121. Gaurav Kumar Kasal and Bhim Singh, "Stand-alone Wind Power Generation," Electrical India, vol. 49, no.4, pp.92-97, April 2009.
122. Bhim Singh and Gaurav Kumar Kasal, "Solid State Controller for Micro Hydro based Stand alone Power Generation," Journal of Institution of Engineers (India), vol. 90, pp.52-59, September 2009.
123. Ashish Shrivastava and Bhim Singh, "Boost PFC Electronic Ballast for 18 W Compact Fluorescent Lamp," International Journal of Engineering and Information Technology, Vol .2, No. 1, pp.25-29, 2010.
124. Sanjeev Singh and Bhim Singh, "Power Quality Improvement in a PMBLDCM Drive Using a Forward Buck Converter," International Journal of Engineering and Information Technology, Vol .2, No. 1, pp.30-36, 2010.
125. B. Singh, S.S. Murthy and S. Gupta, "Analysis and Design of an Improved Electronic Load Controller for Micro-Hydro Applications," Journal of Institution of Engineers (India), vol. 90, pp.3-11, March 2010.
126. Bhim Singh and Shailendra Sharma, "Instantaneous Reactive Power Theory Based Control for IAG with Integrated VSC in Wind Power Generation," Journal of Institution of Engineers (India), vol. 91, Pt.EL-1, pp.23-28, June 2010.
127. Bhim Singh and V. Rajagopal, "Decoupled Solid State Controller for Asynchronous Generator in Pico-Hydro Power Generation," IETE Journal of Research, vol. 56, no.3, pp.139-145, May/June 2010.
128. S. Singh and B. Singh, "Modelling Simulation and Design of Single-stage PFC Forward Boost Converter based Adjustable Speed PMBLDCM Drive for Small Air-conditioner," Journal of Institution of Engineers (India), vol. 91, pp.55-62, September 2010.
129. Sanjeev Singh and Bhim Singh, "Power Factor Correction in Permanent Magnet Brushless DC Motor Drive using Single-Phase Cuk Converter," Journal of Engineering Science and Technology (JESTEC), vol. 5, no. 4, pp. 412 - 425, Sept. 2010.
130. Kalpana Ramesh, G. Bhuvaneswari and Bhim Singh, "Power Quality Improvement in Switched Mode Power Supplies Using Auto-connected Transformer Based 9-phase ac-dc Converters," IETE Journal of Research, vol. 56, no.5, pp.270-285, September /October 2010.
131. Bhim Singh and V. Rajagopal, "SRF Theory Based Control of an Electronic Load Controller for an Isolated Asynchronous Generator Driven by Uncontrolled Pico Hydro Turbine," Journal of Systems Science & Engineering (JSSE), vol. 19, no. 3, pp.29-35, December 2010.
132. Bhim Singh and Sanjeev Singh, "An Improved Power Quality Drive for Air-Conditioners," Cooling India, vol. 49, no.4, pp.24-38, January/February 2011.
133. R S R Chilipi, B Singh and S S Murthy, "A New Three-Phase Four-Wire Integrated Voltage and Frequency Controller for a Self Excited Induction Generator Employing Water Pumping," Journal of Institution of Engineers (India), vol. 91, pp.3-10, June 2011.
134. Bhim Singh and V. Rajagopal, "Integrated Electronic Load Controller for Power Quality Improvement of Isolated Asynchronous Generator in Small Hydro Power Generation," Journal of Institution of Engineers (India), vol. 92, September 2011.
135. Gaurav Kumar Kasal and Bhim Singh, "T- Connected Transformer with a VSC for Voltage Control of an Isolated Asynchronous Generator," IETE Journal of Research, vol. 57, no.5, pp.430-436, September /October 2011.
136. Bhim Singh and Shailendra Sharma, "Neural Network Based Voltage and Frequency Controller for Isolated Wind Power Generation," IETE Journal of Research, vol. 57, no.5, pp. 467-477, September /October 2011.
137. Prerna Gaur, Bhim Singh and Alok Mittal, "Recurrent and Feedforward Neural Network Control of PMSM," IETE Journal of Research, vol. 57, no.6, pp.541-549,

November/December 2011.
138. Shailendra Sharma and Bhim Singh, “Wind Energy Conversion Systems,” Electrical India, January 2012.
139. Jeevanand S, Bhim Singh and B K Panigrahi, “A Modified PNN Based Algorithm for Detecting Turn Faults in Induction Machines,” IETE Journal of Research, Vol. 58, No. 4,pp. 300-309, July/August 2012.
140. Shikha Singh, G. Bhuvaneswari and Bhim Singh, “Improved Power Quality SMPS for Personal Computer Applications,” Journal of Institution of Engineers (India), Vol. 93, No.3, pp 151-161, September 2012.
141. Arun Kumar Verma, Bhim Singh and S.C. Kaushika, “A Standalone Solar Photovoltaic Power Generation using Cuk Converter and Single Phase Inverter,” Journal of Institution of Engineers (India), Vol. 94, No.1, pp 1-12, March 2013.
142. Bhim Singh and Vashist Bist, “DICM and DCVM of a PFC Based SEPIC Fed PMBLDCM Drive”, IETE Journal of Research, Vol. 59, No.2, pp. 141-149, March/April 2013.
143. Arun Kumar Verma, Bhim Singh and D.T Shahani, “Challenges in Solar Photo-Voltaic (SPV) Grid Integration in Urban Areas”, Electrical India, Vol. 53, No.10, pp. 60-79, October 2013.
144. D. Madhan Mohan, Bhim Singh, and B.K.Panigrahi, “HVDC Technology for Power Transmission” Electrical India Magazine, July-2008, pg. 46 – 64.
145. D. Madhan Mohan, Bhim Singh and B.K. Panigrahi, “Power quality improvement in HVDC systems using 18-pulse voltage source converter”, International Journal Power Electronics, Vol. 1, No. 3, 2009, pp. 333 – 346.
146. B K Panigrahi and V Ravikumar Pandi, “Optimal Feature Selection for Classification of Power Quality Disturbances Using Wavelet Packet based Fuzzy k-Nearest Neighbor Algorithm” IET Proceedings of Gen Trans and Distribution, Volume 3, Issue 3, March 2009, pp. 296-306.
147. B. K. Panigrahi and V. Ravikumar Pandi, “Congestion management using adaptive bacterial foraging algorithm, International Journal on Energy Conversion and Management, Vol 50, April 2009, pp. 1202 – 1209.
148. B.K. Panigrahi V. Ravikumar Pandi, Sanjoy Das, Swagatam Das , "Multiobjective fuzzy dominance based bacterial foraging algorithm to solve economic emission dispatch problem" Energy, Volume 35, Issue 12, December 2010, Pages 4761-4770
149. Ravikumar Pandi, V.,Biswas, A., Dasgupta, S.,Panigrahi, B.K., " A hybrid bacterial foraging and differential evolution algorithm for congestion management" , European Transactions on Electrical Power 20 (7) , 2010, pp. 862-871
150. Verma, A., Panigrahi, B.K., Bijwe, P.R., " Harmony search algorithm for transmission network expansion planning", IET Generation, Transmission and Distribution 4 (6) , , 2010, pp. 663-673
151. Verma, A., Panigrahi, B.K., & Bijwe, P.R. (2010). A Comparative study of Metaheuristic methods for transmission network expansion planning. International Journal of Applied Evolutionary Computation, 1(4), 71-79.
152. Verma, A., Bijwe, P.R., & Panigrahi, B.K. (2010). A combination of heuristic and bacteria foragingdifferential evolution algorithm for transmission network expansion planning with security constraints. International Journal of hybrid intelligent systems. 7(2), 101-113.

153. V Ravikumar Pandi, S K Sinha, Ankita Mohapatra, B K Panigrahi and Swagatam Das, “Optimal feature retrieval for classification of non-stationary Power Quality disturbances” Int. J. Artificial Intelligence and Soft Computing, Vol. 2, No. 3, 2010, p211 – 222.
154. B.K. Panigrahi, V. Ravikumar Pandi, Renu Sharma, Swagatam Das, Sanjoy Das, "Multiobjective bacteria foraging algorithm for electrical load dispatch problem" Energy Conversion and Management, Volume 52, Issue 2, February 2011, Pages 1334-1342
155. Soumya R. Mohanty, V. Ravikumar Pandi, B.K. Panigrahi, Nand Kishor, Prakash K. Ray , "Performance evaluation of distance relay with CT saturation Applied Soft Computing, Volume 11, Issue 8, December 2011, Pages 4789-4797
156. Ravikumar Pandi, V.,Panigrahi, B.K., " Dynamic economic load dispatch using hybrid swarm intelligence based harmony search algorithm", Expert Systems with Applications 38 (7) , 2011, pp. 8509-8514
157. Pandi, V.R., Panigrahi, B.K., Bansal, R.C., Das, S., Mohapatra, A., " Economic load dispatch using hybrid swarm intelligence based harmony search algorithm", Electric Power Components and Systems 39 (8) , 2011, pp. 751-767
158. Shrivastava, N.A.,Panigrahi, B.K., " A hybrid swarm-machine intelligence approach for day ahead price forecasting" , International Journal of Innovative Computing and Applications 3 (4) , 2011, pp. 177-187
159. Verma, A., Bijwe, P.R.,Panigrahi, B.K., " Rolling window based dynamic transmission network expansion planning", International Journal of Emerging Electric Power Systems 12 (4) , art. no. 2, 2011.
160. Ravikumar, V.P.,Panigrahi, B.K.,Mohapatra, A., Mallick, M.K., " Economic load dispatch solution by improved harmony search with wavelet mutation", International Journal of Computational Science and Engineering 6 (1-2) , 2011, pp. 122-131
161. Panigrahi, B.K., Pandi, V.R., Das, S., Cui, Z., Sharma, R., " Economic load dispatch using population-variance harmony search algorithm", Transactions of the Institute of Measurement and Control , Vol 34 , No 6, 2012 , pp. 746-754
162. Sudheer Ch, Nitin Anand, B.K. Panigrahi, Shashi Mathur , " Streamflow forecasting by SVM with quantum behaved particle swarm optimization Neurocomputing, In Press, Corrected Proof, Available online 12 September 2012,
163. R.R.Chilipi, B.Singh, S.S.Murthy, Sandeep M., G.Bhuvaneswari "STATCOM-VFD for Voltage and Frequency Control of Small-Hydro Driven SEIG System" Provisionally accepted for publication IET GTD, UK
164. R.R.Chilipi, B.Singh, S.S.Murthy, Sandeep M., G.Bhuvaneswari "Design and Implementation of Dynamic Electronic Load Controller for three-phase self-excited induction generator in remote small-hydro power generation" Accepted for publication in IET Renewable Power Generation UK.
165. Shikha Singh, G.Bhuvaneswari, Bhim Singh "Bridgeless Single Stage Flyback Converter Based Computer Power Supply" Accepted for publication in International Journal of energy technology policy, Inderscience Publishers.
166. Sarsing Gao, G.Bhuvaneswari, S.S.Murthy, Ujjwal Kalla "Efficient voltage regulation scheme for three-phase self-excited induction generator feeding single-phase loads in remote locations" Accepted for publication in IET Renewable Power Generation, UK.

167. Sandeep Madishetti, G.Bhuvaneswari and Bhim Singh "Improved Power Quality Converter for DTC Based Induction Motor Drives" Accepted for publication in IET Power Electronics UK.
168. G.Bhuvaneswari, Kalpana Ramesh and Bhim Singh "Three-Phase Modular Single Stage Full-Bridge Converter for Switched Mode Power Supplies" Accepted for publication in International Journal of Power Electronics, Vol.5, No.1,2013.
169. Shikha Singh, G.Bhuvaneswari, Bhim Singh "Analysis, design and control of a two stage improved power quality telecommunication power supply" International Journal of Power Electronics, Inderscience Publishers, Vol.4, No.6, 2012.
170. Kalpana P., G.Bhuvaneswari, Bhim Singh, Shikha Singh and Sanjay Gairola "Harmonic reduction in 20-pulse AC-DC converter based Switched Mode Power Supplies" Vol.60, Issue 10, IEEE Trans on IE, 2013 Pages: 4178-4190.
171. Shikha Singh, G.Bhuvaneswari, Bhim Singh, "Power quality improvement in Switched mode power supplies with two-stage DC-DC converters" International Journal of Engineering, Science and Technology, UK, Vol.4, No.1,2012, pp 55-64.
172. R.Kalpana, Bhim Singh, G.Bhuvaneswari "Direct Single Stage Power Converter with Power Factor Improvement for SMPS" Journal of Electrical Engineering and Technology Volume: 5 Issue: 3 Pages: 468-476 Published: SEP 2010.
173. R.Kalpana, G.Bhuvaneswari, Bhim Singh, Shikha Singh and Sanjay Gairola "A 28-Pulse AC-DC Converter based SMPS for Telecom Power Supply" IJEEPS, Vol.11 (August 2010) Issue 4, UCB Press, USA.
174. Sarsing Gao, S.S.Murthy, G.Bhuvaneswari and M.S.Lalitha Gayathri, "Design of Microcontroller based Electronic Load Controller for Self Excited Induction Generator supplying single-phase loads" JPE Vol 10, No 10, July 2010 pages 444-449.
175. Bhim Singh, G.Bhuvaneswari, R.Kalpana and Shikha Singh "A Harmonic Mitigator Based on 12-Pulse AC-DC Converter for SMPS" IET proceedings on PE , UK 2010, Vol. 3, Iss. 6, pp. 947–964.
176. Bhim Singh, G.Bhuvaneswari and R.Kalpana, "Autoconnected Transformer based 18-pulse AC-DC Converter for Power Quality Improvement in Switched Mode Power Supplies" IET proceedings on PE , UK, Vol.3, Issue 4, 2010, pages 525-541.
177. Bhim Singh, Vipin Garg, G.Bhuvaneswari, "24-Pulse AC-DC Converter for Harmonic Mitigation" IET-Power Electronics, July 2009, Vol. 2, Iss. 4, pp. 364–374 UK.
178. Shikha Singh, G.Bhuvaneswari and Bhim Singh " Improved Power Quality SMPS for Personal Computer Applications" Journal of IE(I), Springer India, January 2013 (published on-line).
179. R.Kalpana, Bhim Singh and G.Bhuvaneswari "Power Quality Improvement in Switched Mode Power Supplies Using Autoconnected Transformer Based Ninephase AC-DC Converter" IETE Journal of Research Vol.56, Issue 5, Sep/Oct 2010 Pages 270-285.
180. Hasmat Malik, Amit Kumar Yadav, Sukumar Mishra, Tarkeshwar Mehto, "Application of neuro-fuzzy scheme to investigate the winding insulation paper deterioration in oil-immersed power transformer", International Journal on Electrical Power and Energy System, Vol. 53, 2013, pp 256-271.
181. S. Mishra, D. Ramasubramanian, P. C. Sekhar, "A Seamless Control Methodology for a Grid Connected and Isolated PV-Diesel Microgrid", Accepted for publication in IEEE Transactions on Power Systems.
182. S. Mishra, G. Mallesham and P. C. Sekhar, "Biogeography Based Optimal State Feedback Controller for Frequency Regulation of a Smart Microgrid", IEEE Transactions on Smart Grid, Vol. 4, No. 1, March-2013, pp. 628–637.

183. S. Mishra, G. Mallesham, A. N. Jha, "Design of Controller and Communication for Frequency Regulation of a Smart Microgrid", IET Renew. Power Gener., Vol. 6, No. 4, July-2012, pp. 248–258
184. M. Tripathy, S. Mishra, "Interval Type-2 based Thyristor Controlled Series Capacitor to Improve Power System Stability" IET Generation, Transmission & Distribution, Vol. 5, No.2, Feb-2011, pp 209-222.
185. S. Shukla, S. Mishra, B. Singh, "Empirical Mode Decomposition with Hilbert Transform for Power Quality Assessment" IEEE Transactions on Power Delivery, Vol. 24, No. 4, Oct-2009, pp 2159-2165.
186. Y. Mishra, S. Mishra, M. Tripathy, N. Senroy, Z. Y. Dong, "Improving Stability of a DFIG based wind power system with tuned damping controller", IEEE Transactions on Energy Conversion, Vol. 24, No. 3, Sep-2009, pp 650-660.
187. S. Shukla, S. Mishra, B. Singh, "Power Quality Event Classification under Noisy Conditions using EMD based De-noising Techniques", Accepted in IEEE Transactions on Industrial Informatics.

Conference Papers: Total: 136 papers

1. K.Kaushik, D. Mishra, S.De, s.Basagni, W.heinzelman, K. Chowdhury, and S.Jana, "Experimental demonstration of multi-Hop RF energy transfer," in Proc. IEEE PIMRC, London, UK, Sep. 2013.
2. P.Gupta, K.Kaushik, S.De, and S.Jana, "Feasibility analysis on integrated recharging and data collection in pollution sensor networks," in Proc. Nat. Conf. Commun., New Delhi, Feb. 2013.
3. M.M.Vegad, S.De, and B.Lall, "Revisiting distributed transmit power control in ad hoc wireless networks with ODC capability," in Proc. Nat. Conf. Commun., New Delhi, India, Feb. 2013.
4. P.Mandal and S.De, "A new dynamic reservation protocol for many-to-one multi-access with long propagation delay," in Proc. VTC-Fall, Queback City, Canada, Sept. 2012.
5. P.Mandal and S.De, "On the Underwater Wireless Network Clustering," in Proc. Nat. Conf. Commun., Kharagpur, India, Feb. 2012.
6. A.Sharma, B.Panigrahi, and S.De, "Impact of interference on nodal communication range in wireless ad hoc networks," in Proc. Nat. Conf. Commun., Bangalore, India, Jan. 2011. [1 Google citation].
7. M.M.Vegad, S.De, and B.Lall, "A liberal carrier sensing for increased spatial reuse in multi-hop wireless ad hoc networks," in Proc. IEEE Intl. Conf. Commun. (ICC), Cape Town, South Africa, May 2010. [4 Google citations]
8. B.Panigrahi, S.De, B.S.Panda, and J.-D.Lan Sun. Luk, "Energy-efficient greedy forwarding protocol for wireless sensor networks," in Proc. IEEE Vehicular Tech. Conf. (VTC-Spring), Taipei, Taiwan, May 2010. [2 Google citations].
9. M.M.Vegad, S.De, and b.lall, "Mitigation of exposed terminals problem with differential capture capable receivers," in Proc. Nat. Conf. Commun., Chennai, India, Jan. 2010.
10. P.Mandal, S.De, and S.S. Chakraborty, "Characterization of Aloha in underwater wireless networks," in Proc. Nat. Conf. Commun., Chennai, India, Jan. 2010. [3 Google citations]

11. M.M. Vegad, S.De, and B.Lall, “Reconsideration of carrier sensing range for wireless ad hoc networks,” in Proc. IEEE Advances in Networks and Telecommuncation Systems (ANTS), New Delhi, India, Dec. 2009. (Best poster award) [2 Google citations]
12. B. Panigrahi, S.De, J.-D. Lan Sun Luk, “A greedy minimum energy consumption forwarding protocol for wireless sensor networks,” in Proc. Wksp. IAMCOM (in conjunction with COMSNETS), Bangalore, India, Jan. 2009. [5 Google citations]
13. Manjusha Bhave, S. Janardhanan and L. Dewan, "A Robust Third Order Sliding Mode Control of Rigid Underactuated Robotic Manipulator", Proc. International Conference on Control, Computing, Communication and Materials (ICCCCM-2013), Aug. 2013. doi : 10.1109/ICCCCM.2013.6648907
14. Neeli Satyanarayana, S. Janardhanan "Minimum Variance Functional Filtering for Multirate Sampled Systems", Proc. International Conference on Control, Computing, Communication and Materials (ICCCCM-2013), Aug. 2013. doi : 10.1109/ICCCCM.2013.6648906
15. S. A. Nahvi, M. Nabi and S. Janardhanan, "Adaptive sampling of nonlinear system trajectory for Model Order Reduction", Proc. International Conference on Modelling, Identification and Control (ICMIC 2012), pp. 1249-1255, Wuhan, China, June 2012.
16. Mohammad Abid Bazaz, Mashuq-un-Nabi and S. Janardhanan, "Two-step Reduction Procedure for Parametric Transient Electromagnetic Computations", Proc. International Conference on Modelling, Identification and Control (ICMIC 2012), pp. 1204-1209, Wuhan, China, June 2012.
17. Mohammad Abid Bazaz, Mashuq-un-Nabi and S. Janardhanan, "A Stopping Criterion for Krylov-subspace based Model Order Reduction Techniques", Proc. International Conference on Modelling, Identification and Control (ICMIC 2012), pp. 921-925, Wuhan, China, June 2012.
18. M. Agwan, S. Janardhanan and L. Dewan, "A Robust Higher Order Sliding Mode Control Of Rigid Robotic Manipulator", Proc. International Conference on Modelling, Identification and Control (ICMIC 2012), pp. 917-920, Wuhan, China, June 2012.
19. N. Satyanarayana and S. Janardhanan, "Linear Functional Observers for Systems with Delays in State Variables: A Multirate Output Sampling Approach", Proc. International Conference on Modelling, Identification and Control (ICMIC 2012), pp. 578-583, Wuhan, China, June 2012.
20. S. A. Nahvi, M. Nabi and S. Janardhanan, "A Quasi-linearisation approach to trajectory based methods for nonlinear MOR", Proc. International Conference on Modelling, Identification and Control (ICMIC 2012), pp. 217-222, Wuhan, China, June 2012.
21. Shahkar Ahmad Nahvi, Mashuq un Nabi, and S. Janardhanan, "Trajectory Based Methods for Nonlinear MOR: Review and Perspectives", 2012 IEEE International Conference on Signal Processing, Computing and Control (IEEE-ISPCC), Shimla, India, March 2012.doi: 10.1109/ISPCC.2012.6224366.
22. Mohammad Abid Bazaz, Mashuq un Nabi, and S. Janardhanan, "A Review of Parametric Model Order Reduction Techniques", 2012 IEEE International Conference on Signal Processing, Computing and Control (IEEE-ISPCC), Shimla, India, March 2012.doi: 10.1109/ISPCC.2012.6224356.
23. S. Janardhanan and N. Satyanarayana, ``Sliding Mode Control of Uncertain Systems using Multirate Output Feedback Functional Observer", Proc. 12th International Workshop on Variable Structure Systems (VSS2012), pp. 314--318, IIT Bombay, India, Jan. 2012
24. S. Janardhanan, M. Nabi and P. M. Tiwari, ``Attitude Control of Magnetic Actuated Spacecraft using Super-Twisting Algorithm with Nonlinear Sliding Surface", Proc. 12th International Workshop on Variable Structure Systems (VSS2012), pp. 46--51, IIT Bombay, India, Jan. 2012

25. Mohammad Abid Bazaz, Mazhuq-un-Nabi and S. Janardhanan,``Parametrized Model Order Reduction for Fast Transient Electromagnetic Simulations", Proc. 2012 International Conference on Power, Signals, Controls and Computation (EPSCICON), Trissur, India, Jan. 2012. doi: 10.1109/EPSCICON.2012.6175271.
26. S. Janardhanan and N. Satyanarayana, ``Functional Observer Design for Linear Uncertain Systems using Multirate Output Sampling", Proc. 2011 International Conference on Control, Robotics and Cybrnetics (ICCRC 2011), Vol. 1, pp. 61-65, New Delhi, India, Mar. 2011.
27. S. Janardhanan and N. Satyanarayana, ``Design of Multirate Output Feedback Sampling based Functional Observer and State Feedback", Proc. 2010 11th International Conference on Control, Automation, Robotics and Vision (ICARCV 2010), pp. 1297-1301, Singapore, Dec. 2010.
28. Pyare Mohan Tiwari, S. Janardhanan and Mashuq-un-Nabi, ``A Finite-time Convergent Continuous Time Sliding Mode Controller for Spacecraft Attitude Control", Proc. 11th International Workshop on Variable Structure Systems (VSS'10), pp. 399-403, Mexico City, Mexico, Jun. 2010.
29. M. Bhave, S. Janardhanan and L. Dewan, ``A Third Order Sliding Mode Control of Three Link Rigid Robotic Manipulator with Friction and Uncertainties", Proc. National Conference on Recent Trends in Energy, Systems and Control, National Institute of Technology Kurukshetra, Mar. 2013.
30. Bhim Singh and V. Rajagopal, "SRF Theory Based Control of an Electronic Load Controller for an Isolated Asynchronous Generator Driven by Uncontrolled Pico Hydro Turbine," in Proc. of Joint International Conference on Applied Systems Research and XXXIII National Systems Conference (ASR-NSC 2009), held at DEI, Dayalbagh Agra, India from Nov. 27-29, 2009.
31. Sanjeev Singh and Bhim Singh, "PFC Push-Pull Converter for PMBLDCM Driven Air-Conditioner," in Proc. of Joint International Conference on Applied Systems Research and XXXIII National Systems Conference (ASR-NSC 2009), held at DEI, Dayalbagh Agra, India from Nov. 27-29, 2009.
32. Sanjeev Singh and Bhim Singh, "Power Quality Improvement in a PMBLDCM Drive using a Forward Buck Converter," in Proc. National Conf. on Recent Advances on Computational Techniques in Electrical Engineering, held at SLIET Longowal (India), 19-20 March 2010, paper 3023, pp.1-7.
33. Ashish Shrivastava and Bhim Singh, "Boost PFC Electronic Ballast for 18 W Compact Fluorescent Lamp," in Proc. National Conf. on Recent Advances on Computational Techniques in Electrical Engineering, held at SLIET Longowal (India), 19-20 March 2010, paper 3023, pp.1-5.
34. Ashish Shrivastava and Bhim Singh, "Zeta Converter Based Power Factor Corrected Electronic Ballast," in Proc. of 4th National Power Electronics Conference, NPEC-2010, held at IIT Roorkee, June 10-13, 2010.
35. Sanjeev Singh and Bhim Singh, "Voltage Controlled Push-Pull Converter based PFC Drive for PMBLDC Motors," in Proc. of 4th National Power Electronics Conference, NPEC-2010, held at IIT Roorkee, June 10-13, 2010.
36. K. Venkata Srinivas, Bhim Singh, Ambrish Chandra and Kamal-Al-Haddad, "New Control Strategy of Two-Level 12-Pulse VSCs Based STATCOM using Hybrid Fuzzy-PI Controller," in Proc. of 4th National Power Electronics Conference, NPEC-2010, held at IIT Roorkee, June 10-13, 2010.

37. Alka Singh and Bhim Singh, "An Application of Iterative Learning Control Applied to Distribution Static Compensator System," in Proc. of 4th National Power Electronics Conference, NPEC-2010, held at IIT Roorkee, June 10-13, 2010.
38. V Rajagopal and Bhim Singh, "Electronic Load Controller for Islanded Asynchronous Generator in Pico Hydro Power Generation," in Proc. of 4th National Power Electronics Conference, NPEC-2010, held at IIT Roorkee, June 10-13, 2010.
39. V Sheeja, P Jayaprakash, Bhim Singh and R Uma, "VF Controller for Stand Alone Wind Energy Conversion System Employing PMBL Generator," in Proc. of 16th National Power System Conference (NPSC), held at Department of Electrical Engineering, Univ. College of Engg., Osmania University, Hyderabad, A.P, India. From 15^{th} – 17^{th} Dec. 2010, pp. 80-85.
40. Yash Pal, A. Swarup and Bhim Singh, "A Comparison of Three Topologies of Three-Phase Four-Wire UPQC for Power Quality Improvement," in Proc. of 16th National Power System Conference (NPSC), held at Department of Electrical Engineering, Univ. College of Engg., Osmania University, Hyderabad, A.P, India. From 15^{th} – 17^{th} Dec. 2010, pp. 227-232.
41. D. Madhan Mohan, Bhim Singh and B. K. Panigrahi, "Dynamic Control and Power Quality Improvement of HVDC System Using Three-Level Double Bridge Voltage Source Converter," in Proc. of 16th National Power System Conference (NPSC) , held in Hyderabad (India) from 15^{th} – 17^{th} Dec. 2010, PP. 380-385.
42. Sanjeev Singh and Bhim Singh, "Voltage Controlled PFC Forward Converter Fed PMBLDCM Drive for Air-Conditioner," in Proc. of 16th National Power System Conference (NPSC), held at Department of Electrical Engineering, Univ. College of Engg., Osmania University, Hyderabad, A.P, India. From 15^{th} – 17^{th} Dec. 2010, pp. 417-422.
43. Shailendra Sharma and Bhim Singh, "Performance Evaluation of Asynchronous Generator Based Islanded Wind Energy Conversion System," in Proc. of 16th National Power System Conference (NPSC), held in Hyderabad (India) from 15^{th} – 17^{th} Dec. 2010, PP. 589-596.
44. Yash Pal, A. Swarup and Bhim Singh, "Applications of UPQC for Power Quality Improvement," in Proc. of 16th National Power System Conference (NPSC), held at Department of Electrical Engineering, Univ. College of Engg., Osmania University, Hyderabad, A.P, India. From 15^{th} – 17^{th} Dec. 2010, pp. 772-777.
45. Shikha Singh, G. Bhuvaneswari and Bhim Singh, "Design and Control of Single Ended Primary Inductance Converter Based SMPS," in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal (India) from Feb. 25-26, 2011, PP. 27-32.
46. Gaurav Kumar Kasal and Bhim Singh, "Line to Phase Voltage Transformations in an Isolated Generating System," in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal (India) from Feb. 25-26, 2011, PP. 51-54.
47. Yash Pal, A. Swarup and Bhim Singh, "Star-polygon Transformer Supported Three-leg VSIs based Three-Phase Four-Wire UPQC," in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal(India) from Feb. 25-26, 2011, PP. 55-61.
48. Neha Adhikari, Bhim Singh and A.L.Vyas, "Modeling and Control of Stand-Alone Solar-PV Power Generating System," in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal(India) from Feb. 25-26, 2011, PP. 62-67.

49. Ashish Shrivastava and Bhim Singh, "Power Factor Regulated Electronic Ballast Operating in DCM," in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal (India) from Feb. 25-26, 2011, PP. 68-72.
50. Shailendra Sharma and Bhim Singh, "Stand-alone Wind Energy Conversion System with a Doubly Fed Induction Generator," in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal (India) from Feb. 25-26, 2011, PP. 133-139.
51. R. Kalpana, Bhim Singh and G. Bhuvaneswari, "A Three-Phase Modular AC-DC Converter with Power Factor Improvement for Telecommunication Systems," in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal (India) from Feb. 25-26, 2011, PP. 405-410.
52. Arun Kumar Verma, Bhim Singh and D.T. Shahani, "Grid to Vehicle and Vehicle to Grid Energy Transfer using Single-Phase Half Bridge Boost AC-DC Converter and Bidirectional DC-DC Converter," in Proc. of National Conference on Emerging Trends in Electrical and Electronics Engineering (ETEEE-2011), held in KNIT Sultanpur (India) from November 26-27, 2011.
53. Shikha Singh, G. Bhuvaneswari and Bhim Singh, "Power quality improvement in switched mode power supplies using two stage DC-DC converter," in Proc. of National Conference on Emerging Trends in Electrical and Electronics Engineering (ETEEE-2011), held in KNIT Sultanpur (India) from November 26-27, 2011.
54. Bhim Singh and Shailendra Sharma, "PMBLDCG Based Stand-alone Wind Energy Conversion System for Small Scale Applications," in Proc. of National Conference on Emerging Trends in Electrical and Electronics Engineering (ETEEE-2011), held in KNIT Sultanpur (India) from November 26-27, 2011.
55. Bhim Singh and Sabha Raj Arya, "Design and Control of a DSTATCOM for Power Quality Improvement Using Cross Correlation Function Approach," in Proc. of National Conference on Emerging Trends in Electrical and Electronics Engineering (ETEEE-2011), held in KNIT Sultanpur (India) from November 26-27, 2011.
56. Ashish Shrivastava and Bhim Singh, "Improved Power Quality Based High Brightness LED Lamp Driver," in Proc. of National Conference on Emerging Trends in Electrical and Electronics Engineering (ETEEE-2011), held in KNIT Sultanpur (India) from November 26-27, 2011.
57. Yash Pal, A. Swarup and Bhim Singh, "Single-phase Synchronous d-q Reference Frame Controller for Single-Phase UPQC," in Proc. of 35th National Systems Conference 2011, NSC-2011, to be held during 9-11 December, 2011, at Indian Institute of Technology Bhubaneswar, (India).
58. Shailendra Sharma and Bhim Singh, "Stand-alone Variable Speed Wind Energy Conversion System with Squirrel Cage Induction Generator and Battery Storage," in Proc. of Centenary Conference 2011 to be held during 15-17 December, 2011, at Electrical Engineering, Indian Institute of Science, Bangalore, (India).
59. S. S. Murthy, Bhim Singh and V Sandeep, "Design and Development of a Novel Single-Phase Self-Excited Induction Generator for Bio-Energy based Power Generation," in Proc. of Centenary Conference 2011 to be held during 15-17 December, 2011, at Electrical Engineering, Indian Institute of Science, Bangalore, (India).
60. Alka Singh and Bhim Singh, "Simplified Control and Performance Evaluation of Converter Interfaced Distribution Resources," in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).

61. Shikha Singh, G. Bhuvaneswari and Bhim Singh, "Two Stage DC-DC Converter Based Multiple Output Switched Mode Power Supplies," in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).
62. Bhim Singh and Shailendra Sharma, "Voltage and Frequency Controller with Maximum Power Tracking for PMSG Based Stand-alone Wind Energy Conversion Systems," in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).
63. Sabha Raj Arya and Bhim Singh, "MWLSE Control Algorithm of a DSTATCOM for Power Quality Improvement," in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).
64. Swati Narula, Bhim Singh and G. Bhuvaneswari, "Power Quality Improvement Using A Two-Stage Converter for Welding Power Supply," in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).
65. Ashish Shrivastava and Bhim Singh, "Power Factor Corrected Zeta Converter Based LED Lamp Driver for Lighting Systems," in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).
66. Peeyush Pant,Vishal Verma, Bhim Singh, "Power Generation for Isolated Applications Using Wind Turbine by Indirect Current Control of Doubly-fed Induction Generator," in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).
67. Shailendra Sharma and Bhim Singh, "Solid State Controller for Permanent Magnet Synchronous Generator Based Standalone Wind Energy Conversion System," in Proc. of 5th National Power Electronics Conference, NPEC-2011, held during 19-22 December, 2011, Howrah, (India).
68. Bhim Singh and Sabha Raj Arya, "A New Isolated Topology of DSTATCOM with unipolar switching," in Proc. of 17th National Power System Conference (NPSC), held at Department of Electrical Engineering, IIT BHU, Varanasi, U.P., India, on 15th – 17th Dec. 2012.
69. Bhim Singh and V. Rajagopal, "Synchronous Detection method based decoupled voltage and frequency controller for isolated asynchronous generator," in Proc. of 17th National Power System Conference (NPSC), held at Department of Electrical Engineering, IIT BHU, Varanasi, UP, India, on 15th–17th Dec. 2012.
70. Bhim Singh and Ashish Shrivastava, "Single stage single switch power supply (S4PS) design for low power HB-LED Lighting," in Proc. of 17th National Power System Conference (NPSC), held at Department of Electrical Engineering, IIT BHU, Varanasi, U.P., India, on 15th – 17th Dec. 2012.
71. Bhim Singh and Shailendra Sharma, "Stand-alone wind energy conversion system feeding single-phase loads," in Proc. of 17th National Power System Conference (NPSC), held at Department of Electrical Engineering, IIT BHU, Varanasi, U.P., India, on 15th – 17th Dec. 2012.
72. Chinmay Jain, and Bhim Singh, "A Frequency Shifter Based Simple Control for Solar PV Grid Interfaced System," in Proc. of 37th National Systems Conference (NSC-2013), held at Indian Institute of Technology Jodhpur,, India, on 05-07 December, 2013.
73. Bhim Singh, Vashist Bist, Ambrish Chandra and Kamal Al-Haddad, "Sensor Reduction in a PFC Based Isolated BL-SEPIC Fed BLDC Motor Drive," in Proc. of 37th National Systems Conference (NSC-2013), held at Indian Institute of Technology Jodhpur, India, on 05-07 December, 2013.

74. Bhim Singh, Sabha Raj Arya, Chinmay Jain, Sagar Goel, Ambrish Chandra and Kamal Al-Haddad, "Application of Voltage Source Converter for Power Quality Improvement," in Proc. of 37th National Systems Conference (NSC-2013), held at Indian Institute of Technology Jodhpur, India, on 05-07 December, 2013.
75. Shailendra Sharma and Bhim Singh, "A Control Strategy for PMSG Based Standalone WECS to feed Single-Phase Loads," in Proc. of Sixth National Power Electronics Conference (NPEC-2013), held at Indian Institute of Technology Kanpur, India, on 20-23 December, 2013.
76. Vashist Bist and Bhim Singh, "A Reduced Sensor PFC-Based Isolated BL-Cuk Converter Fed BLDC Motor Drive," in Proc. of Sixth National Power Electronics Conference (NPEC-2013), held at Indian Institute of Technology Kanpur, India, on 20-23 December, 2013.
77. Bhim Singh, G.Bhuvaneswari and Swati Narula, "Welding Power Supply with Improved Power Quality Using Sheppard-Taylor Converter" Accepted for presentation in IEEE International Conference Indicon December 2013.
78. Shikha Singh, Bhim Singh, G.Bhuvaneswari, Vashist Bist, Kamal Al Haddad, Ambrish Chandra "Power Quality Improved bridgeless converter based multiple output SMPS" Accepted for presentation in IEEE Industrial Applications Society Annual Meeting 2013 Orlando Florida USA October 2013.
79. Shikha Singh, G.Bhuvaneswari and Bhim Singh "Improved Power Quality Based bridgeless multiple output power supply" Presented in IEEE International Conference ICCCI, Jan 2013.
80. R.Kalpana, G.Bhuvaneswari, Bhim Singh " Unity Power Factor Operation of Three-Phase AC-DC Converter Based on Modular Approach for Telecom Applications" Accepted for presentation in IEEE PEDES Conference Dec 2012.
81. G.Bhuvaneswari, Bhim Singh, Shikha Singh "Three-phase single stage medium power supply using Cuk converter" Presented in the IEEE International Conference IICPE, Dec 2012.
82. G. Bhuvaneswari, Bhim Singh, Swati Narula "Three-Phase Push-Pull Modular Converter Based Welding Power Supply with Improved Power Quality" Presented in the IEEE International Conference IICPE, Dec 2012.
83. Bhim Singh, Shikha Singh, G.Bhuvaneswari "Boost full bridge dc-dc converter based modular converter for telecom power supplies" Presented in IEEE Power India Conference Dec 2012.
84. Bhim Singh, Swati Narula, G. Bhuvaneswari "Power Quality Improvement Using Three Phase Modular Converter for Welding Power Supply" Presented in IEEE Power India Conference, Dec 2012.
85. Swati Narula, G. Bhuvaneswari, Bhim Singh, " A Modular Converter for Welding Power Supply with Improved Power Quality" Presented in IEEE PEDES Conference, Dec 2012.
86. Shikha Singh, G.Bhuvaneswari, Bhim Singh " A Power factor Corrected Two Stage Switched Mode Power Supply" Presented in IEEE PEDES Dec 2012.
87. G.Bhuvaneswari., Bhim Singh, Sandeep M "Three-Phase, Two-Switch PFC Rectifier Fed Three-Level VSI Based FOC of Induction Motor Drive" Presented in IEEE Power India Conference Dec 2012.
88. Bhim Singh, Shikha Singh and G.Bhuvaneswari "Analysis and Design of a Zeta Converter Based Three-Phase Switched Mode Power Supply" Presenetd in IEEE Conference CICN, Nov 2012.
89. R.Kalpana, G.Bhuvaneswari and B.Singh "High Performance Improved Three-Phase Power Converter for Telecom Power Systems" Presented in IEEE Conference on Advances in Power Conversion and Energy Technologies, August 2-4 2012.

90. Bhim Singh, G.Bhuvaneswari, Sandeep M., "Power Quality Improvement in DTC based Induction Motor drive using Minnesota Rectifier" IEEE International conference on ICPS, 2011.
91. Shikha Singh, G.Bhuvaneswari and Bhim Singh "Power Quality Improvement in Telecommunication Power supply System Using Buck Rectifier" Presented in IEEE Conference INDICON 2011.
92. Bhim Singh, G.Bhuvaneswari, Sandeep M., "Power Quality Improvemen in DTC based Induction Motor drive using Minnesota Rectifier" Presented in IEEE International conference on ICPS, 2011.
93. G. Bhuvaneswari, R Kalpana and Bhim Singh. "Single Stage Modular Converter with Power Factor Improvement for Telecom Power Supply" Presented in IEEE International conference PEDES Dec 2010.
94. G. Bhuvaneswari, S. S. Murthy, Sarsing Gao and Rajesh Kr. Ahuja. "A new method to determine saturated magnetizing reactance and frequency of a single-phase self excited induction generator towards steady state analysis" Presented in IEEE International conference PEDES Dec 2010.
95. Shikha Singh, G.Bhuvaneswari and Bhim Singh "Power Quality Improvements in Multiple Output Switched Mode Power Supplies" Presented in IEEE International Conference IICPE, Jan 2011.
96. Kalpana R., Bhim Singh G.Bhuvaneswari, "A 12kW Three-Phase Modular Converter with Unity Power Factor for Telecom Power Supplies" Presented in IEEE International Conference IICPE, Jan 2011.
97. Shikha Singh, G. Bhuvaneswari and Bhim Singh. "Design, Modeling, Simulation and Performance of a Multiple Output SMPS Fed From a Universal Standard Single-Phase Outlet " Presented in IEEE International conference PEDES Dec 2010.
98. S. S. Murthy, G. Bhuvaneswari, Sarsing Gao and Rajesh Kumar Ahuja "Self Excited Induction Generator for Renewable Energy Applications to Supply Single phase Loads in Remote Locations" Presented in IEEE International conference on Sustainable Energy Technologies, Sri Lanka, December 2010.
99. Shikha Singh, G.Bhuvaneswari and Bhim Singh "Multiple output SMPS with improved input power quality" Presented in the IEEE Conference ICIIS in NIT Surathkal July 29-August 1, 2010.
100. S.S.Murthy, Ujjwal K.Kalla, G.Bhuvaneswari "A novel electronic controller implementation for voltage regulation of single phase self-excited induction generator" Presented in IEEE IAS Annual General Meeting October 2010 Texas, USA.
101. S.S.Murthy, G.Bhuvaneswari, Rajesh K.Ahuja and Sarsing Gao""A Novel MATLAB Graphical User Interface Based Methodology For Analysis, Design And Capacitor Estimation Of Self Excited Induction Generators" Presented in IEEE IAS Annual General Meeting October 2010 Texas, USA.
102. G.Bhuvaneswari and G.Somasundaram "Reduction of Neutral Current in Airport Lighting System" Presented in IEEE IAS Annual General Meeting October 2010 Texas, USA.
103. Shikha Singh, G.Bhuvaneswari, Bhim Singh, "Improved Power Quality Based Switched Mode Power Supplies Using Two Stage DC-DC Converter" Accepted for presentation in the NEEC-2011, DTU, New Delhi, Dec 2011.
104. Swati Narula, Bhim Singh an G.Bhuvaneswari "Power quality improvement using a two-stage converter for Welding Power Supply" Accepted for presentation in the NEEC-2011, DTU, New Delhi, Dec 2011.
105. Shikha Singh, G,Bhuvaneswari, Bhim Singh "Improved Power Quality Based Switched Mode Power Supplies Using Two Stage DC-DC Converter" National Conference on

Emerging trends in Electrical & Electronics Engineering 2011 (ETEEE 2011), KNIT Sultanpur, Nov 25-26, 2011.

106. R.Kalpana, Bhim Singh and G.Bhuvaneswari "A Three-Phase Modular AC-DC Converter with Power Factor Improvement for Telecommunication Systems" Presented in National Conference on "Recent Advances in Computational Techniques in Electrical Engineering", Feb 25-26, 2011, Sant Longowal Institute of Engineering & Technology, Longowal, Punjab.
107. Shikha Singh, G.Bhuvaneswari and Bhim Singh "Design and Control of Single Ended Primary Inductance converter based SMPS" Presented in National Conference on "Recent Advances in Computational Techniques in Electrical Engineering", Feb 25-26, 2011, Sant Longowal Institute of Engineering & Technology, Longowal, Punjab.
108. G. Mallesham, S. Mishra, A. N. Jha, "Maiden Application of Ziegler-Nichols Method to AGC of Distributed Generation System", IEEE PSCE 2009, Seattle, March 15-19, 2009.
109. J. Nanda, S. Mishra, P. G. Mishra, K. V. Sajith "A novel classical controller for automatic generation control in thermal and hydrothermal systems", Power Electronics, Drives and Energy Systems (PEDES) & 2010 Power India, 2010 Joint International Conference on , India, Dec 20-23, 2010.
110. S. Shukla, S. Mishra, B. Singh, "TS fuzzy based intelligent control of a three phase shunt filter under balanced and unbalanced conditions", Power Electronics, Drives and Energy Systems (PEDES) & 2010 Power India, 2010 Joint International Conference on , India, Dec 20-23, 2010.
111. S. S. Murthy, S. Mishra, G. Mallesham, P. C. Sekhar, "Voltage and Frequency control of wind diesel hybrid system with variable speed wind turbine" Power Electronics, Drives and Energy Systems (PEDES) & 2010 Power India, 2010 Joint International Conference on , India, Dec 20-23, 2010.
112. G. Mallesham, S. Mishra, A. N. Jha, "Ziegler-Nichols based Controller Parameters Tuning for Load Frequency Control in a Microgrid", International Conference on Energy, Automation and Signal, Bhubaneswar, Orissa, India, Dec 28-30, 2011.
113. S. Mishra, P. C. Sekhar, "Sliding mode based feedback linerizing controller for a PV system to improve the performance under grid frequency variation", International Conference on Energy, Automation and Signal, Bhubaneswar, Orissa, India, Dec 28-30, 2011.
114. G. Mallesham, S. Mishra, A.N. Jha, "Automatic generation control of microgrid using artificial intelligence techniques", IEEE PES General Meeting, San Diego, USA, July 22-26, 2012.
115. S. Mishra, P. C. Sekhar, "Ts fuzzy based adaptive perturb algorithm for MPPT of a grid connected single stage three phase VSC interfaced PV generating system", IEEE PES General Meeting, San Diego, USA, July 22-26, 2012.
116. P. P. Zarina, S. Mishra, P. C. Sekhar, "Photovoltaic system based transient mitigation and frequency regulation", IEEE PES General Meeting, Vancouver, Canada, July 21-25, 2013.
117. Prabhmandeep Kaur, V.K. Jain and Subrat Kar, "Performance of free space optical links under various weather conditions and optical turbulence" International Conference on Emerging Technologies in Electronics and Communication (ICETEC) held during 20-22 December 2013 at GNDU, Amritsar, Awarded with "Best Paper Award" and received Certificate of Excellence.

118. A. Mitra, A. Lord, S.Kar, P.Wright, “Effect of Link Margin and Frequency Granularity on the Performance of a Flexgrid Optical Network” in Proceedings of European Conference and Exhibition on Optical Communication (ECOC)(London,2013), paper We.2.E.3.
119. P. Gopal, V. K. Jain, S. Kar, "Performance Comparison of PIN and APD based FSO Satellite Systems for various Pulse Modulation Schemes in Atmospheric Turbulence", Ninth International Conference on Wireless Communications, Networking and Mobile Computing (WiCOM-2013), Beijing, China, 22-24 September 2013
120. Sarangi, Sanat; Kar, Subrat; , "Wireless Sensor Knowledge Archive," Electronics, Computing and Communication Technologies (CONECCT), 2013 IEEE International Conference on , vol., no., pp.1-6, 17-19 Jan. 2013 doi: 10.1109/ CONECCT. 2013. 6469315 keywords: {Internet of Things;REST;Sensor Networks;Web Service; Wisekar;} URL:http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6469315&isnumber=6469280
121. P. Gopal, V. K. Jain, and S. Kar, "Performance Analysis of Ground to Satellite FSO System with DAPPM Scheme in Weak Atmospheric Turbulence," in *International Conference on Fibre Optics and Photonics*, OSA Technical Digest (online) (Optical Society of America, 2012), paper WPo.43. http://www.opticsinfobase.org/abstract.cfm?URI=Photonics-2012-WPo.43
122. P. Gopal, V.K.Jain, S.Kar, “Performance Analysis of Ground to Satellite FSO System with DAPPM Scheme in Weak Atmospheric Turbulence,”, Chennai, India Photonics 2012, Dec 9-11 2012 [POSTER/# 1507579]
123. P.Govindraj, S.Kar, H.M.Gupta “RESTful Platform Broker: A Novel Framework for Engineering Programmable Smart Spaces”, ThinkMind // SMART 2012, Proc of the the First International Conference on Smart Systems, Devices and Technologies, May 27-June 1, 2012, Stuttgart, Germany, pp.35-43.
124. Nikhilesh Mehta, H.Kaushal, V.K.Jain, S.Kar “Effects of turbulence on beam propagation in an OTG chamber and transmitted beam width optimization” is accepted in Spring International Conference on Electronics and Electrical Engineering (organized by 2012 Spring World Congress on Engineering and Technology (SCET-2012)) Xi'an, China, May 2012.
125. Nikhilesh Mehta, H.Kaushal, V.K.Jain, S.Kar “Performance improvement techniques for optical wireless link in presence of atmospheric turbulence” accepted in International Conference on Wireless and Optical Communication (ICWOC 2012), Zhengzhou, China, June 2012.
126. S. Sarangi, S. Kar, “Genetic Algorithm based Mobility Aware Clustering for Energy Efficient Routing in Wireless Sensor Networks ”, 7th IEEE Intl Conf. on Networks (ICON 2011),14 - 16 Dec, 2011, Singapore
127. Saurabh Gupta, Subrat Kar, S.Dharmaraja "WHOP: Wormhole Attack Detection Protocol using Hound Packet" ”, 7th Intl Conf. on Innovation in IT (http://www.it-innovations.ae/iit10/index.html), Abu Dhabi (UAE), 25 to 27 April 2011
128. Saurabh Gupta, S.Dharmaraja, Subrat Kar, "Mitigation of Wormhole Attack in Wireless Adhoc Network" ”, Intl. Conf. on Recent Trends in information Technology, ICRTIT 2011, Anna University, 3-5 June 2011, Chennai
129. Pramod, V.; Subrat, Kar; , "Design of a FlexRay based embedded platform for development of safety monitoring applications for automobiles," Recent Trends in Information Technology (ICRTIT), 2011 International Conference on , vol., no., pp.354-359, 3-5 June 2011, doi: 10.1109/ICRTIT.2011.5972292 URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5972292&isnumber=5972241

130. S.Sarangi, S.Kar, "A novel algorithm for graded precision localization in wireless sensor networks", *1st Intl Conf on Networks and Communications, NetCoM 2009* , 2009, art. no. 5384022, pp. 18-22.
131. Hemani Kaushal, V.K.Jain, Subrat Kar, " Improvement of Ground to Satellite FSO Link Performance Using Transmit Diversity in Weak Atmopheric Turbulence ", International Conference on Intelligent and Advanced Systems (ICIAS2010), Universiti Petronas, Kualalumpur - Accepted/ Paper No #1569275317
132. Hemani Kaushal, V.K.Jain, Subrat Kar, "Acquisition Time for Laser Uplink Communication to Space-borne Satellite Using Transmit Diversity in Atmospheric Turbulence", submitted to ICFCC2010 Intl Conf on Future Computer and Communication May 21-24, Wuhan, China (Ref: Manuscript ID 374 submitted on 09 Jan 2010; **accepted on** 3 Feb 2010)
133. S.Velmurugan, S.Chaudhury, Subrat Kar, "Automated BCS scoring system using Template Matching by Bayesian Sequential Hypothesis", presented at The First North American Conference on Precision Dairy Management, Toronto, Canada, March 2-5, 2010 (Accepted: paper #2230)
134. Hemani Kaushal, V.K.Jain,Subrat Kar, "Performance of Ground to Deep Space Optical Link in The Presence of Atmospheric Turbulence Using Spatial Diversity Techniques", IICOP 2009, CSIO, Chandigarh, India, Oct 30 – Nov 1 2009 (Presented)
135. Hemani Kaushal, V.K.Jain,Subrat Kar, "Effect of atmospheric turbulence on acquisition time of ground to deep space optical communication", WASET, Vol.38 , pp.792-796,Feb 2009 (Presented), China
136. Hemani Kaushal Sharma, S.Kar, V.K.Jain, "Atmospheric turbulence effect on acquisition time of ground to satellite optical communication system", International Symposium on Optical Engineering and Photonic Technology (OEPT 2009), 2nd International Multi-Conference on Engineering and Technological Innovation (IMETI 2009), Orlando, USA, July 10-13, 2009 .

(b) M.Tech/MS(R) Students

Journal Papers: Total: 22 papers

1. C.Singhal, S.Kumar, S.De, N.Panwar, R.Tonde and P.De, "Class-based Shared Resource Allocation for Cell-Edge Users in OFDMA Networks," (accepted, IEEE Trans. Mob.Comput. Sept. 2012).
2. S.De and R.Singhal, "Towards uninterrupted operation of wireless sensor networks," IEEE Computer Mag., Vol.45, No.9, pp. 24-30, Sep. 2012.
3. R.K.Reddy, S.De, H.M.Gupta, "Joint control of transmit power and frame size for energy-optimized data transfer in wireless sensor networks," IEICE Trans. Commun., Spl. Section on Implementation, Experiments, and Practice for Ad Hoc and mesh Networks, vol. E93-B, no.8, pp.2043-2052, Aug. 2010. [5 Google citation].
4. S. Janardhanan and Rajesh Tiwari, "Controller design of Twin Spool Gas Turbine using Reduced Output Feedback Sliding Mode Control", IETE Journal of Research, Vol. 58, Issue. 5, pp. 367-374, Sep-Oct., 2012.
5. Bhim Singh, P Jayaprakash, T R Somayajulu and D P Kothari, "Reduced Rating VSC with a Zig-Zag Transformer for Current Compensation in Three-Phase Four-Wire Distribution System," IEEE Trans. on Power Delivery,vol.24, no.1, pp.249-259, January 2009.
6. Bhim Singh and Jitendra Solanki, "A Comparison of Control Algorithms for

DSTATCOM," IEEE Transactions on Industrial Electronics, vol. 56, no. 7, pp.2738-2745, July 2009**.**

7. Bhim Singh and Jitendra Solanki, "An Implementation of an Adaptive Control Algorithm for a Three-Phase Shunt Active Filter," IEEE Transactions on Industrial Electronics, vol. 56, no. 8, pp.2811-2820, August 2009**.**
8. Bhim Singh, Sanjeev Singh and S.P. Hemanth Chender, "Power quality improvement in load commutated inverter-fed synchronous motor drives," IET Power Electronics, vol. 3, no.3, pp.411-428, May 2010.
9. Bhim Singh, Sanjeev Singh, and S.P. Hemanth Chender, "Harmonics Mitigation in LCI Fed Synchronous Motor Drives," IEEE Transactions on Energy Conversion, Vol. 25, No. 2, pp. 369-380, June 2010.
10. Bhim Singh and Jitendra Solanki, "Load Compensation for Diesel Generator Based Isolated Generation System Employing DSTATCOM," IEEE Transactions on Industry Applications, vol.47, no.1, pp.238-244, January/February 2011.
11. Bhim Singh, P Jayaprakash, Sunil Kumar and D P Kothari, "Implementation of Neural Network Controlled Three Leg VSC and a Transformer as Three Phase Four Wire DSTATCOM," IEEE Transactions on Industry Applications, Vol. 47, No. 4,pp. 1892-1901, July/August 2011.
12. Vijay Chand Ganti, Bhim Singh, Shiv Kumar Aggarwal, and Tara Chandra Kandpal, "DFIG-Based Wind Power Conversion with Grid Power Leveling for Reduced Gusts," IEEE Transactions on Sustainable Energy, Vol. 3, No. 1, pp. 12-20, January 2012.
13. Bhim Singh, Sabha Raj Arya, Chinmay Jain, and Sagar Goel, "Implementation of Four Leg Distribution Static Compensator," Accepted for publication in IET Generation, Transmission & Distribution.
14. Bhim Singh and Ganesh Dutt Chaturvedi, "Efficient Switch Mode Power Supply Design with Minimum Components for 5W Output Power," Journal of Electrical Engineering & Technology, vol.4, no.1, pp. 79-86, March 2009.
15. Bhim Singh and P. Venkateswarlu, "A Simplified Control Algorithm for Three-Phase, Four-Wire Unified Power Quality Conditioner," Journal of Power Electronics, vol.10, no.1, pp.91-96, January 2010.
16. Bhim Singh, Sabha Raj Arya and Pankaj Kumar Verma, "An Implementation of Double Frequency Oscillation Cancellation Technique in Control of DSTATCOM," International Transactions on Electrical Energy Systems, April 2, 2013.
17. Arun K. Verma, Bhim Singh and S.C. Kaushik, "An Isolated Solar Power Generation using Boost Converter and Boost Inverter," International Journal of Engineering and Information Technology, Vol .2, No. 2, pp.101-108, 2010.
18. S Kumar, and B Singh, "Control of 3-Leg VSC Based 3-Phase 4-Wire DSTATCOM using Modified Instantaneous Symmetrical Component Theory," International Journal of Automation and Power Engineering, Vol.2, No.6, pp 337-346, September 2013.
19. Arun Kumar Verma, Bhim Singh and S.C. Kaushika, "A Standalone Solar Photovoltaic Power Generation using Cuk Converter and Single Phase Inverter," Journal of Institution of Engineers (India), Vol. 94, No.1, pp 1-12, March 2013.
20. G.Bhuvaneswari and B.C.Mahanta "Analysis of Converter transformer failure in HVDC systems in possible solutions" IEEE Transactions on Power Delivery, April 2009 Volume: **24** Issue: **2** Pages: **814-821**.
21. S. Mishra, D. Ramasubramanian, P. C. Sekhar, "A Seamless Control Methodology for a Grid Connected and Isolated PV-Diesel Microgrid", Accepted for publication in IEEE Transactions on Power Systems.

22. J. Nanda, S. Mishra, L. Saikia, "Maiden Application of Bacterial Foraging Based Optimization Technique in Multiarea Automatic Generation Control", IEEE Transactions on Power Systems, Vol. 24, No. 2, May-2009, pp 602-609.

Conference Papers: Total: 49 papers

1. P.Gupta, K.Kaushik, S.De, and S.Jana, "Feasibility analysis on integrated recharging and data collection in pollution sensor networks," in Proc. Nat. Conf. Commun., New Delhi, Feb. 2013.
2. M.U. Parthavi and S.De, "Mesh routing for error resilient delivery of multiple-description coded image/video content," in Proc. IEEE ICCCN, Munich, Germany, July-Aug. 2012.
3. N. Banerjee, S.De, P.De, and K.Dhamale, "Dynamic source and channel rate adaptation for video streaming over wireless fading channels," in Proc. IEEE HPCC, Liverpool, UK, June 2012.
4. S.Kumar, S.De, and H.M.Gupta, "Co-operative downlink scheduling for cell edge and handoff users," in Proc. IEEE WCNC, Paris, France, Apr. 2012.
5. R.Singhal and S.De, "On the feasibility of multi-hop RF energy propagation in wireless sensor networks," in Proc. Nat. Conf. on Advances in Cellular Wireless Telecommuncation Technologies and Services., New Delhi, India, Apr. 2011.
6. S.Sen and S.De, "IEEE 802.15.4 multihop forwarding throughput analysis in presence of hidden/exposed terminals," in Proc. Intl. Symp. On Wireless Personal multimedia Commun. (WPMC), recife, Brazil, Oct. 2010.
7. R.Kumar, S.De, H.M.Gupta, N.Saxena, and A.Roy, " A new QoS aware predictive scheduling strategy in EPONs," in Proc. IEEE Advances in Networks and Telecommunication Systems (ANTS), New Delhi, India, Dec. 2009. [1 Google citation].
8. R.K.Reddy, N. Pandey, B. Panigrahi, S.De, and H.M.Gupta, "Joint control of transmit power and frame size for energy-optimized data transfer in wireless sensor networks," in Proc. Intl. Symp. On Wireless Personal multimedia Commun. (WPMC), Sendai, Japan, Sept. 2009.
9. Himajit Aithal and S. Janardhanan, "Trajectory Tracking of Two Wheeled Mobile Robot Using Higher Order Sliding Mode Control", Proc. International Conference on Control, Computing, Communication and Materials (ICCCCM-2013), Aug. 2013. doi : 10.1109/ICCCCM.2013.6648908
10. Sandeep Kaur and S. Janardhanan, "Second Order Sliding Mode Controller for Space Rovers", Proc. International Conference on Modelling, Identification and Control (ICMIC 2012), pp. 906-910, Wuhan, China, June 2012.
11. Rajesh Tiwari and S. Janardhanan, ``DSP based Tracking of Twin Spool Gas Turbine using Reduced Output Feedback Sliding Mode Control", Proc. 12th International Workshop on Variable Structure Systems (VSS2012), pp. 52--56, IIT Bombay, India, Jan. 2012
12. Meetha Lal Meena and S. Janardhanan, ``QFT based Control for Twin Rotor MIMO System", Proc. 2011 International Conference on Process Automation Control and Computing (PACC 2011), Coimbatore, India, July 2011, doi : 10.1109/PACC.2011.5978954.
13. Rajesh Tiwari and S. Janardhanan, ``Tracking of Twin Spool Gas Turbine using Reduced Output Feedback Sliding Mode Control", Proc. 2011 International Conference on Process

Automation Control and Computing, Coimbatore, India, July 2011, doi : 10.1109/PACC.2011.5978953.
14. S. Janardhanan and Saurabh Inamdar, ``Computationally Efficient Functional Observer for LTI Systems based on a Multirate Sampling Algorithm", Proc. 2011 International Conference on Control, Robotics and Cybernetics (ICCRC 2011), Vol. 1, pp. 116-120, New Delhi, India, Mar. 2011.
15. S. Janardhanan and Rajesh Tiwari, ``Twin Spool Gas Turbine Dynamics Control using Reduced Order Output Feedback Sliding Mode Control", Proc.International Conference on Information, Signal and Communication (ICISC2011), Vallabh Vidya Nagar, Gujarat, India, Feb. 2011.
16. S. Janardhanan and Saurabh Inamdar, ``Multirate Output Feedback Sliding Mode Control Design Using Reduced Order Functional Observer", Proc. 11th International Workshop on Variable Structure Systems (VSS'10), pp. 395-398, Mexico City, Mexico, Jun. 2010.
17. Meetha Lal Meena and S. Janardhanan, ``QFT based Robust Controller for Yaw and Pitch Position of Twin Rotor MIMO System", Proc. National Conference on Progress in Electronics and Allied Sciences, Gurukula Kangri Vishwavidyalaya, Haridwar, India, Nov. 2012.
18. Bhim Singh, P Jayaprakash, Sunil Kumar and D P Kothari, "Implementation of Neural Network Controlled 3-Leg VSC and a Transformer as 3-Phase 4-Wire DSTATCOM," in Proc. of IAS Annual Conference held in the Hyatt Regency Houston, Houston, TX on October 4-8, 2009.
19. V Sheeja, Jayaprakash P, Bhim Singh and R Uma, "BESS Based Voltage and Frequency Controller for Stand Alone Wind Energy Conversion System Employing PMSG," in Proc.of IAS Annual Conference held in the Hyatt Regency Houston, Houston, TX on October 4-8, 2009.
20. Bhim Singh and Sunil Kumar, "Control of DSTATCOM using Icosø Algorithm," in Proc. of IEEE Industrial Electronics Society (IECON 2009) held at Alfandega Congress Center, Porto, Portugal on 3-5 November 2009.
21. Bhim Singh, V Sheeja, R. Uma, P. Jayaprakash, "Voltage- Frequency Controller for Stand Alone WECS Employing Permanent Magnet Synchronous Generator," in Proc. of Third International IEEE Conference on Power Systems (ICPS 2009) held at IIT Kharagpur India on 27-29 December 2009.
22. Sunil Kumar and Bhim Singh, "Control of 4-Leg VSC Based DSTATCOM using Modified Instantaneous Symmetrical Component Theory," in Proc. of Third International IEEE Conference on Power Systems (ICPS 2009) held at IIT Kharagpur India on 27-29 December 2009.
23. Zakir Hussain and Bhim Singh, "Application of Battery Energy Storage System (BESS) in Voltage Control and Damping of Power Oscillations," in Proc. of International Conference on Industrial and Information Systems - 2010 (ICIIS 2010) held at NITK, Surathkal, Karnataka, India during July 29th-Aug. 1st 2010.
24. Bhim Singh, Shiv Kumar Aggarwal, and T. C. Kandpal, "Performance of Wind Energy Conversion System using a Doubly Fed Induction Generator for Maximum Power Point Tracking," in Proc. of IEEE-IAS Annual Conference, held in the Hyatt Regency Houston, Houston, TX on October 3-7, 2010.
25. Vijay Chand Ganti and Bhim Singh, "Quantitative Analysis and Rating Considerations of a Doubly Fed Induction Generator for Wind Energy Conversion Systems," in Proc. of IEEE-IAS Annual Conference, held in the Hyatt Regency Houston, Houston, TX on October 3-7, 2010.

26. V. Sheeja, P. Jayaprakash, B. Singh and R. Uma, “Neural network theory based voltage and frequency controller for standalone wind energy conversion system," in Proc. of 2010 Joint International Conference on Power Electronics, Drives and Energy Systems (PEDES) & Power India, held in New Delhi (India) from 20-23 Dec. 2010, PP. 1-6.
27. B. Singh and S. Kumar, “Modified Power Balance Theory for control of DSTATCOM,” in Proc. of 2010 Joint International Conference on Power Electronics, Drives and Energy Systems (PEDES) & Power India, held in New Delhi (India) from 20-23 Dec. 2010, PP. 1-8.
28. S. Jeevanand, B. Singh, B. K. Panigrahi and V. Negi, “State of art on condition monitoring of induction motors,” in Proc. of 2010 Joint International Conference on Power Electronics, Drives and Energy Systems (PEDES) & Power India, held in New Delhi (India) from 20-23 Dec. 2010, PP. 1-7.
29. Parag Kanjiya, Bhim Singh and P. Jayaprakash, “A robust control algorithm for self supported dynamic voltage restorer (DVR),” in Proc. of 2010 India International Conference on Power Electronics (IICPE), held in New Delhi (India) from 28-30 Jan. 2011, PP.1-8.
30. V. Sheeja, P. Jayaprakash, B. Singh and R Uma, “Isolated Wind Energy Conversion System for Three-Phase Four Wire Loads Employing Adaline based Voltage-Frequency Controller,” in Proc. of 38th IEEE Annual Conference on IEEE Industrial Electronics Society (IECON’2012) held at Montreal, Canada, on 25-28 October 2012.
31. Bhim Singh, Sabha Raj Arya, Chinmay Jain and Sagar Goel, “Multifunction Capabilities of DSTATCOM in Distribution System using Four-Leg Voltage Source Converter,” in Proc. of 5th IEEE International Conference on Power & Energy Systems (ICPS’2013), Kathmandu, Nepal, October 28-30, 2013.
32. Bhim Singh, Sunil Kumar Dube, Sabha Raj Arya, Ambrish Chandra, and Kamal Al-Haddad, “A Comparative Study of Adaptive Control Algorithms in Distribution Static Compensator,” Accepted for presentation in The 39th Annual Conference of the IEEE Industrial Electronics Society (IECON 2013) to be held in Vienna, Austria, from November 11-13, 2013.
33. Arun K. Verma, Bhim Singh and S.C Kaushik, “An Isolated Solar Power Generation using Boost Converter and Boost Inverter,” in Proc. National Conf. on Recent Advances on Computational Techniques in Electrical Engineering, held at SLIET Longowal (India), 19-20 March 2010, paper 3023, pp.1-8.
34. V Sheeja, P Jayaprakash, Bhim Singh and R Uma, “VF Controller for Stand Alone Wind Energy Conversion System Employing PMBL Generator,” in Proc. of 16th National Power System Conference (NPSC), held at Department of Electrical Engineering, Univ. College of Engg., Osmania University, Hyderabad, A.P, India. From 15th – 17th Dec. 2010, pp. 80-85.
35. Subhasis Jhampati and Bhim Singh, “Fuzzy Pre-Compensated PI Controller For HVDC Light Systems,” in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal (India) from Feb. 25-26, 2011, PP. 351-356.
36. Parag Kanjiya and Bhim Singh, “A New Control Algorithm for Self Supported Dynamic Voltage Restorer (DVR),” in Proc. of National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011), held in Longowal (India) from Feb. 25-26, 2011, PP. 357-362.
37. Bhim Singh and Rahul P. Singh, “Three-Phase Single-Stage Solar PV Grid Interface With Instantaneous Current and Power Control,” in Proc. of National Electrical Engineering Conference (NEEC- 2011) held during December 16-17, 2011, Delhi Technological University, DTU Delhi, (India).

38. Bhim Singh and Sunil Kumar, "Control of DSTATCOM in 3-Phase 3-Wire Distribution System using Modified IcosØ Algorithm," in Proc. of 5th National Conference on Emerging Trends in Electrical, Instrumentation & Communication Engineering (ETEIC-2012), held at Anand Engineering College, Agra on 6th & 7th April 2012, (India).
39. Bhim Singh, Sabha Raj Arya, Chinmay Jain, Sagar Goel, Ambrish Chandra and Kamal Al-Haddad, "Application of Voltage Source Converter for Power Quality Improvement," in Proc. of 37th National Systems Conference (NSC-2013), held at Indian Institute of Technology Jodhpur, India, on 05-07 December, 2013.
40. Aakanksha Girolkar and G.Bhuvaneswari "Control of PMBLDC Motor Using Third Harmonic Back EMF Sensing with Zigzag Transformer" Accepted for presentation in IEEE International Conference ICEES, January 2014.
41. Aakanksha Girolkar and G.Bhuvaneswari "Control of PMBLDC motor using Back EMF sensing with adaptive filtering" Presented in IEEE International Conference ICCCI, Jan 2013.
42. Parimita Mohanty, G.Bhuvaneswari, R.Balasubramanian, Navdeep Dhalilwal "Performance comparison of various MPPT techniques for solar PV applications" Presented in the International Conference CSPE, Dec 2012.
43. Rahul R., G.Bhuvaneswari, Hemant Ahuja, R.Balasubramanian "A Novel Control Method to Ride Through Grid Faults in a PMSG Based WECS" Presented in the International Conference CSPE, Dec 2012.
44. G.Bhuvaneswari and R.Annamalai "Development of A Solar Cell Model In Matlab For PV Based Generation System" Presented in IEEE Conference INDICON 2011.
45. Shahid Ali and G.Bhuvaneswari "Performance Comparison of Squirrel Cage Induction Generator Based Wind Energy Conversion System with Different types of Machine Side Converters" Presented in IET Renewable Power Generation Conference, UK, Sept 2011.
46. G.Bhuvaneswari and A.P.Satpathy "ANN Based Optimal Flux Determination for Efficiency Improvement in Direct Torque Controlled induction Motor Drives" Accepted for presentation in IEEE PES GM in Minnesota, USA July 2010.
47. J. Nanda, S. Mishra, P. G. Mishra, K. V. Sajith "A novel classical controller for automatic generation control in thermal and hydrothermal systems", Power Electronics, Drives and Energy Systems (PEDES) & 2010 Power India, 2010 Joint International Conference on , India, Dec 20-23, 2010.
48. S. Mishra, Y. Mishra, S. Vigness, "Security Constrained Economic Dispatch Considering Wind Energy Conversion Systems", 2011 IEEE PES General Meeting, Detroit, Michigan, USA, July 26 - 29, 2011.
49. S. Mishra, D. Ramasubramanian, "IEEEPhillips-Heffron Model for a PV-DG Grid Connected System", IEEE PES General Meeting, Vancouver, Canada, July 21-25, 2013.

(c) UG Students

Conference Papers: Total: 02 papers

1. S.De, A.Kawatra, and S.Chatterjee, "On the feasibility of network energy operated field sensors," in Proc. IEEE Intl. Conf. Commun. (ICC), Cape Town, South Africa, May 2010.
2. S.De, U. Garg, and G. Chaula, "Throughput modeling of multihop radial wireless sensor networks," in Proc. Nat. Conf. Commun., Guwahati, India, Jan. 2009.

3.6. Best papers in last 5 years: (i) Individual best 3, (ii) department/centre best 10; and brief justifications.

Department best 10:

1. Title: Optimization of Cooperative Spectrum Sensing with Energy Detection in Cognitive Radio Networks; Author(s): Zhang, Wei; Mallik, Ranjan K.; Ben Letaief, Khaled; Source: IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS Volume: 8 Issue: 12 Pages: 5761-5766 DOI: 10.1109/TWC.2009.12.081710 Published: DEC 2009; 68 citations
2. Title: PM Synchronous Motor Speed Control Using Hybrid Fuzzy-PI With Novel Switching Functions; Author(s): Sant, Amit Vilas; Rajagopal, K. R.; Source: IEEE TRANSACTIONS ON MAGNETICS Volume: 45 Issue: 10 Special Issue: SI Pages: 4672-4675 DOI: 10.1109/TMAG.2009.2022191 Published: OCT 2009; 51 citations
3. Title: Performance Analysis of MIMO Free-Space Optical Systems in Gamma-Gamma Fading; Author(s): Bayaki, Ehsan; Schober, Robert; Mallik, Ranjan K.; Source: IEEE TRANSACTIONS ON COMMUNICATIONS Volume: 57 Issue: 11 Pages: 3415-3424 DOI: 10.1109/TCOMM.2009.11.080168 Published: NOV 2009; 47 citations
4. Title: An Implementation of an Adaptive Control Algorithm for a Three-Phase Shunt Active Filter; Author(s): Singh, Bhim; Solanki, Jitendra; Source: IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS Volume: 56 Issue:8 Pages: 2811-2820 DOI: 10.1109/TIE.2009.2014367 Published: AUG 2009; 36 citations
5. Title: Maximum Power Point Tracking of Multiple Photovoltaic Arrays: A PSO Approach; Author(s): Miyatake, Masafumi; Veerachary, Mummadi; Toriumi, Fuhito; et al.; Source: IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS Volume: 47 Issue: 1 Pages: 367-380 DOI:10.1109/TAES.2011.5705681 Published: JAN 2011; 30 citations
6. Title: Exploratory Power of the Harmony Search Algorithm: Analysis and Improvements for Global Numerical Optimization; Author(s): Das, Swagatam; Mukhopadhyay, Arpan; Roy, Anwit; Abraham, A; Panigrahi, B. K.; Source: IEEE TRANSACTIONS ON SYSTEMS MAN AND CYBERNETICS PART B-CYBERNETICS Volume: 41 Issue: 1 Pages: 89-106 DOI:10.1109/TSMCB.2010.2046035 Published: FEB 2011; 28 citations
7. Title: Personal Authentication Using Finger Knuckle Surface; Author(s): Kumar, Ajay; Ravikanth, Ch.; Source: IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY Volume: 4 Issue: 1 Pages: 98-110 DOI: 10.1109/TIFS.2008.2011089 Published: MAR 2009; 26 citations
8. Title: Improving Stability of a DFIG-Based Wind Power System With Tuned Damping Controller; Author(s): Mishra, Y.; Mishra, S.; Tripathy, M.; et al.; Source: IEEE TRANSACTIONS ON ENERGY CONVERSION Volume: 24 Issue: 3 Pages: 650-660 DOI: 10.1109/TEC.2009.2016034 Published: SEP 2009; 23 citations
9. Title: A Game-Theoretic Approach for Distributed Power Control in Interference Relay Channels; Author(s): Shi, Yi; Wang, Jiaheng; Ben Letaief, Khaled; Mallik, Ranjan K.; Source: IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS Volume: 8 Issue: 6 Pages: 3151-3161 DOI: 10.1109/TWC.2009.080831 Published: JUN 2009; 23 citations
10. Title: A Comparison of Control Algorithms for DSTATCOM; Author(s): Singh, Bhim; Solanki, Jitendra; Source: IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS Volume: 56 Issue: 7 Pages: 2738-2745 DOI: 10.1109/TIE.2009.2021596 Published: JUL 2009; 22 citations

3.7. Average citation per department/centre.

4.89 citations/ paper.

3.8. Change modifications, etc. done to improve the quality of (i) M.Tech, and (ii) Ph.D graduates.

(i) Most of the M.Tech courses are realigned to increase the design and research contents by introducing an appreciable contribution through term papers and design presentations. Introduction of term papers and design presentation has given rise to following advantages:

- An improved interaction amongst the students and in the process strengthened collaborative work in the true sense.
- Interaction between M.Tech and Ph.D students have increased with introduction of design projects and term papers to reflect the nature of ongoing research. This has resulted in better understanding of research methodology for Ph.D students.
- It has also enhanced the interaction between students and teachers.

(ii) Both M.Tech and Ph.D students are give ample opportunities as teaching assistants thus further strengthening the teaching abilities.

3.9. Sponsored projects – (i) Individually, (ii) with another faculty of the group/section of the department, (ii) with another faculty of the department but from another group/section of the department (iv) with another faculty of another dept./centre.

(i) Individually.

S. No.	Sponsored Project (IRD)	Amont (in Lakh)	St. Date	PI
1.	Hardware Designs of Wireless System (RP02235)	231.5	25.05.09	Prof. B. Bhaumik
2.	IDRC Research Chair in wireless Communication (RP02253)	291.58	24.07.09	Prof. R.K.Mallik
3.	Interference Cancellation in MAC based multiuser MIMO Communication Systems (RP02358)	18.70	25.05.10	Dr. Manav Bhatnagar
4.	Design of 16-bit High Speed Differential Current Output D/A Converter (Sub project # 2 under MI00581) (RP02364)	3.30	18.06.10	Prof.G.S. Visweswaran
5.	Design and development of robust stabilizing digital controllers for power electronic systems used in smart dc-grid applications (RP02426)	45.40	26.11.10	Prof. M. Veerachary
6.	G1WP1-eAgriculture- Crop Desease mitigation and management System (Phase 2 of RP02237) (RP02679)	8.00	12.11.12	Prof. S. Kar
7.	G1WP4 – Internet of Things – eHealth (Phase 2 of (RP02237) (RP02680)	56.80	12.11.12	Prof. S. Kar

8.	High Resolution Time-to Digital Converter (TDC) and Range ambiguity Improvement in Time of fight 3D-camera (RP02715)	22.63	01.01.13	Dr. Mukul Sarkar

S. No.	Sponsored Project (FITT)	Amount (in Lakh)	Year	PI
1.	Development of a wireless sensor network based gait assessment system for fall prediction in elderly patients	36.73	2008-09	Prof. Subrat Kar
2.	Algorithms for application arising in advanced wire-line broadband communication systems	65.40	2012-13	Prof. S. Prasad
3.	Exploration in machine learning and optimization for market applications	12.00	2012-13	Prof. Jayadeva

(ii) With another faculty of the group/section of the department

S. No.	Sponsored Project (IRD)	Amount (in Lakh)	St. Date	PI
1.	Intelligent Condition Monitoring of Induction Motors (RP02183)	30.18	19.01.09	Prof. B. Singh, PI Dr.B.K.Panigrahi, CP
2.	Signal Processing and Informaton therotic Study of Cognitive Radio Networks (RP02233)	11.41	22.05.09	Prof. S.Prakriya, PI Dr. B.Lall, CP Prof.R.K.Mallik, CP
3.	Personal Authenticaion using Face-based Biometrics (RP02309)	32.83	08.02.10	Prof. M.Hanmandlu, PI Prof. H.M.Gupta, CP
4.	Rendering Locational Bias to Freqeuncy Linked unscheduled Interchange (UI) Pricing (RP02314)	19.64	12.02.10	Dr. A.R.Abhyankar, PI Prof. P.R.Bijwe, CP
5.	Analysis of the Stability of Grid Connected Wind Energy Conversion Systems (RP02322)	26.65	12.03.10	Dr. N. Senroy, PI Prof. S.Mishra, CP
6.	Hand Gesture Analysis (RP02357)	7.50	25.05.10	Dr. S. Dutta Roy, PI Prof.S. Chaudhury, CP
7.	Managing Intangible Cultural Assets through Onltological Interlinking (RP02361)	38.00	22.06.10	Prof. S.Chaudhury, PI Dr. B.Lall, CP Dr. S.Dutta Roy,CP
8.	Voltage and Frequency Control of Microgrid (RP02363)	39.32	22.06.10	Prof. S.Mishra, PI Dr.B.K.Panigrahi, CP

9.	Modeling Analysis and Design of Power Supplies for Telecommunication Tower (RP02366)	6.68	02.07.10	Prof. G.Bhuvaneswari, PI Prof. B. Singh, CP
10.	Human Emotion Recognition using Computer Vision (RP02373)	25.00	13.07.10	Dr.S.Dutta Roy, PI Prof. S.Chaudhury, CP
11.	Design and Development of a Array-of-Array MOEM based Free Space Optical Link for Ground to Satellite Communication (RP02389)	64.65	01.09.10	Prof. S.Kar, PI Prof. V.K.Jain, CP
12.	Development of Robust Document Image Understanding System for Documents in Indian Scripts (OCR) Phase – II (RP02441)	1186.23	01.07.10	Prof. S.Chaudhury, PI Dr. B.Lall, CP Dr.S.Dutta Roy, CP
13.	Effieient Algorithms for global Optimization and for Learning and their Hardware Implementation (RP02459)	41.06	14.06.11	Prof. Jayadeva, PI Dr. S.Chatterjee, CP
14.	Power Quality Improvement in Power Converter Systems (RP02506)	46.22	19.09.11	Prof. G.Bhuvaneswari, PI Prof. B.Singh, CP
15.	Design and Development of Precision Snow Precipitation Measurement Device at Sub-Zero Temperatures (RP02525)	7.83	03.11.11	Prof. S.Kar, PI Prof.H.M.Gupta, CP
16.	Cross-Layer Design and Optimization for Mobile Multimedia communications (RP02527)	3.22	09.11.11	Dr. Swades De, PI Prof. H.M.Gupta, CP
17.	Development of Algorithm for Detection of spatio-temporal Discontinuity Werrors in Video (RP02534)	15.63	30.11.11	Prof.S.Chaudhury, PI Dr. B.Lall, CP
18.	Simulation and Analysis of System Design requirements for Ground to Satelite and Inter Satelite Free Space Optical communication Link (RP02558)	17.26	17.02.12	Prof. S. Kar, PI Prof. V.K.Jain, CP
19.	Analysis, Design and Control of Power Electronic Converters for Grid Interfaced Solar Power Generation (RP02583)	83.18	03.04.12	Prof. Bhim Singh, PI Prof. G.Bhuvaneswari, CP
20.	Investigation on Interface and Power management strategies in Cooperative Relay Communication (RP02661)	29.48	13.09.12	Prof. S.Prakriya, PI Dr. Swades De, CP
21.	Development in Sensor Web Enablemet (RP02670)	19.95	10.10.12	Prof. S. Kar, PI Prof. S.Chaudhury, CP
22.	Relay Coordination in Distribution	49.01	19.12.12	Dr. B.K.Panigrahi,

	Networks with DG Penetration (RP02693)			PI Dr. A.R.Abhyankar, CP
23.	Design and development of Robust Controller for Seamless Operation of Microgrid (RP02808)	54.99	09.09.13	Prof. S.Mishra, PI Dr. N.Senroy, CP

(iii) With another faculty of the department but from another group/section of the department

S. No.	Sponsored Project (IRD)	Amount (in Lakh)	St. Date	PI
1.	Sensories Control of Permanent Magnet Brushless Motors (RP02320)	37.82	12.03.10	Prof.K.R.Rajagopal, PI Prof.I.N.Kar, CP
2	Sampling and compression for multiview 3-D displays (RP02359)	35.43	16.06.10	Prof.S.Chaudhury, PI Dr. B.Lall, CP Prof.S.D.Joshi, CP
3.	Green Sensor Networks for Air Quality Support (RP02610)	56.23 (IITD share)	17.05.12	Dr. Swades De, PI Dr. S.Chatterjee, CP Dr. Soumya Jana, (IITH), CP, Dr. Kaushik Chowdhury (Northeastern U., USA, PI), Dr. Stefano Basagni (Northeastern U., USA, CP), Prof. Wendi Heinzelman (Univ. Rochester, USA, PI)
4.	Energy Harvesting from Ambient sources for Wireless Sensor Nodes (P02695)	45.35	20.12.12	Dr. S.Chatterjee, PI Dr. Swades De, CP

(iv) With another faculty of another dept./centre

S. No.	Sponsored Project (IRD)	Amount (in Lakh)	St. Date	PI
1.	Network Energy Scavenging in Wireless Ad Hoc Snesors Networks	50.68	06.07.09	Dr. S.Chatterjee,PI Dr. Swades De, CP

	(RP02251			Prof. S. Tuli, (CARE) CP
2.	Optimal Mobility and Resource Management in Next Generation 4G wireless Networks (RP02227)	4.66	20.03.09	Dr. S. De, PI Prof. H.M.Gupta, CP Prof. B.S.Panda (Math), CP
3.	Centrally Sponsored Plan Scheme of National Mission on Education through Information and Communication Technology (Virtual Labs Project Phase – II) (RP02341)	80.00 (IITD Share)	01.04.10	Prof. R.K.Shevgaonkar, Director, PI Prof. R. Bose, CP
4.	Development of Coordinated Multi WMR Systems (Sub project # 2 under the main project # RP02346) (RP02348)	132.34	04.05.10	Prof. I.N.Kar, PI Prof.S.Chaudhury, CP Dr. S. Mukherjee, ME, CP Dr. S.Janardhanan,CP Dr. Kolin Paul, CSE, CP
5.	Vision-Guided Control of a Robot Manipulator (Sub project # 3 under main project # Rp02346) (RP02349)	144.34	04.05.10	Dr. S. Dutta Roy, PI Prof. S. Banerjee, CSE, CP
6.	Cross-Layer Protocols for Enhanced Quality of user Experience in Broadband Wireless Networks (RP02458)	41.06	14.06.11	Dr. Swades De, PI Prof. H.M.Gupta, CP Dr. V.J. Ribeiro, CSE, CP
7.	Phenomics of Moisture Deficit and Low Temperature Stress Tolerance in Rice (RP02487)	44.70	15.02.11	Prof. S.Chaudhury,PI Dr. B.Lall, CP Dr. A. Chugh, Biological, CP
8.	Centre for Excellence in Low Power Design on Nanoscale Devices, Circuits and Systems (RP02779)	100.00	29.07.13	Prof. M.J.Kumar, PI Prof. R.K.Patney, CP Prof. B.Bhaumik, CP Prof.G.S. Visweswaran, CP Prof. A. Kumar, CSE, CP Prof. M. Balakrishnan,CSE, CP Prof. Jayadeva, CP Prof. P.R.Panda,

				CSE, CP Dr. Kolin Paul, CSE, CP Dr. S.Chatterjee, CP

3.10. Industry consultancies

List attached as ***appendix No. 08.***

No. of consultancies (IRD) : 34, Total amount : Rs. 232.55 Lakh

No. of consultanicies (FITT) : 20, Total amount : Rs. 113.24 Lakh

3.11. New areas of research which are different from the faculty's Ph.D thesis area.

The following are the research areas which are different from the faculty's Ph.D thesis area:

1. Multirate Signal processing, Wavelet Theory, Modeling of Network Traffic, Theory of Linear Corionical Transform/ Fractional fourier Transform, SAW filter Design, Biomedical Signal Processing (Prof. S.D.Joshi)
2. Free-space optical communication (Prof. V.K.Jain)
3. Contraction analysis, Nonlinear robust control. Mobile robotics, multi-agent systems (Prof. I.N.Kar).
4. Model Reduction, Robotics, Functional observation (Dr. S. Janardhanan).
5. Biomolecular Circuit Design, Model Reduction (Dr. Shaunak Sen).
6. Automotic Power Electronics & Drives (Dr. Amit K. Jain)
7. Genomic Signal Processing, Fermi Acceleration Plasmonics (Dr. Kushal K. Shah)
8. Biomedical electronics/ instrumentation, Medical imaging, redication effects (Dr. M. Sarkar).
9. Computational electromagnetic as applied to problems in remote – sensing and inverse imaging (Dr. Uday K. Khankhoje)
10. Mechine Intelligence, Evolutionary computing, Power system protection, AI in forecasting (Dr. B.K.Panigrahi)
11. Signal Processing of Wide Area measurement system data in Power Systems. Signal Proceesing applications in Power Quality. Wind turbine generation systems. Model order reduction techniques in Control Theory. Energy storage systems. Wide Area Control and monitoring. (Dr. N.Senroy).
12. Compact Device modeling (Dr. Abhisek Dixit).
13. (a) Optical networks, (b) Free space optics, (c) Fault tolerant and reliasility studies. (Prof. V.Chandra)
14. Modeling visual pathway, Biomedical Diagnostic software & hardware. (Prof. B. Bhaumik).
15. (a) Load profiling, (b) Generator fuel economics, (c) Risk analysis & (d) Distrbution system protection (Dr. A.R.Abhyankar).
16. (a) Optical communication, (b) Sensor networks and (c) Embedded systems (Prof. Subrat Kar).
17. Electrical Vehicles, High efficiency Motors, Motor Controllers & Domestic Appliances (Prof. K.R. Rajagopal).

3.12. Methodology for (i) identifying obsollescene in research areas, and (ii) identification of new areas for future research.

This is done on the basis of current trends in research in leading academic institutions and the needs of industry. The groups in the department are formed on basis of research areas. The groups periodically review their research areas and identify thrust areas.

3.13. Number of large interdisciplinary projects (within department's areas, and across the institute)

S. No.	Sponsored Project	Amount (in Lac)	St. Date	PI
1.	Network Energy Scavenging in Wireless Ad Hoc Snesors Networks (RP02251)	50.68	06.07.09	Dr. S.Chatterjee,PI Dr. Swades De, CP Prof. S. Tuli, (CARE) CP
2.	Centrally Sponsored Plan Scheme of National Mission on Education through Information and Communication Technology (Virtual Labs Project Phase – II) (RP02341)	80.00 (IITD Share)	01.04.10	Prof. R.K.Shevgaonkar, Director, PI Prof. R. Bose, CP
3.	Development of Coordinated Multi WMR Systems (Sub project # 2 under the main project # RP02346) (RP02348)	132.34	04.05.10	Prof. I.N.Kar, PI Prof.S.Chaudhury,CP Dr. S. Mukherjee, ME, CP Dr. S.Janardhanan,CP Dr. Kolin Paul, CSE, CP
4.	Vision-Guided Control of a Robot Manipulator (Sub project # 3 under main project # Rp02346) (RP02349)	144.34	04.05.10	Dr. S. Dutta Roy, PI Prof. S. Banerjee, CSE, CP
5.	Cross-Layer Protocols for Enhanced Quality of user Experience in Broadband Wireless Networks (RP02458)	41.06	14.06.11	Dr. Swades De, PI Prof. H.M.Gupta, CP Dr. V.J. Ribeiro, CSE, CP
6.	Phenomics of Moisture Deficit and Low Temperature Stress Tolerance in Rice (RP02487)	44.70	15.02.11	Prof. S.Chaudhury,PI Dr. B.Lall, CP Dr. A. Chugh, Biological, CP
7.	Green Sensor Networks for Air Quality Support (RP02610)	56.23 (IITD share)	17.05.12	Dr. Swades De, PI Dr. S.Chatterjee, CP Dr. Soumya Jana, (IITH), CP, Dr. Kaushik Chowdhury (Northeastern U., USA, PI),

				Dr. Stefano Basagni (Northeastern U., USA, CP), Prof. Wendi Heinzelman (Univ. Rochester, USA, PI)
8.	Centre for Excellence in Low Power Design on Nanoscale Devices, Circuits and Systems (RP02779)	100.00	29.07.13	Prof. M.J.Kumar, PI Prof. R.K.Patney, CP Prof. B.Bhaumik, CP Prof.G.S. Visweswaran, CP Prof. A. Kumar, CSE, CP Prof. M. Balakrishnan,CSE,CP Prof. Jayadeva, CP Prof. P.R.Panda, CSE, CP Dr. Kolin Paul, CSE, CP Dr. S.Chatterjee, CP

4) Innovation, Design and Development

4.1. No. of students who have been funded for innovating (TePP, PRISM, etc.).

TePP: 2 teams of UG students.

72 students have been funded for innovating under SURA. The year-wise list is given below:

S.No.	Name	Entry No.
SURA-2008 (2009)		
1.	Gagan Krishna Dixit	2006EE10322
2.	Amrit Singh Saini	2006EE10313
3.	Piyush Gupta	2006EE10334
4.	Anuraag Gupta	2006EE10319
5.	Gamandeep Sethi	2006EE10323
6.	Abhinav Kr. Singh	2006EE20366
7.	Shashank Kr. Sawan	2006EE20381
8.	Ritesh Garg	2006EE10342
9.	Saurabh Rajput	2006EE50414
10.	Vikram Garg	2006EE50415
11.	Pushpendre Rastogi	2006EE50412
12.	Madhav Singh	2006EE50408
13.	Lalit Jain	2006EE10330
14.	Varun Torka	2006EE10350
15.	Ankit Agrawal	2006EE10315
16.	Divya Pratap Singh	2006EE10321
17.	Mayank Kumar	2006EE10331

18.	Prince Dhawan	2006EE50112
SURA-2009/2008 (2009)		
19.	Mridul	2007EE10326
20.	Varun Gupta	2007EE10439
21.	Pranav Prince	2007EE10331
22.	Ashesh Jain	2007EE50403
23.	Uma Parthavi	2007EE50410
24.	Aditya Goel	2007EE10315
25.	Manish Mittal	2007EE20375
26.	Rohit Singh Sahani	2007EE20688
27.	Abhishek Bhatnagar	2007EE10314
28.	Gursharan Singh Bhue	2007EE10324
29.	Ketan Bansal	2007EE10570
30.	Rhishabh Garg	2007EE50517
31.	Aditya Goel	2007EE50052
32.	Avinash Kumar	2007EE10060
33.	Ankit Kansal	2007EE10317
34.	Shikhar Gupta	2007EE10343
35.	Nikhil Malik	2007EE10327
36.	Rahul Paliwal	2007EE10335
SURA-2010 (2011)		
37.	Punit Goyal	2008EE10357
38.	Manu Kumar Mittal	2008EE10346
39.	Himanshu Nayar	2008EE10344
40.	Sanchit Bansal	2008EE10363
41.	Manish Bajaj	2008EE10345
42.	Pawan Gupta	2008EE10353
43.	Prashant Joshi	2008EE10355
44.	Ankit Tiwari	2008EE10333
45.	Akshay Kumar	2008EE50411
46.	Varun Singla	2008EE50429
47.	Rajat Mengi	2008EE10400
48.	Rohit Singla	2008EE20401
49.	Abhinav Parihar	2008EE10326
SURA-2011 (2012)		
50.	Dakshita Khurana	2008EE20386
51.	Surabhi Sankhla	2008EE10367
52.	Ankit Laddha	2009EE10376
53.	Barun Kumar	2009EE10384
54.	Ankit Chandawala	2009EE10384
55.	Prabha Agrawal	2009EE10405
56.	Bhavesh Mishra	2009EE20446
57.	Anupam Sharma	2009EE20443
58.	Aman Mittal	2009EE50473
59.	Sagar Sachdev	2009EE10413
60.	Sahil Garg	2009EE50616
61.	Prakhar Dargar	2009EE10407
62.	Alok Singhal	2009EE50472
63.	Jigyasa Gupta	2009EE20306

64.	Naveli	2009EE20018
SURA-2012 (2013)		
65.	J Phani Mahesh	2010EE50549
66.	K. Sriharsha	2010EE10453
67.	Sammyak Jain	2010EE20526
68.	Sourabh Rohilla	2010EE20529
69.	Abhimanue Jalan	2010EE10433
70.	Pankaj Fauzdar	2010EE10433
71.	Abhishek Gupta	2010EE10435
72.	Chakshu Grover	2010EE10442

4.2. & 4.3 Technology developed and Transferred (*give list and brief information*).

1. Dr. Amit K. Jain: Under Development – Integrated Starter Generator for mild-hybrid vehicle with TVS – Lucas, Chennai.
2. Prof. K.R.Rajagopal: Low Wattage ceiling fan, Low cost electrical vehicle controller, Novel sensorless techniques for PM BLDC and PMSM motors, Stepper motors and Efficient motor controllers.
3. Prof. Subrat Kar: Rich Frameworks for Sensor networks : Software Frameworks for pervasive sensor networks have been developed and developed with active usage from foreign universities (University of Cambridge, university of Bristol, and University of Ulster) and Indian institutes (IIT-Hyd, IIT-Madras)
   Gait Assessment System (DST): Developed and demonstrated in various public DST exhibitions (at India Habitat Center, for example).
4. Prof. Jayadeva: Software for SAW filter design – transferred to Motorola, Scottsdale as part of a consultancy project.

4.4 Number of patents filed and patent granted as a fraction of patents filed.

Patents granted: 11

1. Nilanjan Senroy and Siddarth Suryanarayanan, System and Method for Determining Masking Signals for Applying Empirical Mod Decomposition (EMD) and for Demodulating Intrinsic Mode Functions Obtained from Applications of EMD, U.S. Patent No 7,908,103 Issued 3/15/2011.
2. Vinod Chandra and D. Chadha: "An optical qxq switch for fault tolerant routing of data Communication" Indian Patent Application Number 1801/DEL/2011 dated 24.06.2011
3. Vinod Chandra and D. Chadha: "A method and assembly for bidirectional data flow through an optical vortex network" Indian Patent Application Number 3831/DEL/2011 Date of filing 27.12.2011
4. S. Chatterjee, Y. Tsividis, P. Kinget, "Low Voltage Operational Transconductance Amplifier Circuits", *U.S.* Patent no. 8030999, filed on Sep. 20, 2005, granted on Oct. 4, 2011.
5. Anuj Grover and G.S.Visweswaran ,Title: "Low Voltage Write Time Enhanced SRAM Cell and Circuit Extensions", Date of first filing: December 2011. ST reference # 11-IND-567,

6. Anuj Grover and G.S.Visweswaran, Title: “Data-depenent Pullup Transistor Supply and Body Bias Voltage Application for a Static Random Access Memory (SRAM) Cell”, Date of first filing: October 2012, ST reference # 11-IND-0935.
7. Anuj Grover and G.S.Visweswaran, Title: “Flipped Raplica Bitline based PVT sensor”, Date of first filing: 31 May 2013, ST reference # 11-IND-0934.
8. G.S.Visweswaran, Surya Sharma, Sumant Bapat and Ansuya Bhat “Apparatus and Method for Low Power Rail-to-Rail Operational Amplifier”, Granted on May 7, 2009. US Patent No. US 7, 714, 651 B2.
9. G.S.Visweswaran, Paramjeet Sahni, “Regulator with Improved Load Regulation” Granted on Feb. 22, 2011. US Patent No. US7,893,671 B2.
10. Subrat Kar, Promod.V, “A method for invoking emergency response in an electronic data acquisition system” Date of filing: 3.03.2010, Patent No. 460/DEL/2010.
11. Jayadeva, Ashish Verma, Sachindra Joshi, P. Himanshu, “Method for Assessing Pronounciatio abilities” US Patent 8271281 issued in Sep 2012 (orginal filing in 2008).

Patents filed: 38

1. Vinod Chandra and D. Chadha: “A method and assembly for bidirectional data flow through an optical vortex network” US Patent Application Number FT/243/VD/CES/11 Dated 27.12.2013
2. Bhim Singh, SS Murthy, Puneet Goel and Navin Kishore, “Controller for wind energy conversion system employing doubly fed induction generator feeding Local Loads,” Pending Indian Patent No. 442/DEL/2010, filed on February 26, 2010.
3. Bhim Singh, SS Murthy, Puneet Goel and Shailendra Tiwari, “Controller for wind energy conversion system employing squirrel cage induction generator feeding Local Loads,” Pending Indian Patent No. 508/DEL/2010, filed on March 5, 2010.
4. Bhim Singh and Sanjeev Singh, “Power Factor Correction Based Flyback Converter Fed Permanent Magnet Brushless DC Motor Drive for fan Applications,” Pending Indian Patent No. 1561/DEL/2011, filed on June 2, 2011.
5. Bhim Singh and Shailendra Sharma, “A Novel Four-Leg Voltage Source Converter Based Voltage and Frequency Controller for an Autonomous Wind Energy Conversion System,” Pending Indian Patent No. 2241/DEL/2012, filed on July19, 2012.
6. Bhim Singh and V. Rajagopal, “A Hydro Power System,” Pending Indian Patent No. 345/DEL/2012, Filed on 07 February, 2013.
7. I. N. Kar and M. Kumar, Direct thermal sensation index based control and apparatus for HVAC system, Applied for Indian Patent (Application no: 94/DEL/2010, date of filing: 18-01-2010).
8. M. Jagadesh Kumar and Kanika Nadda, "Induced Charge Plasma based Semiconductor Device", Application filed (Application No. 74/DEL/2012, dated 09/01/2012)
9. S. Chaudhury, S. Tripathi, S. Dutta Roy. "Online Object Tracking." US Patent filed 30 December 2011, Application number: 13/341,697 (Patent ID: 81860339 - for internal ref)
10. S. Chaudhury, M. Mathur, A. Khandelia, S. Tripathi, B. Lall, S. Dutta Roy, S. Gorecha. "System and Method for Object-Based Parametric Video Coding."US Patent filed 04 September 2009, Application number: 12554579 (Patent ID: 81132047, for internal ref). Published. http:// www.implu.com/ patent_application/20110058609
11. Ranjan Bose, “An apparatus for detecting metallic objects using wireless communication”, Date of filing: 18.09.2009.
12. Ranjan Bose, “An apparatus and method for packet eror correction in networks”, Date of filing: 8.10.2009.
13. Surendra Prasad, “Optimal Distribution of Complexity for Partial Cancellation in VDSL”, Date of filing: 17.12.2009.

14. I.N.Kar, “Direct thermal sensation index based control and apparatus for HVAC system”, Date of filing: 18.01.2010.
15. Bhim Singh, “Controller for wind energy conservation system employing squirrel cage induction generator feeding local loads and a method thereof” Date of filing: 5.03.2010.
16. Ranjan Bose, “Packet Error correction in Networks” Date of filing: 7.04.2010.
17. Jayadeva, “A System and Method for Authentication and Verification of Documents and Articles”, Date of filing: 2.07.2010.
18. Surendra Prasad, “Systems and Methods of Resource Allocation for Cancellation of Crosstalk”, Date of filing: 15.12.2010.
19. Ranjan Bose, “An apparatus and method for parasitic Communication (P)”, Date of filing: 5.04.2011.
20. S.S.Murthy, “A novel self-excited brushless Single Phase Induction Generator (SEIG) integrated with robust automatic electronic voltage regulator (P),” Date of filing: 29.08.2011.
21. Ranjan Bose, “An apparatus and method for mobile-phone based water purification (P)” Date of filing: 5.09.2011.
22. J.K.Chatterjee, “A novel closed loop speed control using carrier space vector pulse width modulated direct torque control scheme for Induction motor drive” Date of filing: 4.06.2012.
23. Bhim Singh, “Power Factor correction base 4D flyback converter for permanent magnet brushless DC motor Drive for Fan Application” Date of filing: 19.07.2012.
24. J.K.Chatterjee, “Voltage and Frequency control of self excited induction generator (brushless Generator) in isolated three phase four-wire under balanced and unbalanced operations” Date of filing: 9.11.2012.
25. R.K.Mallik, “Tunable PAPR Fequency division multiplexing” Date of filing: 18.12.2012.
26. Ranjan K. Mallik, Manav R.Bhatnagar, Jack H. Winters, “Deterministic Processing for MIMO Systems” USA Patent, Date filed: 27.02.2012.
27. Bhim Singh, “An analog controller for controlled frequency operation in two winding single phase self excited induction generator based power generation systems for micro hydel application” Date of filing: 17.06.2013.
28. Jayadeva & M.N. Gupta, “An optimization free technique for determing concentration of the constituents of a mixture” Date of filing: 3.09.2013.
29. Bhim Singh, “A novel digital voltage controller for power quality improving power generation from asymmetric two winding single phase self-excited induction generator” Date of filing: 18.10.2013.
30. Ranjan Bose, “Smart and safe headphones” Indian Patent being filed through IIT Delhi.
31. Ranjan Bose, “A portable sanitation device” Indian Patent Application Serial No.2546/Del/2011.
32. Ranjan Bose, “A Method for Direction of Arrival estimation, Beamforming, Source Tracking and Interference Mitigation by nodes in a wireless network based on Swarm Behaviour” Indian Patent Application being field through IIT Delhi March 2011.
33. Ranjan Bose, “An Apparatus and Method for Personal Layer Security in Wireless Cooperative Communication System” Indian Patent Application being filed through IIT Delhi Sep. 2010.
34. Ranjan Bose, “An Apparatus and Method for Personal Area Network and Body Area Network using Coupling” Indian Patent Application being through IIT Delhi Jan.2011.
35. Ranjan Bose, “An Apparatus and Method for Pocket Error Correction in Networs” Indian Patent Application Serial No. 858/Del/2010; US Patent Application being filed through Intellectual Ventures.

36. Jayadeva, "A cryptographic method for creation of labels affixed to valuable objects that are impossible to fraudulently create or duplicate but provide for easy authentication and integrity checks" (with Prof. B.N.Jain). Indian provisional patent filed.
37. Jayadeva, S.S.Batra, M.N.Gupta, and J. Mukherjee, "Method and Computer Program for an Optimization-free Approach to Predictive Analytical Chromatography" Indian provisional patent filed, 2013.
38. Jayadeva, "System and method for getting a maximum margin classifier with minimum VC dimensions from data" Application NO.3615/DEL/2013; Filing Date: 12/12/2013.

4.5 Innovations of products, processes, designs, etc. in the department.

Following faculty members have developed a company under TBIU:

1. Prof. K. R. Rajagopal
   - Name of Incubating Unit
     Global Motertech Pvt. Ltd.
   - Technologoy/product/process in incubation
     Technology based products and services in Motor Design and Analysis software
   - Funds sourced
     Rs.3.40 lakh (MSME)
   - Entry
     April 2009.
2. Prof. S. Chaudhury
   - Name of Incubating Unit
     Genesis Location Services (P) Ltd.
   - Technology/product/process in incubation
     Location based products and services
   - Funds sourced
     Rs. 20.00 lakh (TBD)
   - Entry
     January 2011

4.6 Availability and access to student's workships, "tinkering laboratories" so that they may pursue their own ideas.

1. **EEL100:** In the new curriculum a small mini-project component is included for the students to explore something new in terms of control of a small toy motor or construction of a simple digital circuit, relay or an amplifier etc. Students can access lab anytime.
2. **Design/ Practical Experience (NDN100):** Objective of this non-graded core component is to give opportunities to students to acquire substantial design/ practical experience both as a part of formal course as well as is an informal setting before they graduate. Second and even more important objective of this course is to inculcate design thinking among students and facilitate them to gain some design related experience. Students can choose to work on a research/ development project under any faculty member in the Institute of their choice and get credits for the same towards final degree requirement.
3. **A course in the old curriculum, EEN110:** Introduction to Electrical Engineering, is the new curricullam has been expanded in scope include all disciplines of engineering. In fact now it is being offered as two non-graded courses namely:

(i) Introduction to Engineering (NIN100).
(ii) Introduction to Programme.

Whereas the first course would involve listening of lectures, developing project reports based upon self-study, visit to laboratories (in and outside the Institute) and Industry and also executing simple scientific or engineering project, the second one would be discipline specific activities like project & seminars.

4. **EE211/EEP221:** Design activities related to various aspects and applications of Electrical Engineering/ Electrical Power Engg.
5. **EED310 Mini Project:** This one semester course, basically is a project activity, emphasizing design, in any area of Electrical Engineering under the guidance of a faculty member.
6. **Electronics Hobby Club:**

   Aim of the Club:

   - To provide students with a functional knowledge of electronics and to impart them with practical knowledge related to digital and analog circuit design.
   - This promotes participation in circuit design competitions. To form teams from amongst club members to participate in the competitions.
   - To give an overview of the emerging areas in electronics.

   Structure of events:

   - Lectures on technical topics – given by Faculty, Ph.D students, M.Tech students. Industry personnel are invited to give lectures for exposure to application specific work.
   - Workshops and competitions – in parallel with the lectures, events are scheduled. These are conducted through problems to the participants. These problems are designed such that majority of them can be realized in hardware and presented. Some of thes may be in the form of "Proof of Concept" wherein simulation based studies can be suffice.
   - Arrange a presentation of an overview of emerging areas as also research areas of Professors – may include brief overview on various branches in electronics as well. Students are given an opportunity to interact with a faculty member working in the area of his/her interest. These lectures are not intended to be highly technical in nature, only an overview should suffice.
7. **Embedded Systems lab:** It is freely accessible to students for exploring ideas – they are specially encouraged to build, innovate and prototype through the Internship Program GIPEDI.

4.7. No. of students/teams who have competed in national / international competitions, and outcome.

1. Sultan Siddiqui and G.S.Visweswaran, "600 MHz 18 Kb Ternary Content Addressable Memory", this design won the best design award of Rs.1,00,000/- in the CADENCE Design contest in 2009.
2. 3 Ph.D students competed for POSOCO award. 2 M.Tech students competed for POSOCO award, of Dr. N.Senroy.

3. 1 team (Four students) – Arpan Phull, Praval jain, Nitin Upadhyay, Anurag maheshwari – were awarded "Honorable Mention" citation and a cash prizeof USD $ 1000 in IEEE Computer Society International Design Competition CSIDC-2003, a global design competition among teams from 172 educational institutes world-wide [awarded at Washington DC, USA on 2 July 2003].

5) R & D Environment

5.1. No. of post-doctoral scholars hired in the department/centre and their durations, from (i) abroad, (ii) on project, and (iii) others, and outcomes.

None

5.2. No. of foreign students enrolled in (i) Masters, and (ii) Ph.D programmes.

(i) Masters: 02, (ii) Ph.D: 03

5.3. No. of Indian and foreign faculty/researchers who have spent a sabbatical in the department.

None

5.4. Sabbatical taken by faculty and where spent.

1.	Prof. K. R. Rajagopal	1.01.2009 to 31.12.2009	IIT Delhi, To start a Company under TBIU of FITT/IITD & Book writing
2.	Prof. P.R.Bijwe	1.08.2009 to 31.07.2010	IIT Delhi, Book writing
3.	Prof. R.K.P.Bhatt	2.08.2010 to 31.12.2010	IIT Delhi, Book writing
4.	Prof. R.K.Patney	1.02.2011 to 31.07.2011	IIT Delhi, Book writing
5.	Prof. I.N.Kar	26.07.2011 to 15.06.2012	IIT Delhi, Book writing
6.	Prof. S.Chaudhury	10.07.2013 to 9.07.2014	IIT Delhi, Book writing

5.5. Number of seminars (education and research separately) given by the faculty (i) in the department, (ii) in other departments, (iii) at other institutions.

Seminar given in the Department:

S. No.	Name of Faculty	Seminars	
		Education	Research
1.	Prof. Subrat Kar	07	
2.	Dr. S. Agarwal		01
3.	Dr. S. Dutta Roy	01	
4.	Prof. Jayadeva	20	
5.	Dr. S. Janardhanan	03	03
6.	Dr. Uday Khankhoje		01
7.	Dr. Shaunak Sen		03

Seminars given in other Department:

S. No.	Name of Faculty	Seminars	
		Education	Research
1.	Prof. M.Hanmandlu	02	
2.	Prof. Subrati Kar		02
3.	Prof. Jayadeva	05	

Seminars given at other institutions:

S. No.	Name of Faculty	Seminars	
		Education	Research
1.	Dr. S. Agarwal	03	02
2.	Dr. A.R.Abhyankar	07	17
3.	Prof. V.K.Jain	02	02
4.	Dr. B.K.Panigrahi	08	07
5.	Dr. S. Dutta Roy	34	
6.	Dr. Manav Bhatnagar	05	05
7.	Prof. Sukumar Mishra	25	10
8.	Prof. S.D.Joshi		14
9.	Dr. N. Senroy	03	07
10.	Dr. Swades De		08
11.	Prof. Bhim Singh		58
12.	Prof. Jayadeva	15	
13.	Prof. I.N.Kar	03	04
14.	Prof. G.Bhuvaneswari	08	22
15.	Dr. S. Janardhanan	01	04
16.	Dr. Uday Khankhoje		06
17.	Dr. Shaunak Sen	04	02
18.	Prof. K.R. Rajagopal		06

5.6. No. of faculty/researchers/scholars invited by the department for giving (i) seminars, (ii) spending at least a week in the department.

1. Dr. Vijay Gupta, Department of Electrical Engineering, University of Natre Dame, Indiana, USA delivered a seminar titled 'On Control with Time-varying Processor Availability' on 8.02.2013.
2. Hiroyuki Asahara, Fukuoka University, Japan
3. Gaurav Gandhi, mLabs India
4. Pulkit Grover, CMU, USA
5. Amit Bhaya, UFRJ, Brazil
6. Le Yi Wang, Wayne State University, USA
7. Tokunbo Ogunfunmi, Santa Clara University, USA
8. Niket Kaisare, ABB, India
9. Prof. C.T.Lin ,Taiwan
10. Prof. Hishao Ishibuchi ,Japan
11. Prof. N.R.Pal, India)
12. Prof. Amit Bhaya, Federal University of Rio de Janeiro: on 3 occasions for 1-3 weeks each time.

Apart from the above list a list of IEEE Seminars/Lectures/Talks is attached as an ***appendix No. 03)***.

5.7. No. of faculty/researchers who visited the department on their initiative for giving (i) seminars, (ii) spending at least a week in the department.

1. Dr. Pulkit Grover, Department of Electrical and Computer Engineering, Carnegie Melon, University, Pennsylvania, USA delivered a IEEE CAS/CS siminar titled 'Fundamental limits on communication energy via Information-fromction' on 4.09.2013.
2. Faculty members from University of Bordeaux, France.
3. Prof. Saifur Rahman, Prof. Dusan Boroyevich, faculty members from Virginia Tech.
4. Prof. Ned Mohan from University of Minnesota at Minneapolis
5. Prof. B.K.Bose from University of Tennessee at Knoxville, USA
6. Prof. S. P. Bhattacharyya, Texas A&M University, USA; To give a seminar on "New Approaches to the Design of Fixed-Order Controllers.
7. Arjun P. Sridhar, Post-doctoral fellow, RMIT Australia: approximately for 6 months.

5.8. Adequacy of research infrastructure.

Adequacy of research area group-wise are given below:

- ***Control Group:***

  The Control group has 6 faculty actively engaged in research on complex networked feedback systems in domains ranging from distributed multi-agent vehicle formations in robotics to the design of biomolecular circuits. This effort utilizes a combination of rigorous theoretical expertise and advanced laboratory infrastructure. Current infrastructure includes a high-end computational facility for analyzing complex multiscale system behaviour as well as a testbed for investigation of multi-agent vehicle formations. Ongoing work is to develop a laboratory facility for experimental investigations on measuring dynamics of biomolecular circuits inside living cells. Planned work is to augment the multi-vehicle test-bed to include new types of vehicles and formation capabilities and will require expansion of available facilities. In particular, enhancement of existing research infrastructure is essential for continuation of ongoing work and proper execution of planned work, to push the envelope of available state of the art.

- ***IEC Group:***

  The IEC group has 10 faculty members working on electronic circuits and devices. The vision of the group is to pioneer in the domain of efficient circuits and optimized devices. For the vision to be achieved the research infrastructure like tools from SMDP programme, relatively good student researchers, space, a healthy/friendly working environment are already made available. However there are certain areas where the research infrastructure could be improved. The administration has to become proactive and create the necessary environment, to facilitate research. Currently it is observed that administration units are taking a much longer time to process the papers and lacks in transparency. An online monitoring system and a time bound clearance of the files will be very helpful. The amount of paper works involved with either purchase or hiring must be reduced. Trained man power to assist the researcher with paper works as well as

maintenance of the research lab is an asset. Administration should think of ways of providing them to group of researchers. The information regarding inventory of the department/institute must be well indexed and easily available for optimal utilization.

Another concern is the institute seed money for research which is fixed irrespective of the area of research for which the person is hired. This one size fits all approach consistently discriminates against new faculty who are experimentalists and creates long startup delay times, which are very harmful to productivity and relevance of faculty work (especially those doing fabrication of devices). The processing of the research grant is also very slow. The crunch in the availability of lab space is another serious problem, and creates yet another level of delays.

To perform research in VLSI, as well as to train our students in VLSI, we are required to fabricate state-of-the-art integrated circuits. Unfortunately, there aren't too many faunding sources for consumables. The Institute has a lot of funds for equipment; agencies such as the DSTare happy to sponsor equipment; unfortunately securing funding for each integrated circuit that we fabricate is an uphill task. For active research in VLSI it is imperative that we have a secure source for routine funding of our integrated circuit fabrication costs – unfortunately this is consumable.

Lastly an important element in research infrastructure is the manpower. Proper training of the manpower for research is very essential. Often the student researchers join the research group with enthusiasm, however later struggle to cope up with the work. The administration should look into allowing such students to leave with a diploma or a certificate for the courses done. This helps in creating a satisfied work force and will affect the quality of the research.

- ***Communication Group:***

  Currently there are 16 faculty in the communications group working in diverse areas like communications engineering, signal processing, photonics and optical communication. The current research infrastructure is adequate in some respects but is also lacking in several aspects.Though we have sufficient space for our PhD students, there is a need for more working space for our MTech and MS(R)students. There is also an immediate need for technical staff since two of our current staff are going to retire very soon. We have been getting reasonably good students for our various programs but we feel that the quality of our student pool could be significantly increased by conducting various outreach programs involving the major colleges and universities of Delhi and elsewhere. It would be very nice to have more funds available for this purpose. Doing good research also requires offering of specialized courses for our MTech and PhD students. However, the current classroom facilities are not adequate in this regard. A significant amount of investment is needed to bridge this gap. Last but not the least, we also need common computing facility which could be used by all faculty and students of our group. This will help a lot in avoiding duplication of effort thereby saving a lot of valuable time and energy.

- ***Power Group:***

  The research labs within the Power Group are as follows – ***i***) Power System Core Lab, ***ii***) Power System Simulation Lab, ***iii***) UG Machines lab, ***iv***) PG Machines lab, ***v***) Drives lab, ***vi***) Power Electronics lab, ***vii***) PEEMD Project lab, and ***viii***) Special Machines lab.

  The Power system simulation lab is equipped with high speed PCs that have installed in them the latest modeling, simulation and optimization software. Some of these include PSS/E, DigSILENT PowerFactory, ETAP, GAMS etc. In addition, an OPAL RT based

real-time digital simulator is also present. The Power system core lab consists of various FACTS devices, dSPACE kits and solar PV array for research purpose. Currently research scholars, post-graduate and undergraduate students use these labs for conducting research on advanced protection, smart grids, renewable energy, power system economics and optimization. Some emerging areas of research in power systems include smart grids, wide area measurement, protection and control systems, renewable and distributed generation, microgrids and high performance intelligent computation and simulations. For this purpose, looking at the expected growth in terms of researchers and students, approximately 2,500 sq ft of lab space is urgently required.

UG machines lab: This lab is used by Masters and Ph.D students for simulation and implementation of electric machine drives research. We have variety of machines setups for UG Laboratory and research. 3-phase PWM voltage source inverters and matrix converters are available to students for research. Control circuit and current and voltage sensing circuits are invariably built by the students. For students who are implementing their projects in hardware, few controllers such as DSPIC, TIDSPLF2407/2812 TMSLF2812 and DSPACE systems are currently available.

PG machines lab: This lab has a variety of machines like DC, induction and synchronous machines and special machines like PMSM, PMBLDC, SRM and Stepper motors. There are also generalized machine sets that can be configured as AC or DC machines. Fundamental machine related experiments are conducted in this lab capturing the starting/ running characteristics with current/voltage sensors, CROs and power quality analyzers. NI Labview software tools are there for both instrumentation and control. Machine design software like SPEED, Maxwell etc. are also installed in this lab to enable the students to design and analyze machines.

Drives lab: This lab has VSI fed induction motor drive, stator voltage controlled induction motor drive, pole changing cage motor, rectifier fed DC motor drive, rotor resistance controlled wound rotor induction motor drive and special machines like PMSM, PMBLDC, SRM and Stepper motors. Experiments related to different methods of starting and braking are conducted in this lab. For simulation purposes, PSIM and SIMULINK are extensively used. Measurement and characterization are done using current/voltage sensors, CROs and power quality analyzers.

Power Electronics lab: This lab has controlled and uncontrolled AC-DC converters along with firing units, DC-DC converters of different isolated and non-isolated configurations, AC voltage controller unit with control circuit, single-phase and 3-phase PWM voltage source inverters, multi-level converters, current source converters and matrix converters. Experiments related to device characteristics and different types of converters are carried out capturing the device/converter characteristics with current/voltage sensors, CROs and power quality analyzers. For simulation purposes, PSPICE, PSIM and SIMULINK are extensively used. For students who are implementing their projects in hardware, different types of microcontrollers such as DSPIC, ADMC 401, 80196 and TIDSP 2812 and 2407 are used. DSPACE is also available in the lab which is being used by the research students for implementation purposes.

PEEMD project lab: This lab is extensively used by Masters and Ph.D students for simulation of power electronics and drives systems. Several controlled and uncontrolled

AC-DC converters, full-bridge and half-bridge DC-DC converters, AC voltage controllers, single-phase and 3-phase PWM voltage source inverters, multi-level converters, current source converters and matrix converters are there in this lab which are used by the students to build improved power quality converters for drives or STATCOMS and other power quality conditioners. Control circuit and current and voltage sensing circuits are invariably built by the students. Control algorithms are also developed by the students. For simulation purposes, PSPICE, PSIM and SIMULINK are extensively used. For students who are implementing their projects in hardware, different types of microcontrollers such as DSPIC, ADMC 401, 80196 and TIDSP 2812 and 2407 are used. DSPACE (2 units) and opal-RT are also available in the lab which is being used by the research students for implementation purposes.

- ***Computer Group:***

  Current infrastructure:

  We have 7 labs associated with the group: Multimedia Lab, Protocol Lab, Embedded Systems Lab, Computer Technology Lab, IT Lab, Vision Lab, Robotics Lab. There are a number of sponsored research projects being carried out by members of the group, and largely as part of these the group has acquired a variety of equipment, such as Computing Resources, Multimedia data Acquisition and Presentation Systems, SoC based development tools, FPGA kits and tools, Micro-controller based system development tools, Logic Analyzer, and a High Speed / high bandwidth Oscilloscope.

  Desirables:

  We have only two full-time technical staff associated with these labs; the rest are being managed by contract staff or part-time M.Tech. students. The staff are also not adequately trained. Ideally, at least 5 more qualified and trained lab staff members are needed to ensure efficient functioning of the 7 labs listed above. Also, current labs are limited to about 20 seats each, whereas the undergraduate batch size has grown to 100 or more; so for undergraduate labs we need much more space to be able to accommodate the entire batch in one or at most two slots, rather than having to create large numbers of slots that eat up lab time and resources. More seating space is also needed for research students, both Master's and Ph.D.; at present we are unable to provide a dedicated desk/computer to all of them. In terms of equipment, the primary requirement in the group presently is for more server-class computing systems with large memory and storage (these could be at the Departmental level), for computation-intensive research initiatives, which are becoming increasingly prominent.

5.9. Adequacy of technical staff – existing numbers and competency areas; competency areas in which there is a shortage.

We have 8 teaching labs, 11 teaching plus research labs, and 5 research labs . We only have 15 technical staff. We urgently need additional technical staff in all areas, namely Control, Communication, Computer technology, Integrated Electronics & Circuits, and Power. We need at least 15 additional technical staff.

S.No.	Lab. Name	Location	No. of Tech. Staff	Technical Staff
1.	Power System &	MS-104	01	Mr. Tara Chand

	Electromechanics lab			
2.	Power systems Simulation lab.	II-137		
3.	UG Machine Lab.	II-133	02	Mr. Dhanraj Singh Mr. Suresh Chandra
4.	PG Machine Lab.	II-116	01	Mr. Sri Chand
5.	Drives Lab.	II-113		
6.	PEEMD Project Lab.	II-113		
7.	Instrumentation/ Special Machines Lab.	II-122/ II-116		
8.	Power Electronics Lab.	II-104	01	Mr. Gurcharan Singh
9.	Control Lab.	II-214	01	Mr. Sunil Kumar
10.	Multimedia Lab.	II-405	01	Mrs. Usha Bhola
11.	Embedded Lab.	II-320	01	Mr. Deepak Priyadarshi
12.	IT Lab.	II-221		
13.	Robotics & Computer Lab.	II-305		
14.	Bio-metrics Lab.	II-339		
15.	Core Electronics & Circuits Lab.	II-401	02	Mr. Pitram Ms. Usha Devi N
16.	UG Electronics Lab.	II-402		
17.	Opto-electroncis Lab.	II-205	01	Mrs. Neeru Asija
18.	Photonics Lab.	IIA-303		
19.	Communication Lab.	MS-202	02	Mr. S.K.Gandhi Mr. Sunil Khanna
20.	Microwave Lab.	MS-210		
21.	DSP Lab.	IIA-319		
22.	Departmental Workshop	II-111	01	Mr. Jagbir Singh
23.	Cyber Lab.	II-304	01	Mr. Ritwik Pahari
24.	Protocol Lab.	II-339 B		

5.10. Work space available for (a) Masters students, (b) Ph.D students, (c) prject staff, (d) post doctoral scholars.

No separate space available. All students seat in the lab.

5.11. No. of national conference/workshops/seminars attended by Ph.D students (*total and per students for 5 years*).

No of conference attended : 37

S.No.	Name & Entry No.	Conference Name	Place	Date
1.	Sandeep Madishetti 2010EEZ8059	Workshop conducted by TI in DTU	Delhi	Dec. 2012
2.	Sandeep Madishetti 2010EEZ8059	Workshop conducted by OPAL-RT	Delhi	Dec. 2013
3.	Swati Narula 2010EEZ7522	Conference in SLIT & KNIT	Sultanpur	2012
4.	Swati Narula 2010EEZ7522	Conference in SLIT & KNIT	Sultanpur	2012
5.	Anoop C. Nair	UKIWCWS, Delhi 2009	Delhi	Dec. 2009

	2005EEZ8005			
6.	Anoop C. Nair 2005EEZ8005	ACM Mobicom India, 2009	India	Sept. 2009
7.	V. Rajabopal 2008EEZ8030	Joint International Conference on Applied Systems Research and XXXIII National Systems Conference (ASR-NSC 2009)	Dayalbagh, Agra	Nov. 27-29,2009
8.	Sanjeev Singh 2007EEZ8203	Joint International Conference on Applied Systems Research and XXXIII National Systems Conference (ASR-NSC 2009)	Dayalbagh, Agra	Nov. 27-29,2009
9.	Sanjeev Singh 2007EEZ8203	National Conf. on Recent advances on Computational Techniques in Electrical Engineering	SLIET Logowal, India	March 19-20, 2010.
10.	Ashish Shrivastava 2006EEZ8260	National Conf. on Recent Advances on Computational Techniques in Electrical Engineering	SLIET Longowal, India	March 19-20, 2010.
11.	Ashish Shrivastava 2006EEZ8260	4th National Power Electronics Conference, PEC-2010	IIT Roorkee	June 10-13, 2010
12.	Sanjeev Singh 2007EEZ8203	4th National Power Electronics Conference, PEC-2010	IIT Roorkee	June 10-13, 2010
13.	V. Rajagopal 2008EEZ8030	4th National Power Electronics Conference, PEC-2010	IIT Roorkee	June 10-13, 2010
14.	Shikha Singh 2009EEZ8609	National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011)	Longowal, India	Feb. 25-26, 2011
15.	Ashish Shrivastava 2006EEZ8260	National Conference on Recent Advances in Computational Techniques in Electrical Engineering (RACTEE-2011)	Longowal, India	Feb. 25-26, 2011
16.	Shikha Singh 2009EEZ8609	National Conference on Emerging Trends in Electrical and Electronics Engineering (ETEEE-2011)	KNIT Sultanpur, India	Nov. 26-27, 2011
17.	Shailendra Sharma 2008EEZ8414	National Electrical Engineering Conference (NEEC-2011)	DTU, Delhi	Dec. 16-17, 2011

18.	Sabha Raj Arya 2010EEZ8642	National Electrical Engineering Conference (NEEC-2011)	DTU, Delhi	Dec. 16-17, 2011
19.	Swati Narula 2010EEZ7522	National Electrical Engineering Conference (NEEC-2011)	DTU, Delhi	Dec. 16-17, 2011
20.	Ashish Shrivastava 2006EEZ8260	National Electrical Engineering Conference (NEEC-2011)	DTU, Delhi	Dec. 16-17, 2011
21.	Chinmay Jain 2012EEZ8126	37th National Systems Conference (NSC-2013)	IIT Jodhpur	Dec. 05-07, 2013
22.	Vashist Bist 2010EEZ7559	37th National Systems Conference (NSC-2013)	IIT Jodhpur	Dec. 05-07, 2013
23.	Sabh Raj Arya 2010EEZ8642	37th National Systems Conference (NSC-2013)	IIT Jodhpur	Dec. 05-07, 2013
24.	Swati Narula 2010EEZ7522	IEEE IICPE-2012 in Dec 2012, Power India Conference-2012 and IICPE-2010 in Jan 2011	Delhi and Murthal	Dec 6-8, 2012; Dec 19-22, 2012; Jan 28-30, 2011.
25.	Shikha Singh 2009EEZ8609	IEEE IICPE-2012, Power India Conference 2012, and IICPE in Jan 2011	Delhi and Murthal	Dec 6-8, 2012; Dec 19-22, 2012; Jan 28-30, 2011.
26.	Sandeep Madishetti 2010EEZ8059	Power India Conference 2012	Murthal	Jan 28-30, 2011.
27.	Neeli Satyanarayana 2008EEZ8035	Intl. Conference on Control, Robotics and Cybernetics 2011	New Delhi, India	19.03.2011 to 20.03.2011
28.	Pyare Mohan Tiwari 2008EEZ8038	12th International Workshop on Variable Structure Systems	Mumbai, India	12.01.2012 to 14.01.2012
29.	Shahkar Ahmad Nahvi 2010EEZ8056	2012 IEEE International Conference on Signal Processing, Computing and Control	Shimla, India	15.03.2012 to 17.03.2012
30.	Neeli Satyanarayana 2008EEZ8035	International Conference on Control, Computing, Communication and Materials 2013	Allahabad, India	03.08.2013 to 04.08.2013
31.	Prabhmandeep Kaur 2012EEZ8124	International Conference on Emerging Technologies in Electronics and Communication (ICETEC)	GNDU, Amritsar	20-22 Dec, 2013
32.	Sanat Sarangi	2013 IEEE International	Bangalore, India	17-19,

	2009BSZ8524	Conference on Electronics, Computing and Communication Technologies (CONECCT)		Jan. 2013
33.	P. Gopal 2012BSZ8160	India Photonics 2012	Chennai	Dec 9-11, 2012
34.	P. Govindraj 2012BSZ8324	India Photonics 2012	Chennai	Dec 9-11, 2012
35.	Saurabh Gupta	Intl. Conf. on Recent Trends in Information Technology, ICRTIT 2011	Chennai	3-5 June, 2011
36.	V. Pramod	Intl. Conf. on Recent Trends in Information Technology, ICRTIT 2011	Chennai	3-5 June, 2011
37	Sanat Sarangi 2009BSZ8524	1st Int. Conf. on Networks and communications, NetCom 2009	Chennai	2009

5.12. No. of international overseas conference/workshops/seminars attended by Ph.D students (*total and per student for 5 years*).

No of overseas conference attended : 30

S.No.	Name & Entry No.	Conference Name	Place	Date
1.	Ankit Dubey 2010EEZ8631	IEEE Globecom-2013	Atlanta, Georgia	9.12.13 to 13.12.13
2.	Naren Bharatwaj V 2009EEZ8432	ICPS 2013 Conference	Kathmandu, Nepal	28.10.13 to 30.10.13
3.	R. Prashanth 2010EEZ8051	6th International IEEE, EMBS Conference on Neural Engineering	USA	6.11.13 to 8.11.13
4.	Vashist Bist 2010EEZ7559	5th International Conference on Power & Energy Systems	Kathmandu, Nepal	28.10.13 to 30.10.13
5.	Soumik Sarkar 2010EEZ8052	52nd IEEE Conference on Decision and Control	Firenze, Italy	10.12.13 to 13.12.13
6.	Deepak Mishra 2012EEZ2429	IEEE PIMRC' 2013	London, UK	7.9.13 to 12.9.13
7.	Sushrant Monga 2008EEZ8329	26th IEEE International System on Chip Conference-SOCC	Erlangen, Germany	3.9.13 to 9.9.13
8.	K. Kaushik 2012EEZ8322	Conference on Personal, Indoor and Mobile Radio Communication (PIMRC) 2013	London, UK	8.9.13 to 11.9.13
9.	Jeevanand .S 2008EEZ8324	IEEE IAS Annual Meeeting 2012	Las Vegas, Nevada, USA	7.10.12 to 11.10.12
10.	Pravesh Biyani	IEEE ICASSP	Taipel, Taiwan	20.4.09 to

	2006EEZ8262			23.4.09
11.	Koena Mukherjee 2011EEZ8051	Europian Control conference, ECC2013	Zurich, Switzerland	17.07.13 to 19.07.13
12.	Neeli Satyanarayana 2008EEZ8035	Intl. Conference on Modeling, Identification and Control 2012	Wuhan, China	24.06.2012 to 26.06.2012
13.	Mohammad Abid Bazaz 2010EEZ8667	Intl. Conference on Power, Signals, Control and Communication 2012	Trissur, India	03.01.2012 to 06.01.2012
14.	Hitesh Shrimali 2006EEZ8264	International Symposium for Circuits and Systems (ISCAS -2011)	Rio-de-Janeiro	May 2011
15.	Sushrant Monga 2008EEZ8329	International Symposium for Circuits and Systems (ISCAS -2012)	Korea	May 2012
16.	Sushrant Monga 2008EEZ8329	IEEE System-on-Chip (SoC) conference -2013	Munich, Germany	Aug 2013
17.	Anoop C. Nair 2005EEZ8005	MOBICOM 2009	Beijing, China	Sept. 20-25, 2009
18.	Anoop C. Nair 2005EEZ8005	IEEE ICNP	New Jearsy, USA	Nov. 2009
19.	S. Velmurugan	First North American Conference on Precision Dairy management	Toronto, Canada	March 21-24, 2010
20.	Hemani Kaushal 2007EEZ8098	WASET	China	Feb 2099
21.	Hemani Kaushal 2007EEZ8098	International Symposium on Optical Engineering and Photonic Technology (OEPT 2009)	Orlando, USA	July 10-13, 2009
22.	Hemani Kaushal 2007EEZ8098	International Conference on Intelligent and Advanced Systems (ICIAS2010)	Kualalumpur	2010
23.	Hemani Kaushal 2007EEZ8098	Intl. Conf. on Future Computer and Communication	Wuhan, China	21-24 May, 2010
24.	A. Mitra 2011EEZ8306	European Conference and Exhibition on on Optical Communication (ECOC)	London, 2013	2013
25.	P. Gopal 2012BSZ8160	Ninth International conference on Wireless Communications, Networking and Mobile Computing (WiCOM-2013)	Beijing, China	22-24, Sep., 2013

26.	P. Gopal 2012BSZ8160	International Conference on Fibre Optics and Photonics	America 2012	2012
27.	H. Kaushal 2007EEZ8098	SCET-2012	Xi'an, China	May, 2012
28.	K. Kaushal 2007EEZ8098	ICWOC 2012	Zhengzhou, China	June, 2012
29.	Sanat Sarangi 2009BSZ8524	7th IEEE Intl. Conf. on Networks (ICON 2011)	Singapore	15-16 Dec, 2011
30.	Saurabh Gupta	7th Intl. Conf. on Innovation in IT	Abu Dhabi	25-27 April 2011

5.13. No. of students who have continued to Ph.D. (i) in same dept., (ii) other departments of IITD, (iii) in India, and (iv) abroad (separately for M.Tech. and B.Tech. students).

No. of students who have continued to Ph.D :

(i) In same dept. : 18 MTech and 1 MS
(ii) In other dept. : 02 Mtech
(iii) In India : 02 MTech
(iv) In abroad : 18 MTech, 23 BTech and 6 Dual Degree

5.14. No. of projects with co-guide from industry.

Ph.D : 06, M.S.(R): 09, and M.Tech : 62.

5.15. No. of students who have been spend time in industry as part of thesis/project work (give number and duration).

M.Tech : 66, duration: 2-6 months.

5.16. Self assessment reports of the department/centres/schools if any.

None

5.17. Placement of M.Tech. and Ph.D. graduates in technical careers (*as per format at Annexure-5*).

Attached as ***appendix No. 09.***

5.18. Inter-disciplinary work: (i) joint thesis guidance by faculty across groups within a department, or across departments/centres, (ii) Proposals submitted and funded – PI – CoPI and their group/department affiliations.

(i) PhD thesis guidance across groups in the department: 10
PhD thesis guidance across department centers: 11

(ii) 'Outer Planetary Research' proposal submitted to NASA with as Co-Investigator by Dr. Uday K. Khankhoje. Other Co-Investigator are at JPL (Jet Propulsion Lab.)

Virtual Labs project (Mission Project) together with other IITs (Prof. R.Bose)

"SONT – a flexible optical access network" (proposed/Rs.2.50 Crores – Deity) negotiating with Alcatel Lucent (Prof. Subrat Kar)

"Physioligical parameter estimation in cattle using multiple sensor fusion technology" (proposed/Rs.8 Crores –ICAR) – NDRI Karnal, CBR Karnal (Prof. Subrat Kar).

"Joint Cluster Project on Web Sensor Enablement" (Proposed/Rs.9 Crores-DST)- with IIT Madras, IIT Jodhpur, DTU Delhi, MIT Madras, Amrita University (Prof. Subrat Kar).

6) Outreach / External stakeholder engagement.

6.1. Educational

(a) Workshops/Short term courses- topical research for disseminating research of IITD.

S.No.	Workshops/Short term courses (IRD)	PI	Total Fund (in Rs.)
1.	An IEEE International Electrical Workshop UKIWCWS under Engineering Research Project # RP02233	Prof. S. Prakriya	245000.00
2.	Sustainable and Renewable Energy for Power Generation	Prof. Bhim Singh	100000.00
3.	DST EPSERC Interaction meeting on smart energy grids and energy storage	Prof. G. Bhuvaneswari	1700000.00
4.	Techno Economical Challenges of Integrating renewable Energy Sources on Power System Operations and Control	Prof. S.Mishra	709750.00
5.	Computational Intelligence Theories, Applications and Future Directions	Prof. S. Chaudhury	60000.00

S.No.	Workshops/Short term courses (FITT)	PI	Total Fund (in Rs.)
1.	Indo-Canada Workshop on "Electricity Generation using Renewable Energy"	Prof. S.S.Murthy	537500.00
2.	3rd International Conference on "Pattern Recognition and Machine Intelligence (PReMI'09)"	Prof. I.N.Kar Prof. S.Chaudhury	2188250.00
3.	12th International Conference on "Rough sets, Fuzzy sets, Data mining and Granular Computing RSFDGrC 2009"	Prof. S. Chaudhury Prof. I.N.Kar	975050.00
4.	Technology Demonstartion / Exhibition for Telecom Centres of Excellence (TELECOM INDIA 2009)	Prof. S. Kar	476530.00
5.	National Photonics Fellowship Meet	Prof. S. Kar	80000.00
6.	DLF for weakly meshed distribution system	Prof. P.R.Bijwe	66573.00
7.	Workshop on SWAP for SAMSUNG	Dr. B. Lall	500000.00

(b) Workshops/Short term courses- educational methods (teaching, learning resources pedagogy)

S.No.	Workshops/Short term courses (IRD)	PI	Total Fund (in Rs.)
1.	Prof. C.S.Jha Memorial (IIT Golden Jubilee) Seminar on Effective Engg. Teaching	Prof. S.S.Murthy	100000.00
2.	Workshop on Sensor Network & web enables	Prof. S. Chaudhury	400000.00
3.	2nd UK IRDC International Workshop on Cognitive Wireless Systems (UKIWCWS-2010)	Prof. S. Prakriya	550000.00
4.	Computational Intelligence and its Applications to Smart Grid	Prof. S. Mishra	260000.00
5.	Regional Workshop	Prof. S. Prakriya	250000.00

S.No.	Workshops/Short term courses (FITT)	PI	Total Fund (in Rs.)
1.	Certificate Course on "Embedded Systems & Applications in Telecom and Multimedia"	Dr. B.Lall	830000.00
2.	Internship Program in Engineering Innovation and Design in Electrical Sciences for UG/PG students	Prof. S. Kar	55000.00
3.	Internship Program in Engineering Innovation and Design in Electrical Sciences for UG/PG Students (Batch-II)	Prof. S. Kar	70500.00
4.	Personality Development Program at Bharti School	Prof. S. Kar	83330.00
5.	Global Internship Program in Engineering Design and Innovation	Prof. S. Kar	18750.00
6.	Short term Course on "Computer Aided Design of Electrical Machines with Power Electronics Application"	Prof. S.S.Murthy	289000.00
7.	Short term Course on "Next Generation Networks"	Prof. S. Kar	475000.00
8.	Global Internship Program in Engineering Design and Innovation	Prof. S. Kar	83000.00
9.	Global Internship Program in Engineering Design and Innovation	Prof. S. Kar	53000.00
10.	Global Internship Program in Engineering Design and Innovation	Prof. S. Kar	113500.00
11.	Certification Course on "Embedded Systems and Applications"	Prof. S. Kar Dr. B. Lall	484000.00
12.	Global Internship Program in Engineering Design and Innovation	Prof. S. Kar	120000.00
13.	O&M Training for PGCIL Employees	Prof. S. Mishra	120000.00
14.	O&M Training for PGCIL Employees (T-2)	Prof. S. Mishra	100000.00
15.	O&M Training for PGCIL Employees (T-3)	Prof. S. Mishra	100000.00
16.	Global Internship Program in Engineering	Prof. S. Kar	33500.00

	Design and Innovation		
17.	O&M Training for PGCIL Employees (T-4 & 5)	Prof. S. Mishra	220000.00
18.	O&M Training for PGCIL Employess (T- 6, 7, 8 & 9)	Prof. S. Mishra	420000.00
19.	Training on C-Ethernet	Prof. S. Kar	100000.00
20.	O&M Training for PGCIL Employees (T- 10, 12 & 14)	Prof. S. Mishra	300000.00
21.	O&M Training for PGCIL Employees (T – 11 & 13)	Prof. S. Mishra	200000.00
22.	Global Internship Program in Engineering Design and Innovation	Prof. S. Kar	108500.00
23.	Switchgear (CB/CT/CVT) Maintenance –ABB Vadodara	Prof. S. Mishra	112360.00
24.	Transformer Reactor and Maintenance – ABB Vadodara	Prof. S. Mishra	112360.00
25.	Training on Transformers Reactor and Maintenance	Prof. S. Mishra	112360.00
26.	O&M Training for PGCIL	Prof. S. Mishra	200000.00
27.	Training on "Transformer Reactor and Maintenance"	Prof. S. Mishra	100000.00
28.	O&M Training for PGCIL employees (under MoU) – Switchgear (CB/CT/CVT) at CGL, Mishra Nashik	Prof. S. Mishra	100000.00
29.	Switchgear Maintenance & OLTC Maintenance	Prof. S. Mishra	200000.00
30.	O&M Training for PGCIL employees (Under MoU)	Prof. S. Mishra	200000.00
31.	O&M Training for PGCIL employees (Under MoU)	Prof. S. Mishra	100000.00
32.	Seminar on Video Codec	Prof. S.Chaudhury	100000.00
33.	Workshop on "Interactive (Human Computer) Technologies for the End-User"	Dr. S.Dutta Roy	193500.00
34.	Security Volnerabilities in Current Communication & Network Technologies	Prof. S.D.Joshi Dr. B.Lall	650000.00
35.	Workshop on Low Power Embedded System using MSP430 Microcontroller by Texas Instruments, Bangalore	Prof. G.S.Visweswaran	145500.00
36.	OFDM and Synchronization	Prof. S. Prakriya	77200.00
37.	Workshop on Sensor Network & Web Enablement	Prof. S. Kar Prof. S.Chaudhury	400000.00
38.	Workshop on Multimedia	Dr. B.Lall	250000.00

IEP ATTENDED/CONDUCTED

S.No.	IEP Topic(s)	Name(s) of the expert(s) conducting the IEP	Date/Duration	Total number of Participants attended
1	FPGA Laboratory	Prof. Kolin Paul	13th July to 17th July 2009	10

2	Low Noise Low Power OPAMP Design & Testing	Prof. G.S. Visweswaran	14th March 2011 to 19th March 2011	13
3	RF Circuits Design and Lab	Dr. S. Chatterjee	16th January 2012 to 20th January 2012	9

(c) Learning, research material on the website.

1. Info on website: http://web.iitd.ac.in/~janas/courses.html The site contains course outline and related material and some test papers and solution for the following courses:
   EEL301 – Control Engineering I.
   EEL102 – Principle of Electrical Engg.
   EEL721 – Linear Systems Theory.
   EEL704 – Robotics and Automation.
   EEL823 – Discrete-time System.
   EEL879 – Selected topics in Advanced Control (Applied Linear Algebra)-II.
   EEL829 – Selected topics in Advanced Control (Applied Linear Algebra)-I
2. Dr. Shaunak Sen: The website http://web.iitd.ac.in/~shaunak/sen contains learning and research material. Learning material includes selected lecture notes exams & assignments (with solutions), and lecture organization. This is available for
   EEL824 – Nonlinear Systems (2013-04, Sem 1)
   EEL301 – Control Engineering – I (2012-13, Sem 2)
   EEL829 – Selected topics in Advanced control & systems theory –I (2012-13, Sem 1)
   Research material contains description of our work, as well as references to our published work.
3. Dr. Amit K. Jain: My website now contains info on course floated in all semesters, student (Ph.D, ME, MS & B.Tech) registered with me in present & Past my biography is also present in my website.
4. Dr. Kushal K. Shah*:* http://web.iitd.ac.in/~kkshah contains
   - Slides for "Signals & Systems".
   - Reference papers & books for a course on "Plasmonics & NIMs".
   - Reference papes & books for a course on "Engineering Electromagnetics" & "Signals & Systems in Biology".
5. Dr. Mukul Sarkar*:* http://web.iitd.ac.in/~msarkar contains information about the courses.
6. Prof. S. Prakriya: http://web.iitd.ac.in/~shanakar.prakriya contains information for lab courses on DSP, slides for theory courses, course outlines.
7. Dr. Saif K. Mohammed*:* http://web.iitd.ac.in/~saifkm contains information about courses I have taken so far (i.e. courses at IITD and courses taken at LINK 'O' PING University Sweeden).
8. Prof. V.K.Jain*:* Course material on web:
   - UG course: EEL101 : Fundamentals of Electrical Engineering.
   - PG course: EEL860 : Wireless Communication.
9. Dr. Uday Khankhoje: http://web.iitd.ac.in/~uday
10. Dr. Abhisek Dixit*:* http://web.iitd.ac.in/~adixit Information on Compact Modeling course.

11. Dr. A.R.Abhyankar: http://privateweb.iitd.ac.in/~abhyankar contains lecture slides, tutorials, assignments, list of references for two courses:
    - EEL303 : Power Engineering I
    - EEL795 : Restructured Power Systems
12. Dr. N. Senroy: http://web.iitd.ac.in/~nsenroy Material updated: all presentations made in class (ppt/pdf). Key to Minor question papars. Guide to technical writing. Common mistakes made I preparation of technical manuscripts. Pre-major total marks.
13. Prof. R.Bose***:*** www.vlab.co.in Wireless Communication on NPTEL
14. Prof. Subrat Kar: All courses have their course material and assignments on the Sakai website http://sakai.iitd.ac.in.

(d) Science & technology for public information- on website.

www.vlab.co.in : Virtual Labs projects

(e) Courses taught to students of other IITs/NITs/Other institutions.

1. Prof. V.K.Jain - Communication Theory, 1st Sem, 12-13, NIT Delhi
2. Prof. R. Bose - IIT Mandi (May/June 2013)
   - Part of Wireless Communication
   - Part of Information Theory
3. Prof. Bhim Singh - Electrical Machines Laboratory –II for B.Tech (Elect.) of NIT Delhi (25.02.2013 to 30.04.2013)

(f) Courses taught via NKN.

1. Prof. R.Bose***:*** Letures on Virtual Labs through NKN

(g) Courses developed for NPTEL.

1. Wireless Communications: Prof. Ranjan Bose.
2. Restructured Power System: Dr. A.R.Abhyankar.
3. Industrial Drives: Prof. K.R.Rajagopal.
4. Embedded Systems: Prof. S. Chaudhury.
5. Advanced Power Electronics: Prof. Bhim Singh.
6. Communication Engineering: Prof. Surendra Prasad.
7. RF Integrated Circuits: Dr. S. Chatterjee
8. Semiconductor Devices: Prof. G.S.Visweswaran.
9. Statistical Signal Processing: Prof. R.K.Patney.
10. Multimedia: Prof. S. Chaudhury.
11. Optical Networks: Prof. Subrat Kar.
12. Control Engineering: Prof. M. Gopal
13. Digital Signal Processing: Prof. S.C.Dutta Roy

(h) Books, monographs, study material made available outside IITD.

Books

1. B. Bandyopadhyay, S. Janardhanan and S. Spurgeon (Eds.), "Advances in Sliding Mode Control - Concept, Theory and Implementation", Ser. Lecture Notes in Control and

Information Sciences, Vol. 440, p. 380, Springer-Verlag, Heidelberg, 2013, ISBN 978-3-642-36985-8
2. Yaduvir Singh and S. Janardhanan, "Modern Control Engineering", 638 p., Cengage Learning, 2010, ISBN 978-9-814-31920-1
3. Devi Chadha, "Terrestrial Wireless Optical Communications", McGraw-Hill Professional; 1 edition, March 26, 2013.
4. Subrat Kar: ETSC also has video lectures on "Optical Communication" available for sale.

(i) Experiments developed and made available to other institutions.

New Laboratories setup at IIT Ropar (faculty involved: Prof. S.D.Joshi, Prof. Bhim Singh, Prof. R.K.Mallik, Prof. P.R.Bijwe).

(j) Seminars live/via NKN, web to other institutions in India/abroad.

1. Prof. R.Bose: Letures on Virtual Labs through NKN

(k) Reach out to schools, NCERT, KVs, ets. (e.g. K-12 programmes).

Prof. Subrat Kar has (with the help of M/s Cononical, makers of Ubuntu the popular Linux based Operating System) been distributing Open Source CDs to Principals of Central Schools. Prof. Subrat Kar has distributed over 190 CDs to 25 schools so far.

(l) Mentoring of other institutions, e.g. new IITs, NITs, universities, etc. including faculty mentoring, curriculum development, laboratory development, etc.

1. New Laboratories setup at IIT Ropar (faculty involved*:* Prof. S.D.Joshi, Prof. Bhim Singh, Prof. R.K.Mallik, Prof. P.R.Bijwe).
2. IIT Delhi is one of the seven resource centres(RC) as part of the DietY initiative to spread VLSI activities across the nation in the form of a project entitled "Speacial manpower Development Project". A set of Institutions were identified across the nation to be included in the project as Participating Institutions(PI) and get an opportunity to gain strength in the area of VLSI Design and Education. The terms of reference of the project included, (i)faculty monitoring, (ii) curriculum development for courses in VLSI and associated area, (iii) develop and set up a VLSI Design Laboratory, (iv) Encourage and aid in chip design and testing. An interesting and encouraging outcome of this exercise has been the increased confidence in the faculty and students of the PIs to reach competence level in commensurate with their potential.
3. Prof. Subrat Kar was on the Board of Studies of Indraprastha Institute of Information Technology IIIT –Delhi and was instrumental in formulating their recently launched B.Tech ECE Program.

6.2. Industry collaboration

(i) No. of students (Ph.D/Masters) directly linked to industry funded projects.

01 Ph.D student (British Telecom)
02 M.S (R) (1-STM, 1-CDOT)

The following is the list of students directly linked to industry funded projects of VDTT:

2009 Entry Full - Time VDTT Students:

S. No.	STUDENT NAME	Entry No.	Sponsor's Name
1.	Arun Kumar Pilania	2009JVL2167	Intel Project
2.	Amol Gupta	2009JVL2168	SiRF Project
3.	Vinod Krishnan V.	2009JVL2172	Calypto
4.	Saravana Kumar M.	2009JVL2173	TANMIC

Part-Time (2009 Entry No.):

S. No.	STUDENT NAME	Entry No.	Organization Where Employed
1.	Ankur	2009JVL2175	Cadence
2.	Avanish Kumar Singh	2009JVL2176	Magma

2010 Entry (Full – Time) VDTT Students:

S.No.	STUDENT NAME	Entry No.	Sponsor's Name
1.	Sudarshan V.	2010JVL2097	NXP Semiconductors
2.	Divya Bhadauria	2010JVL2098	NXP Semiconductors
3.	Nigesh B.	2010JVL2099	Cadence
4.	Harijot Singh Bindra	2010JVL2100	Cadence
5.	Jasleen Kaur Ahuja	2010JVL2101	Cadence
6.	L.N.V.Lalitha Vurakaranam	2010JVL2103	EADS Project
7.	Arvind S.	2010JVL2107	IBM Project
8.	Anand Issac	2010JVL2109	MHRD Project
9.	Soumit Biswas	2010JVL2110	DST Project

Part-Time: (2010 Entry)

S. No.	Student Name	Entry No.	Organization Where Employed
1.	Sunil Mehta	2010JVL2122	Cadence
2.	Gaurav Sharma	2010JVL2123	Cadence
3.	Abhishek Chaudhary	2010JVL2124	Freescale
4.	Rohit Srivastava	2010JVL2125	Freescale

2011 Entry Full – Time VDTT Students:

S. No.	Student Name	Entry No.	Sponsor's Name
1.	Suvadip Banerjee	2011JVL2062	Texas Instruments
2.	Kumar Anurag Shrivastava	2011JVL2063	Texas Instruments
3.	Rohit Narula	2011JVL2064	Texas Instruments
4.	Suneel Sharma	2011JVL2065	ST Microelectronics
5.	Mohammad Zaid	2011JVL2066	ST Microelectronics

6.	Jobin James	2011JVL2067	Nvidia
7.	Vivek Singh	2011JVL2068	Nvidia
8.	Taher Ismailbhai Khokhawala	2011JVL2069	Indo-Brazil Project
9.	Nidhi U	2011JVL2070	Indo-Sweden Project
10.	Hima Spurthi Madineni	2011JVL2071	SiRF Project

2012 Entry Full-Time VDTT Students:

S.No.	Name of Candidate	Entry No.	Sponsor's Name
1.	Prashutosh Gupta	2012JVL2900	Texas Instruments
2.	Abhijeet S. Joshi	2012JVL2901	Texas Instruments
3.	Sneha R. Shetty	2012JVL2902	Cypress Semiconductors
4.	Lakshmi K.	2012JVL2903	Cypress Semiconductors
5.	Makar Chand Snai	2012JVL2905	Cypress Semiconductors
6.	Pratik A. Misal	2012JVL2908	Cypress Semiconductors
7.	Shivani Sharma	2012JVL2909	Cadence Design Systems
8.	Avinash Singh	2012JVL2910	Cadence Design Systems
9.	Jean Jacob	2012JVL2912	Cadence Design Systems
10.	Srikanthan H	2012JVL2913	ST Microelectronics (Analog)
11.	Sachin Jain	2012JVL2914	ST Microelectronics
12.	Kranthi Kandula	2012JVL2898	Micro Reactor Network On Chip project
13.	Siddharth Sabharwal	2012JVL2899	Embedded Learning Systems project
14.	Niharika Sachdeva	2012JVL2911	Reconfigurable Computing project
15.	Shivam Agarwal	2012JVL2906	Memory Power Modeling project
16.	M. Varun	2012JVL2907	Smart Cane/Assistive Devices project
17.	Amanpreet Kaur	2012JVL2904	System Power Optimization project

2012 Entry Part-Time VDTT students:

S. No.	Student Name	Entry No.	Organization Where Employed
1.	Rajesh Gupta	2012JVL2915	Cadence
2	Wasiq Zia	2012JVL2916	Cadence
3.	Amit Kumar	2012JVL2918	Freescale

2013 Entry (Full – Time) VDTT Students:

S. No.	Student Name	Entry No.	Sponsor's Name
1.	Muzammil Jamal	2013JVL2816	Texas Instruments
2.	Venkateswaran	2013JVL2825	Cypress Semiconductors

	Ananthanarayanan		
3.	Rajesh Karri	2013JVL2819	Cypress Semiconductors
4.	Jitesh Jagannath Poojary	2013JVL2813	Cypress Semiconductors
5.	Pawan Kumar	2013JVL2818	Nano Technology
6.	Sourajit Jash	2013JVL2824	Assistive Technologies
7.	Hameedah Sultan	2013JVL2811	Thermal Simulation
8.	Munish Kumar Jain	2013JVL2815	MHRD project
9.	Shailesh Sharma	2013JVL2820	MHRD project
10.	Sagar Shirish Shahapure	2013JVL8291	MHRD project

2013 Entry Part-Time VDTT students:

S. No.	Student Name	Entry No.	Organization Where Employed
1.	Vijit Gadi	2013JVL2826	Synopsis
2.	Jaspreet Singh	2013JVL2812	Synopsis
3.	Shashi Shankar Thakur	2013JVL2822	Freescale

(ii) No. of industry staff/engineers who have taken a regular course(s) for entire semester.
Ph.D – 61 (data for 5 years); M.Tech/MS(R) – 16 (data for 2 years).

(iii) Technology transfer to companies, entrepreneurs, local and other government/government agencies, NGOs (separately).

S.No.	Title	Inventor	Date of Grant
1.	Method of manufacturing a fiber array block for integrated optics circuits and products thereof	Prof. Sheel Aditya	1.02.2009
2.	System and method for blind multi-users (MU) detection of BPSK-DS-CDMA signals	Prof. S. Prasad	28.01.2011
3.	System and method for blind multi-users (MU) detection of BPSK-DS-CDMA signals	Prof. S. Prasad	29.12.2009

(iv) Continuing education/courses for industry.

S.No.	Course(s)	Faculty
	2008-09	
1.	Seminar on video codec	Prof. S. Chaudhury
	2009-10	
2.	Workshop on "Interactive (Human Computer) Technologies for the End-User"	Dr. S. Dutta Roy
3.	Indo-Canada Workshop on "Electricity Generation using Renewable Energy"	Prof. S. S. Murthy
4.	3rd International Conference on "Pattern Recognition and Machine Intellignece (PReMI'09):	Prof. I.N. Kar, Prof. S. Chaudhury
5.	12th International Conference on "Rough sets, Fuzzy sets, Data mining and Granular Computing RSFDGrC 2009"	Prof. S. Chaudhury Prof. I.N.Kar

6.	Technology Demonstration / Exhibition for Telecom Centres of Excellence (TELECOM INDIA 2009)	Prof. S. Kar
7.	Short Course on "Computer Aided Design of Electrical Machines with Power Electronics Application"	Prof. S. S. Murthy
8.	Security Vulnerabilities in Current Communication & Network Technologies	Prof. S.D. Joshi Dr. Brejesh Lall
9.	Short Course on "Next Generation Networks"	Prof. S. Kar
2011-12		
10.	Workshop on Low Power Embedded System using MSP430 Microcontroller by Texas Instruments, Bangalore	Prof. G.S. Visweswaran
11.	OFDM and Synchronization	Prof. S. Prakriya
12.	O&M Training for PGCIL Employees	Prof. S. Mishra
13.	O&M Training for PGCIL Employees (T-2)	Prof. S. Mishra
14.	O&M Training for PGCIL Employees (T-3)	Prof. S. Mishra
15.	Workshop on Sensor Network & Web Enablement	Prof. S. Kar Prof. S. Chaudhury
16.	O&M Training for PGCIL Employees (T-4 & 5)	Prof. S. Mishra
17.	O&M Training for PGCIL Employees (T-6,7,8 & 9)	Prof. S. Mishra
18.	Training on C-Ethernet	Prof. S. Kar
19.	O&M Training for PGCIL Employees (T-10, 12, & 14)	Prof. S. Mishra
20.	O&M Training for PGCIL Employees (T-11 & 13)	Prof. S. Mishra
21.	Workshop on Multimedia	Dr. B. Lall
2012-13		
22.	Switchgear (CB/CT/CVT) maintenance –ABB Vadodara	Prof. S. Mishra
23.	Transformers Reactor and maintenance –ABB Vadodara	Prof. S. Mishra
24.	Training on Transformers Reactor and Maintenance	Prof. S. Mishra
25.	O&M Training for PGCIL Employees	Prof. S. Mishra
26.	Training on "Transformers Reactor and Maintenance"	Prof. S. Mishra
27.	O&M Training for PGCIL Employees (under MoU)-Switchgear (CB, CT, CVT) at CGL, Mishra Nashik	Prof. S. Mishra
28.	Workshop on SWAP for SAMSUNG	Dr. B. Lall
29.	Switchgear Maintenance & OLTC Maintenance	Prof. S. Mishra
30.	O&M Training for PGCIL Employees (under MoU)	Prof. S. Mishra
31.	O&M Training for PGCIL Employees (under MoU)	Prof. S. Mishra
32.	About 32 Refresher Courses + 2 Weekend modules on a consultancy basis – on Telecom, Embedded Systems, Optical Networks.	Prof. Subrat Kar

(v) Faculty secondment to industry.

None

(vi) Research projects undertaken with industry as partner.

S.No.	Project Name	Industry Name	Funds (in lakhs)	Dt. Start	PI
1.	Hand Gesture Analysis	HP Labs India, 24 Salarpuria Arena, Hosur Main Roa	7.50	25.05.2010	Dr. S. Dutta Roy, PI Prof. S. Chaudhury,

					CP
2.	Design of 16-bit High Speed Differential Current Output D/A Converter (Sub project # 2 under MI00580)	ST Microelectronics Pvt. Ltd.	3.30	18.06.2010	Prof. G.S. Visweswaran
3.	Development of Algorithm for Detection of Spatio-temporal Discontinuity Werrors in Video	Interra Systems	15.63	30.11.2011	Prof. S. Chaudhury, PI Dr. B.Lall, CP
4.	High Resolution Time-to Digital Converter (TDC) and Range ambiguity Improvement in Time of Fight 3D-camera	Analinear Technologies	22.63	1.01.2013	Dr. Mukul Sarkar

(vii) Laboratories, equipment, etc. provided by industry for use in UG / PG teaching laboratories and student projects.

1. Some machines and drives have been donated in PG Machine and Drives lab by Rockwell Automation & Crompton Greaves Ltd
2. ST Microelectronics has set-up a laboratory as part of an MoU for VLSI Design.
3. M/s Canonical (makers of the OS Ubuntu) have donatied 100 copies of the all version of the OS since v5.02. Today, this is not a very significant thing because anybody can download the OS for free. However, when Internet access was a scarce commodity, the shipped CD provided a vital resource.
4. M/s Telelogic, a subsidiary of IBM, provided an initial free donation of 35 licenses of Telelogic Tau, which is a UML design tool. Valued then at a nominal value of over USD 30000 per license, this was a valuable boost and initiative which led to the setting up of the Protocol Engineering lab in the Computer Technology Group. This has been used by students across IITD as part of software lab and telecom software lab (Bharti) – Telelogic (35 licenses: net commercial worth USD 40000 each x 35)
5. M/s Opnet donated a initial donation of 115 licenses of Opnet which was a valuable asset in the development of the Computer networking laboratory – Opnet (115 licenses: net commercial worth USD 39000 x 115)).
6. M/s Windriver Systems donated VxWorks to the Computer Technology Groug (VxWorks – 35 licenses: net commercial worth Rs. 1.5 crores)
7. Xilinx (Software: Embedded Dev Kit, Xilinx Platform Studio, Foundation ISE, Sys Gen / DSP and Hardware: Spartan-3 XC2 Boards: net commercial worth USD 21000).
8. Altera donated Altera Quartus software + kits to the Computer Technology Group (40 UP2 kits : net commercial worth USD 60000).

(viii) Seminars/workshops held with industry by the department.

(a) Training for Power Grid engineers at Transformer & switching manufacturing site approximately 15 nos. in a year (since 2011).

(b) Certifiate Course on Embedded Systems for Multimedia and Telecom intended for professionals and educators: ten weeks, through FITT, New Delhi [24 participant], 12 Jan 2009 – 22 Feb 2009.

(c) Tutorial/ Workshop on Fuzzy Logic and Applications, Bharti School of Telecom, New Delhi, India, Nov 7-8, 2009.

(d) Short Course on Next-generation Networking (with Dr. Krishan Sabnani as Invited Speaker) with the Airtel IIT Delhi CoE in Telecom/ FITT Delhi held at IHC, New Delhi Jan 9-10, 2010.

(e) Workshop on Green telecom, with inputs from Alcatel-Lucent and TERI, Feb 8, 2011.

(f) Workshop on Green and Sustainable IT, with inputs from Alcatel-Lucent – Operating large networks and systems is becoming increasingly more complex, energy consuming and expensive. The purpose of this workshop is to bring together (a) a diverse set of researchers across academia and industry working on like-minded goals; Designing networks and systems with low operational expenses and low energy footprints (b) to form two groups of investigators from academia and industry to propose multi-objective consortium based collaborative research projects in green telecom (both in wired and wireless areas) Jun 7, 2011.

(g) Workshop on Cost-Effective Animal Management, NDRI Karnal 3-24 Mar 2012.

(h) Precision Techniques in Animal Husbandry held at IIT Delhi 30 mar 2012.

(h) Workshop on Green Telecom and IT being organized jointly by the Indian Institute of Science (IISc) and Bell Labs India in Bangalore, India April 4-5, 2012.

(i) SIG on Automotive Technologies : The Future Car Dec 11, 2012.

6.3. Professional

(a) Service as Board, Senate, selection committee member at other IITs, NITs, and Universities.

1.	Prof. R.K.Mallik	-	1. *Selection Committee Member*, NITK Suratkal, Tezpur University, IIT Kharagpur, IIT Hyderabad.
2.	Prof. Bhim Singh	-	1. IIT Roorkee (Senate) 2. Thapar Institute of Technology, Patiala (Senate & Selection Committee) 3. IIT Bhubaneswar (Selection Committee) 4. IIT Patna (Selection Committee)
3.	Prof. B. Bhaumik	-	1. IIT Mandi (member, BoG), 2. IIT Ropar (member, Faculty Selection Committee)
4.	Prof. V.K.Jain	-	1. NIT Kurukshetra, NIT Goa, 2.NIT Delhi, Gautam Budh 3. University, G. Noida (Selection Committee Member)

			4. PEC member, University of Technology, Chandigarh
3.	Prof. G.S.Visweswaran	-	1. IIT Madras, Member faculty selection committee, 2. IIT Guwahati, Member faculty selection committee 3. IIT Jodhpur , Member faculty selection committee 4. NIT Goa, Member faculty selection committee 5. NITKozhikodu, Member faculty selection committee 6. DAIICT, Member faculty selection committee 7. NIT Goa, Senate member
4.	Prof. S.D.Joshi	-	1. IIT Ropar., Member faculty selection committee at 2. NIT Kurukshetra, Member faculty selection committee 3. Member Board of Studies, RGPV, Bhopal 4. Member Board of Studies, CRUST, Murthal 5. Member Board of Studies, RTU, Kota
5.	Prof. M.Veerachary Anantpur	-	1. Member Board of Studies, JNT Univesity,
6.	Prof. G.Bhuvneswari University	-	1. Member Board of Graudate Studies, Anna
7.	Prof. K.R.Rajaopal University	-	1. Member Board of PG Studies, Shiv Nadar 2. IISc Bangalore, Selection Committee member, 3. IIT Kharagpur, Selection Committee Member, 4. IIT Bhuvaneswar, Selection Committee Member, 5. IIT Indore, Selection Committee Member, 6. VNIT Nagpur, Selection Committee Member, 7.Shiv Nadar University, Selection Committee Member. 8. Selection Committee Member, CSIR committee 9. Selection Committee Member, DRDO
8.	Prof. Jayadeva University	-	1. Selection committee member, Shiv Nadar

(b) Service as Ph.D thesis examiner at other institutions.

All Faculty members are involved as Ph.D thesis examiner at other institutions.

(c) Service as technical expert on committees- MHRD, DST, DSIR, DRDO, Pan-IIT initiatives, other ministries, state and local governments.

1.	Prof. Bhim Singh	-	1. PAC Member, DST 2. Selection Committee Member, DRDO 3. SIC member, Min. of Power
2.	Prof. V.K.Jain	-	1. Common wealth selection of MHRD

			2. Project Review and Stearing Group (PRSG) of DIT, Govt. of India. 3. Women Scientists Program of DST.
3.	Prof. S. Mishra	-	1. Expert in Women Scientist scheme of DST 2. Expert in DSIR 3. Section (5) committee member of INAE
4.	Prof. G.S.Visweswaran	-	1. Technical Programme Committee Member of Asia Pacific Conference on Circuits and Systems, 2010 2. Technical Programme Committee Member of VLSI Design Conference, India, 2009 3. Chairman, PRSG, DIT Project on UWB at NIT Trichy, 2008-2011. 4. Chairman, PRSG, DIT Project on UWB at IIT Guwahati, 2008-2011. 5. Member of PRSG, DIT Project on Centre for Analog and Mixed Signal Design at IIT Madras, IIT Kharagpur and CEERI Pilani. 2009-2012.
5.	Prof. G.Bhuvaenswari	-	1. Expert committee member of Fast Track Proposal, DST
6.	Dr. B. Lall	-	1. Technical Expert for e-challan of Delhi Traffic Police.
7.	Dr. S. Chatterjee Development	-	1. Technical expert for TDB (Technology Board).
8.	Prof. B. Bhaumik	-	1. Member of DST project review committee
9.	Prof. K.R.Rajagopal Electrical	-	1. Chairman, Project Review Committee for Vechicles, DSIR 2. Expert member, Project Monitoring committee, Electrical Vehicles, CSIR 3. Expert member, SEEP, Ministry of Power 4. Member, Ceiling fan committee, World bank
10.	Prof. Subrat Kar	-	1. PEC Member DST/ TDT for the period 2009-2013, 2. RAC panelist for DRDO 3. Department of Electronics & Information Technology (DeitY)- Member Program Review and Steeraing Group for Photonics and Optical Sensing 4. Indo-US Task Force / PAC ECMA-Switzerland (Academic Member / representing IIT Delhi on TC32- TG17/ TC32-TG14),

5. GreenTouch Consortium (Academic member / representing IIT Delhi)

(d) Technical expert on policy, regulatory, laws, standards committees.

1. Prof. Subrat Kar	-	1. Bureau of Indian Standards (BIS) Member (MHD-Health Informatics Sectioanal Committee, 2008 onwards and continuing) 2. Member (LITD 11- Fibre optics, Fires, Cables and Devices Sectional Committee) telecom Engineering Centre (TEC) /DoT – DCC – Switching (S1), 3. NWG-15 (Optical Transport Networks and Access Infrastructures) 4. Telecom Standards Development Society India – TSDSI – membership under migration from DOSTI ECMA – Switzerland (Academic member / representing IIT Delhi on TC32-TG17 / TC32-TG14).

(e) Member of Board/Advisory Board of public and private sector corporations.

1. Prof. Bhim Singh	-	1. BHEL Board
2. Dr. N.Senroy	-	1. NTPC selection committee 2. Haryana Vidut Vitaran Nigam Ltd. Selection Committee
3. Prof. S. Mishra	-	1. NTPC Selection committee 2. Haryana Vidyut Niagam
4. Prof. G.S.Visweswaran	-	1. Technology Advisory Committee Cypress Semiconductors, Bangalore
5. Prof. Subrat Kar	-	1. Member, Technical Advisory Board, PowerGrid Corporation with permission from IIT Delhi.

(f) Positions (e.g. Director, Vice Chancellor, etc.) held by faculty on lien.

1. Prof. Surendra Prasad	-	Director, IIT Delhi (2005-2011)

6.4. Contribution to national development goals

(a) Projects undertaken and their outcome.

(COMPLETED)

- ***Project title: "Special Manpower Development Project in VLSI Design – Phase II"; Sponsored by: DietY, MCIT, New Delhi; (PI- Prof. G. S. Visweswaran, Co-PI: Prof. Basabi Bhaumik)***

  Objective:

IIT Delhi is one of the seven resource centres(RC) as part of the DietY initiative to spread VLSI activities across the nation in the form of a project entitled "Speacial manpower Development Project". A set of Institutions were identified across the nation to be included in the project as Participating Institutions(PI) and get an opportunity to gain strength in the area of VLSI Design and Education. The terms of reference of the project included, (i)faculty monitoring, (ii) curriculum development for courses in VLSI and associated area, (iii) develop and set up a VLSI Design Laboratory, (iv) Encourage and aid in chip design and testing.

Achievements:

The associated PIs have been successful in getting a PG programme in VLSI Design or strengthen the existing PG programme in VLSI Design. The culture of designing circuits on Silicon and testing them as part of some of the major projects has grown to an healthy level both at IIT Delhi and the other Institution. We have also succeededin transforming some of the PIs in to potential Resource Centre for next phase of the project. As a consequence of the support received in the project the Design activities at IIT Delhi has also taken increased considerably.

(ON-GOING)

1. Project title: "Hardware Designs of Wireless System" (RP02235); Sponsored by: DST; PI: Prof. B. Bhaumik.
2. Project title: "IDRC Research Chair in Wireless Communications" (RP02253); Sponsored by: The Internation Research Chairs Initiative; PI: Prof. R.K.Mallik
3. Project title: "Personal Anthentication using Face-based Biometrics (RP02309); Sponsored by: DST; PI: Prof. M. Hanmandlu, Co-PI: Prof. H.M.Gupta.
4. Rendering locational bias to Frequency Linked unscheduled Interchange (UI) Pricing (RP.2314); Sponsored by: DST; PI: Dr. A.R. Abhyankar, Co-PI: Prof. P.R. Bijwe.
5. Project title: "Sensoriess Control of Permanent Magnet Brushless Motors" (RP02320); Sponsored by: DST; PI: Prof. K.R. Rajagopal, Co-PI: Prof. I.N.Kar.
6. Project title: "Centrally Sponsored Plan Scheme of National Mission on Education through Information and Communication Technology (Virtual labs Project Phase-II)" (RP02341); Sponsored by: MHRD; PI: Prof. R.K.Shevgaonkar, Co-PI: Prof. R.Bose.
7. Project title: "Development of Coordinated Multi WMR Systems (Sub project #2 under the main project # RP02346)" (RP02348); Sponsored by: Board of Research in Nuclear Sciences (DAE); PI: Prof. I.N.Kar, Co-PI: Prof. S. Chaudhury, Prof. S. Mukherjee, Dr. S. Janardhanan, Dr. Kolin Paul.
8. Project title: "Vision-Guided Control of a Robot Manupulator (Sub project project # 3 under the main project # RP02346)" (RP02349); Sponsed by: Board of Research in Nuclear Sciences (DAE); PI: Dr. S. Dutta Roy, Co-PI: Prof. S. Banerjee.
9. Project title: "Sampling and compression for multiview 3-D displays" (RP02359); Sponsored by: DST; PI: Prof. S. Chaudhury, Co-PI: Dr. B. Lall, Prof. S.D.Joshi.

10. Project title: “Managing Intangible Cultural Assets through Onltological Interlinking” (RP02361); Sponsored by: DST; PI: Prof. S. Chaudhury, Co-PI: Dr. B. Lall, Dr. S. Dutta Roy.
11. Project title: “Development of Robust Document Image Understanding System for Documents in Indian Scripts (OCR) Phase –II” (RP02441); Sponsored by: Department of Information Technology; PI: Prof. S. Chaudhury, Co-PI: Dr. B. Lall, Dr. S. Dutta Roy.
12. Project title: “Cross-Layer Protocols for Enhanced Quality of User Experience in Broadband Wireless Networks” (RP02458); Sponsored by: DST; PI: Dr. Swades De, Co-PI: Prof. H.M. Gupta, Dr. V.J. Ribeiro.
13. Project title: “Efficient Algorithms for global Optimization and for Learning and their Hardware Implementation” (RP02459); Sponsored by: International Division, DST; PI: Prof. Jayadeva, Co-PI: Dr. S. Chatterjee.
14. Project title: “Phenomics of Moisture Deficit and Low Temperature Stress Tolerance in Rice” (RP02487); Sponsored by: NFBSRA, Indian Council of Agricultural Research; PI: Prof. S. Chaudhury; Co-PI: Dr.B. Lall, Dr. Archana Chugh.
15. Project title: “Power Quality Improvement in Power converter Systems” (RP02506); Sponsored by: DST; PI: Prof. G. Bhuvaneswari, Co-PI: Prof. Bhim Singh.
16. Project title: “Simulation and Analysis of System Design Requirements for Ground to Satellite and Inter Satellite Free Space Optical communication Link” (RP02558); Sponsored by: ISRO; PI: Prof. Subrat Kar, Co-PI: Prof. V.K.Jain.
17. Project title: “Analysis, Design and Control of Power Electronic Converters for Grid Interfaced Solar Power Generation” (RP02583); Sponsored by: DST; PI: Prof. Bhim Singh, Co-PI: Prof. G.Bhuvaneswari.
18. Project title: “Green Sensor Networks for Air Quality Support” (RP02610); Sponsored by: Ministry of Communications & Information Technology; PI: Dr. Swades De; Co-PI: Dr. S. Chatterjee.
19. Project title: “Investigation on Interference and Power management strategies in Cooperative Relay Communications” (RP02661); Sponsored by: DST; PI: Prof. S. Prakriya, Co-PI: Dr. Swades De.
20. Project title: “G1WP1 – eAgriculture – Crop Disease mitigation and Management System (Phase 2 of RP02237)” (RP02679); Sponsored by: Internation Division, DST; PI: Prof. Subrat Kar.
21. Project title: “G1WP4 – Internet of Things – eHealth (Phase 2 of RP02237)” (RP02680); Sponsored by: International Division, DST; PI: Prof. Subrat Kar.
22. Project title: “Relay Coordination in Distribution Networks with DG Penetration” (RP02693); Sponsored by: DST; PI: Dr. B.K. Panigrahi, Co-PI: Dr. A.R. Abhyankar.
23. Project title: “Energy Harvesting from Ambient Sources for Wireless Sensor Nodes” (RP02695); Sponsored by: DST; PI: Dr. S. Chatterjee, Co-PI: Dr. Swades De.
24. Project title: “High Resolution Time-toDigital Converter (TDC) and Range ambiguity Improvement in Time of Fight 3D-camera” (RP02715); Sponsored by: Analinear Technologies; PI: Dr. Mukul Sarkar.
25. Project title: “Centre for Excellence in Low Power Design on Nanoscale Devices, Circuits and Systems” (RP02779); Sponsored by: MHRD; PI: Prof. M.J. Kumar, Co-PI:Prof. R.K.

Patney, Prof. B. Bhaumik, Prof. G.S. Visweswaran, Prof. Anshul Kumar, Prof. M. Balakrishnan, Prof. Jayadeva, Prof. P.R.Panda, Dr. Kolin Paul, Dr. S. Chatterjee.

26. Project title: "Design and Development of Robust Controller for Seamless Operation of Microgrid" (RP02808); Sponsored by: DST; PI: Prof. S. Mishra, Co-PI: Dr. N. Senroy.

(b) Policy inputs- implications, visible impact on society.

Project title: "Rendering Locational Bias to Frequency Linked unscheduled (UI) Pricing" Sponsored by : DST; (PI- Dr. A.R.Abhyankar)

"The project was aimed at providing a solution for improving the imbalance settlement mechanism in India. The committee analysing 2012 back-to-back blackouts recommended that the real time settlement (UI) mechanism needs to be reviewed. However, under the DST sponsored project being investigated by me, we had started task of improving the UI mechanism much earlier, anticipating such type of fallout of the same.

The recommendations of the work, if implemented (with grid level customisation) can be a good amount of contribution towards improving the reliability & security of the grid. Now, in the era of entire nation being one single synchronously connected grid, the system operator needs more secure and improved solutions, the UI mechanism being one of them. With the improvisation suggested, the real time operation of the grid will be less vulnerable. Thus, outcome of the project is that, its proper implementation can save a lot of money on account of improving the grid security and reliability."

(c) Entrepreneurship development.

Following faculty members have developed a company under TBIU:

1. Prof. K. R. Rajagopal
   - Name of Incubating Unit
     Global Motertech Pvt. Ltd.
   - Technologoy/product/process in incubation
     Technology based products and services in Motor Design and Analysis software
   - Funds sourced
     Rs.3.40 lakh (MSME)
   - Entry
     April 2009.
2. Prof. S. Chaudhury
   - Name of Incubating Unit
     Genesis Location Services (P) Ltd.
   - Technology/product/process in incubation
     Location based products and services
   - Funds sourced
     Rs. 20.00 lakh (TBD)
   - Entry
     January 2011

6.5. Alumni engagement

(a) Regular interactions / engagement with alumni and outcomes.

Ineraction through alumni meetings.

(b) Contributions from alumni.

1. Participation in some events as sponsors (TRYST, for example).
2. Experts for M.Tech project evaluations.
3. Ph.D co-supervisors and experts.
4. Seminars under the aegis of IEEE and other workshops.

6.6. Recognitions and Awards

(a) Awards to faculty.

1.	Prof. S. Mishra	-	1. Silver Jubilee Young Engineer Award, INAE, 2012
2.	Prof. Bhim Singh	-	1. Khosla National Award-2013
3.	Dr. S. Agarwal	-	1. INSPIRE Faculty Award, DST, 2012
4.	Dr. M.Sarkar	-	1. DST International Travel award 2. Reviewer for Optical express and optical letter.
5.	Dr. Swades De	-	1. Editor of Springer Photonic Network Communcations Journal, Feb. 2012. 2. Editor of IEEE Communcations Letters Apr. 12 3. Networks Symposium Chair, Nat. Conf. Comm. Feb. 12
6.	Dr. Amit Jain	-	1. INAE Innovative Students Projects Award: for Ph.D thesis, Oct. 2012. 2. Prof. D.J.Badkas Gold Medal, March 2013. 3. POSOCO PPSA-2013 Award, March 2013.
7.	Dr. M. Bhatnagar	-	1. Exemplary Reviewer, IEEE Comm. Letters, 2012 2. Exemplary Reviewer, IEEE Comm. Letters, 2010 3. Editor IEEE Transactions on Wireless Comm. 2011 3. Listed in "Marquis Who's Who 2009. 26th edition".
8.	Dr. N. Senroy	-	1. Teaching Excellence award, 2010
9.	Dr. S. Dutta Roy	-	1. Associate Editor, Pattern Recognition Letters (since 2011)
10.	Prof. G.Bhuvaneswari	-	1. B.K.Bose Award (2011) from IETE for significant contribution in Power Electronics.

(b) Fellows of academics, INAE, etc.

1.	Prof. R.K.Mallik	-	1. Fellow IEEE, 2. Fellow Indian Academy of Sciences, 3. Fellow INSA, 4. Fellow TWAS
2.	Prof. Sukumar Mishra	-	1. Fellow IET (UK) 2. Fellow INAE, 2009
3.	Prof. Bhim Singh	-	1. Fellow IEEE 2. Fellow TWAS 3. Fellow INSA 4. Fellow IASc

			5. Fellow IET (UK)
4.	Dr. Shaunak Sen IITD	-	1. Kusuma Young Facutly Incentive Fellowship,
5.	Prof. S. Prasad	-	1. Fellow NASI
6.	Prof. G.Bhuvaneswari	-	1. Fellow of INAE, IE(I), IETE

7) Governance

7.1. Governace

(a) Organization structure –their autonomy/terms of reference

Departmental responsibilities are distributed amongst the faculty. Current Departmental duty list is attached as ***appendix No. 10.***

(b) Planning documents developed by the department- space, faculty, staff related.

Space: The Department is facing acute shortage of space. The space requirement for the department is conveyed to the Institute. The relevant document is attached in ***appendix No. 11.***

Staff: To overcome the shortage of technical staff, Department asked for immediate recruitment for at least six technical staff. The document regarding this is attached in ***appendix No. 12.*** Recently Institute has advertised for technical posts and it is currently being processed.

Faculty Special initiative is taken by the department to recruit new faculty. In last 3 years 11 new faculty has joined as Assistant Professor and 01 as Associate Professor. Department processes faculty applications at the level of Assistant Professor every four months.

(c) Records of discussions within the department- internal documents (meeting minutes, positons papers, discussion papers, concept papers, etc.)

Meeting minutes (DFB, DRC, COP) kept in the office. Position papers, Discussion papers and Concept papers are the part of Curriculum Review and these are discussed in the Curriculum Review Committee.

(d) Physical resources- percentage utilization for UG PG core and elective teaching separately, UG and PG student projects, Ph.D student research. Projections for future.

Total Lab space in department is 36102.5 sq. ft. Out of this 34.57% (12481 sq. ft) is used for UG Teaching Lab, 10.11% (3648.5 sq.ft) for PG teaching lab, 16.24% (5865 sq.ft.) for purely research lab and 39.08% (14108 sq.ft) for overlapping research labs with teaching labs.

(e) Financial resources- (i) funds provided to the department, (ii) processes of distribution, (iii) funding for focus areas, (iv) funding for UG and PG core teaching laboratories. Outcomes of fund utilization. Changes in funding pattern and funds utilization, and effects on departmental strategy.

(i) Fund is provided to the department by the Institute.

(ii) Department has five groups (IEC, Power, Control Enigneering, Computer Technlogy & Communication Engineering), the fund is distributed amongst them.

(iii) 10 to 15% fund kept for focus areas.

(iv) The groups (IEC, Power, Control Engineering, Computer Technology and Communication Engineering) look after the UG & PG lab's requirements.

(f) Delegation of decision making within department/centre. List the processes and structures for financial and academic management, and the methodology for their review.

The financial power lies with HoD.

Administrative responsibilities for academic management is attached ***as appendix No. 09.***

7.2. Department management and operations

(a) Organization structure- mandates, flexibility, etc.

Departmental responsibilities are distributed amongst the faculty. Current Department duty list is attached ***as appendix No. 09.***

(b) Processes for curriculum planning.

The curriculum review is conducted every ten years, first a committee, comprising of faculty members from all the departments, called '*Curriculum Review Committee'* is formed under the Chairmanship of Dean (Academic Affairs). Based on feedback from Industry, faculty members, Alumni and other stake holders, this committee prepares concept paper which is finalized by having extensive discussions with departments. Once the *'Concept Paper'* is finalized, the departments are asked to frame the different programmes in tune with the concept paper. The concept paper for the recent curriculum review process and the document prepared by the EE Department are attached as ***appendix No. 01*** to provide complete picture of the process.

(c) Processes and methods for teaching resources management.

Teaching load first discussed in the group and final allocation is done in Department Faculty Board (DFB).

(d) Guest faculty, affiliation for teaching core, elective UG & PG courses.

The guest faculty are invited for teaching PG & UG core courses and specialized elective courses in each semester as follows:

1. Guest faculty from Superannuated faculty - 05
2. Guest faculty from Academic/R&D Lab/ Industry - 05
3. Guest faculty from Industry for capsule courses of 1 crdit - 05

(e) Faculty short-listing criteria.

Institute-level short-listing criteria for faculty positions:

MINIMUM SHORT-LISTING CRITERIA FOR AN ASSISTANT PROFESSOR:

- PhD. with 3 years experience (excluding the experience gained while pursuing Ph.D.),
- First class or equivalent grade in preceding degree in respective discipline, with a consistently good academic record,

- Potential for very good teaching,
- Maximum age is 35 years for male and 38 years for female candidates (to be relaxed by 5 years in case of persons with physical disability, SC and ST), and
- At least 4 refereed conference/journal papers (of which at least 2 should be in reputed journals).

MINIMUM SHORT-LISTING CRITERIA FOR AN ASSOCIATE PROFESSOR:

- Ph.D. with 6 years experience (excluding the experience gained while pursuing Ph.D.) of which at least 3 years should be as Assistant Professor or equivalent,
- First class or equivalent grade in preceding degree in respective discipline, with a consistently good academic record,
- Should have demonstrated capability for good teaching,
- At least 10 refereed conference/journal papers (of which at least 4 should be in reputed journals, out of which at least 2 in last 3 years), and
- Completed at least one sponsored R&D or consulting project as a PI, or completed two sponsored R&D or consulting project as a co-PI.

MINIMUM SHORT-LISTING CRITERIA FOR A PROFESSOR:

- Ph.D. with 10 years experience (excluding the experience gained while pursuing Ph.D.) of which either.
  a. At least 4 years should be as Associate Professor or equivalent, or
  b. At least 8 years should be as Assistant Professor or equivalent (in case of Institutions where the post of Associate Professor or equivalent does not exist),
- First class or equivalent grade in preceding degree in respective discipline, with a consistently good academic record,
- Should have demonstrated excellence in teaching,
- At least 20 refereed conference/journal papers (of which at least 8 should be in reputed journals, out of which at least 3 in last 4 years),
- Should have guided independently at least one Ph.D. student, or have guided at least two Ph.D. students jointly with other faculty/researchers, and
- - Completed:
  a. One sponsored R&D or consulting project as a PI, and
  b. One more sponsored R&D or consulting project as a PI, or two sponsored R&D or consulting projects as a co-PI.

Note:

1. *The Department/Centre/School can suitably enhance with additional criteria above the Institute level short-listing criteria for faculty positions.*
2. *In case of exceptionally outstanding candidates on some fronts, criteria on some other front(s) may be relaxed and justified by the Short-listing Committee.*

Additional criteria for the Department of Electrical Engineering:

Additional Short-listing Criteria for an Assistant Professor

1. Basic (Bachelor's/Master's) degree must be in one of the following (or in equivalent specialization):
   (1) B.Tech. Electrical Engineering

(2) B.Tech. Electrical and Electronics Engineering
(3) B.Tech. Electronics and Communication Engineering
(4) B.Tech. Control/Instrumentation
(5) B.Tech. Computer Science
(6) B.Tech. Information Technology
(7) B.Tech. Energy Studies
(8) M.Sc. Physics (Electronics Specialization)
(9) Integrated Master's degree or equivalent in these areas.
(10) The basic degree can be in any other engineering discipline or M.Sc. Physics (Electronics Specialization) with Master's and/or Ph.D. degree in Electrical Engineering/Electronics Engineering/Computer Science & Engineering for exceptional cases.
(11) In the case of specialization in Control Engineering, in view of its interdisciplinary nature, degrees in other engineering disciplines can be considered with minor area in Electrical Engineering/Electronics Engineering/Computer Science & Engineering for exceptional cases.

2. First class or equivalent grade in all degrees in respective discipline, with a consistently good academic record.

Guidelines for short-listing as special cases:

(i) High quality conference papers in lieu of journal papers.
(ii) Patents in lieu of journal papers.
(iii) Age more than 35.

Additional Short-listing Criteria for an Associate Professor

1. Basic (Bachelor's/Master's) degree must be in one of the following (or in equivalent specialization):
   (1) B.Tech. Electrical Engineering
   (2) B.Tech. Electrical and Electronics Engineering
   (3) B.Tech. Electronics and Communication Engineering
   (4) B.Tech. Control/Instrumentation
   (5) B.Tech. Computer Science
   (6) B.Tech. Information Technology
   (7) B.Tech. Energy Studies
   (8) M.Sc. Physics (Electronics Specialization)
   (9) Integrated Master's degree or equivalent in these areas.
   (10) The basic degree can be in any other engineering discipline or M.Sc. Physics (Electronics Specialization) with Master's and/or Ph.D. degree in Electrical Engineering/Electronics Engineering/Computer Science & Engineering for exceptional cases.
   (11) In the case of specialization in Control Engineering, in view of its interdisciplinary nature, degrees in other engineering disciplines can be considered with minor area in Electrical Engineering/Electronics Engineering/Computer Science & Engineering for exceptional cases.

2. At least five out of ten publications should be in refereed journals of repute.
3. First class or equivalent grade in all degrees in respective discipline, with a consistently good academic record.

Guidelines for shortlisting as special cases:

Additional three papers in reputed journals in lieu of one Ph.D. guidance singly/jointly.

Additional Short-listing Criteria for a Professor

1. Basic (Bachelor's/Master's) degree must be in one of the following (or in equivalent specialization):
   (1) B.Tech. Electrical Engineering
   (2) B.Tech. Electrical and Electronics Engineering
   (3) B.Tech. Electronics and Communication Engineering
   (4) B.Tech. Control/Instrumentation
   (5) B.Tech. Computer Science
   (6) B.Tech. Information Technology
   (7) B.Tech. Energy Studies
   (8) M.Sc. Physics (Electronics Specialization)
   (9) Integrated Master's degree or equivalent in these areas.
   (10) The basic degree can be in any other engineering discipline or M.Sc. Physics (Electronics Specialization) with Master's and/or Ph.D. degree in Electrical Engineering/Electronics Engineering/Computer Science & Engineering for exceptional cases.
   (11) In the case of specialization in Control Engineering, in view of its interdisciplinary nature, degrees in other engineering disciplines can be considered with minor area in Electrical Engineering/ElectronicsEngineering/Computer Science & Engineering for exceptional cases.

2. At least ten out of twenty publications should be in refereed journals of repute.
3. First class or equivalent grade in all degrees in respective discipline, with a consistently good academic record.

Guidelines for shortlisting as special cases:

(i) Successful supervision of one Ph.D. student jointly and three additional papers in reputed journals.
(ii) Evidence of submission of Ph.D. thesis (singly or jointly) and six additional papers in reputed journals.
(iii) In very special cases with otherwise outstanding academic/industrial/research contributions, combined experience both at Assistant and Associate Professor levels may be considered.

(f) How collectiveness of the faculty has enhanced academic output and enhanced quality, etc.

Based on the research interest the department has five research groups in the following area, namely:

1. Control Engineering
2. Communication Engineering
3. Computer Technology
4. Power Engineering
5. Integrated Electronics & Circuits

Some of the faculty members whose interest spans more than one area are member of more than one groups. Faculty member collaborates with each other depending upon common interest in specific problems. A large number of Ph.D students are supervised jointly by two faculty members either from the same group or across the groups. This enhances not only interaction amongst faculty but also research quality. Many of the major sponsored projects have upto five or more faculty members working together. There are few projects of interdisciplinary nature and have faculty members from other department across the Institute. For details please see point No.3.13.

(g) Nature, quantum and quality of support from of secretarial staff, stores and inventory management, purchases, ambience, etc.

As far as store and inventory are concern, Electrical Engineering Department is a large department with a large number of laboratories and projects. It is difficult to maintain smooth and efficient functioning of purchases and inventory management with only one staff as Store Keeper. An additional staff as Assistant Store Keeper to assist Store keeper is urgently required.

Secretarial staff need to be trained for efficient and faster office management and need to be trainned for office related softwere use. Right now, at indivisual level faculty has no secretarial help.

7.3. Facutly

(a) Faculty profile and a critique of the same.

S.No.	Faculty Name	Designation	Qualifications	Research Area
1.	Prof. B. Bhaumik	Professor & Head	B.Tech, M.Tech, Ph.D	Biological Neural Networks - Visual processing, Neuromorphic Chip Design, Analog and Mixed Signal VLSI Circuits.
2.	Prof. V. Chandra	Professor	B. Tech Ph.D	Communication Systems, Fault Tolerant Computing systems, Optical Communication.
3.	Prof. M.Hanmandlu	Professor	B.Tech, M.Tech, Ph.D	Soft Computing, Image Processing, Computer Vision, Pattern recognition, Biometrics, Medical Imaging, Surveillance, Intelligent Control.
4.	Prof. P.R.Bijwe	Professor	B.Tech, M.Tech, Ph.D	Power Systems Analysis and Optimization, Distributiion Systems Analysis and Optmization.
5.	Prof. D. Chadha	Professor	B.Tech,	Optical Communication

			M.Tech, Ph.D.	and Network, Photonics, Microwaves, Electromagnetics
6.	Prof. G.S.Visweswaran	Professor	B.Tech, M.Tech, Ph.D.	CAD of VLSI, Design of Digital, Analog and Mixed Signal VLSI Circuits.
7.	Prof.V.K.Jain	Professor	M.Sc., Ph.D.	Noise Study and Modeling, Digital Communications, Data Communications, Optical communications and Networks.
8.	Prof.Bhim Singh	Professor	B.Tech, M.Tech, Ph.D	Power Electronics, Electrical Machines and Drives, HVDC, FACTS, Power Quality, Renewable Energy, DSP Based Control of Power Converter and Drive.
9.	Prof. S.D.Joshi	Professor	B.Tech, M.Tech, Ph.D.	Statistical Signal Processing, Image Processing, Group Theoritical Approach to Signal/Image Processing.
10.	Prof.S.Chaudhury	Professor	B.Tech, Ph.D.	Computer Vision, Multimedia Systems, Computational Intelligence.
11.	Prof.M.J.Kumar	Professor	MS, Ph.D	Nanoelectronics, VLSI Device Modeling and Simulation, IC Technology, Power Semiconductor Devices.
12.	Prof. Subrat Kar	Professor	Ph.D	Photonic Switching, Optical Networks, Computer Communication Networks.
13.	Prof. Jayadeva	Professor	B.Tech, Ph.D.	Machine Learning, Neuromorphic Engineering, VLSI Design, Optimization.
14.	Prof. Ranjan Bose	Professor	B.Tech, MS, Ph.D	Wireless Communications, Broad Wireless Access, Ultra Wideband Communication (UWB), Information Theory and Coding.
15.	Prof. R.K.Mallik	Professor	Ph.D	Communication Theory and Systems, Difference Equations, Linear Algebra.

16.	Prof.K.R.Rajagopal	Professor	Ph.D.	Electrical Machines, Drives, Power Electronics, PM Brushless DC, Switched Reluctance, Stepper and Hysteresis Motors, High Effiency Induction Motors, FE Analysis and CAD, Magnetic Bearing, Motor Controllers, Electric Vehicles and Domestic Appliances.
17.	Prof. I.N.Kar	Professor	B.E., M.Tech, Ph.D.	Robust Control, Mechatronics, System Identification, Intelligent Control, Non-linear Systems.
18.	Prof.G.Bhuvaneswari	Professor	B.Tech, M.Tech, Ph.D	Power Electronics, Electrical Machines and Drives, Power Quality.
19.	Prof. M.Veerachary	Professor	B.Tech, M.Tech, D.E.	Power Electronics, High Frequency Switch-Mode Power Conversion, Fuzzy-Neuro controllers for PE systems, DSP based controllers, Object Oriented Modeling of PE systems, Development of MPPT controllers for Space/Photovoltaic sources, Photovoltaic Power conversion, Intelligent controllers for VRMs, Digital Control Theory and Applications.
20.	Prof. S. Prakriya	Professor	B.E., M.A.Sc. Ph.D	Cooperative communications, Cognitive radio, Signal Processing for Communications.
21.	Prof. Sukumar Mishra	Professor	B.Sc., M.Sc., Ph.D.	Power System Engineering, Intelligent Techniques for Control of Power System and Power Quality Studies, Renewable Energy.
22.	Dr. S.Dutta Roy	Associate Professor	B.E., M.Tech, Ph.D	Computer Vision and Image Analysis, Pattern Recognition, Audio Data Retrieval and Analysis,

				Biometrics and Bioinformatics.
23.	Dr. B.K.Panigrahi	Associate Professor	Ph.D	Power Quality, FACTS Devices, Power System Protection, AI Application to Power System.
24.	Dr. B.Lall	Associate Professor	B.E., M.E., Ph.D.	Multiscale Modeling of Stochastic Processing, Widesense Cyclostationary Process Representation, Physical layer in Wireless Communication.
25.	Dr. Swades De	Associate Professor	B.Tech, M.Tech, Ph.D	Wireless Communication Networks and Systems, Broadband Access and Routing Techniques, Performing Modeling and Analysis.
26.	Dr. M. Nabi	Associate Professor	B.E. M.Tech. Ph.D	Control Systems, Guidance and Control, Computational methods for Modeling, Simulation and Control, Finite Element Method, Distributed Parametered Systems, Flexible Structures, Electromagnetic and Coupled Systems, Electromagnetic NDT.
27.	Dr. S.Chatterjee	Associate Professor	B.Tech, M.S. Ph.D	Analog circuit design and VLSI, Analog and Digital filter design, Low power and Low voltage circuit techniques, Measurement and Instrumentation techniques.
28.	Dr. N. Senroy	Associate Professor	B.Tech, M.S., Ph.D	Power System Stability and Control, Wide area Measurement and Control, Statistical Techniques in Power Systems, Power Quality
29.	Dr. M.Bhatnagar	Associate Professor	B.E., M.Tech, Ph.D	Signal Processing for MIMO Communication Systems, Cooperative Communications, Ultra Wideband (UWB) Communications, Non-

				coherent Decoders, Cognitive Networks, Coding Theory of MIMO Communication Systems.
30.	Dr. Madhusudan Singh	Associate Professor	M.Sc., M.S., Ph.D	Flexible electronics, maskless lithography and printing methods, organic and inorganic photovoltaics, organic light-emitting diodes, nanoscale transport, sustainability, wide-bandgap semiconductors, device design and characterization.
31.	Dr. Umesh Kumar	Assistant Professor	B.Tech., Ph.D	Modeling and simulation of devices, Active and Chaotic Circuits, Analog circuits and VLSI, Analog Signal Processing, Analog Filters, Nano Electronics and Technology, Brain Simulation, Analog VLSI Realizations of Human Organs, New Devices and Circuits.
32.	Dr.S.Janardhanan	Assistant Professor	B.E. M.Tech Ph.D	Discrete-time Systems, Sliding mode control, Robust control.
33.	Dr. A.R.Abhyankar	Assistant Professor	B.E. M.Tech. Ph.D	Power System Restructing Issues, Transmission Pricing, Congestion Management, Market Models, Power System Analysis and Optimization.
34.	Dr. Anuj Dhawan	Assistant Professor	B.Tech. Ph.D	Nanomaterials, Plasmonics, Photonic devices, Biosensors, Biomedical devices, Nanofabrication, Growth and self-assembly of novel optical & electronic materials, Computational electromagnetics, Sensors: fiber-optic & chip-based, Biophotonics and bioimaging.
35.	Dr. Shubhendu Bhasin	Assistant Professor	B.E. M.S.	Nonlinear Control, Adaptive Control of

			Ph.D	Uncertain Nonlinear Systems, Robotics, Autonomous Systems, Reinforcement Learning Control, Approximate Dynamic Programming, Differential Games.
36.	Dr. Mukul Sarkar	Assistant Professor	B.E. M.Sc Ph.D	Solid State Imaging, CMOS image sensors, Bio-inspired vision systems, Neuromorphic Imaging, Analog/Digital circuit design, Optoelectronics and Photonics.
37.	Dr. Kushal K. Shah	Assistant Professor	B.Tech. Ph.D	Electromagnetic Fields, Plasma Science, Nonlinear Dynamics, Bioinformatics
38.	Dr. Shaunak Sen	Assistant Professor	B.Tech. M.S. Ph.D	Control Systems, Dynamical Systems.
39.	Dr. Amit K. Jain	Assistant Professor	B.E. M.Sc. Ph.D	Power Electronics, High Performance Electric Motor Drives, FACTS and Power Quality, Power Generation Control, Renewable Energy.
40.	Dr. Sumeet Agarwal	Assistant Professor	B.Tech. D.Phil.	Pattern Recognition and Machine Learning, Complex Networks, Systems Biology, Evolution and Evolvability, Darvinian Literary Studies, Public Health Informatics.
41.	Dr. Saif K. Mahammed	Assistant Professor	B.Tech. Ph.D.	Wireless Communication (Large MIMO Systems/Massive MIMO Systems), Communication Theory and Systems, Information Theory, Statistical Signal Processing.
42.	Dr. Turbo Majumder	Assistant Professor	B.Tech, M.Tech, Ph.D.	Network-on-chip (NoC) platforms, Multi-core processors and systems-on-chip (SoCs), Hardward acceleration, Biocomputing, High-Performance Computing

				(HPC)
43.	Dr. Uday Kiran Khankhoje	Assistant Professor	B.Tech, M.S. Ph.D	Computational Electromagnetics, Nano-photonics
44.	Dr. Abhisek Dixit	Assistant Professor	M.Tech, D.E.	Logic CMOS device design and Characterization, CMOS variability, reliability and thermal-effects, Agressively scaled CMOS embedded DRAM (eDRAM) and SRAM cells, Compact device modeling and process design kits (PDK), Modeling and characterization of Si solar-cells and modules

(b) Diversity in faculty profile by: (i) gender, (ii) category, (iii) region, (iv) Ph.D institution, (v) post-doctoral institutions worked in, (vi) organizations/industry worked in, (vii) employment prior to joining the department.

S.No.	Faculty Name	Ph.D Institution	Gender
1.	Prof. B. Bhaumik	IIT Kanpur	F
2.	Prof. V. Chandra	IIT Delhi	M
3.	Prof. M.Hanmandlu	IIT Delhi	M
4.	Prof. P.R.Bijwe	IIT Delhi	M
5.	Prof. D. Chadha	IIT Delhi	F
6.	Prof. G.S.Visweswaran	IIT Kanpur	M
7.	Prof.V.K.Jain	IIT Delhi	M
8.	Prof.Bhim Singh	IIT Delhi	M
9.	Prof. S.D.Joshi	IIT Delhi	M
10.	Prof.S.Chaudhury	IIT Kharagpur	M
11.	Prof.M.J.Kumar	IIT Madras	M
12.	Prof. Subrat Kar	IISc Bangalore	M
13.	Prof. Jayadeva	IIT Delhi	M
14.	Prof. Ranjan Bose	Univ. of Pennsylvania	M
15.	Prof. R.K.Mallik	Univ. of Southern Calfornia	M
16.	Prof.K.R.Rajagopal	IIT Delhi	M
17.	Prof. I.N.Kar	IIT Kanpur	M
18.	Prof.G.Bhuvaneswari	IIT Madras	F
19.	Prof. M.Veerachary	Uni. of the Ryukyus, Japan	M
20.	Prof. S. Prakriya	Univ. of Toronto	M
21.	Prof. Sukumar Mishra	R.E.C. Rourkela	M
22.	Dr. S.Dutta Roy	IIT Delhi	M
23.	Dr. B.K.Panigrahi	Sambalpur Univ.	M
24.	Dr. B.Lall	IIT Delhi	M
25.	Dr. Swades De	State University of New York at Buffalo	M
26.	Dr. M. Nabi	IIT Bombay	M

27.	Dr. S.Chatterjee	Columbia University	M
28.	Dr. N. Senroy	Arizona State University	M
29.	Dr. M.Bhatnagar	Univ. of Oslo, Norway	M
30.	Dr. Madhusudan Singh	Univ. of Michigan, Ann Abor	M
31.	Dr. Umesh Kumar	IIT Delhi	M
32.	Dr.S.Janardhanan	IIT Bombay	M
33.	Dr. A.R.Abhyankar	IIT Bombay	M
34.	Dr. Anuj Dhawan	North Carolina State Univ., Raleigh, NC, USA	M
35.	Dr. Shubhendu Bhasin	University of Florida, USA	M
36.	Dr. Mukul Sarkar	Technial Univ. of Delft, The Netherlands	M
37.	Dr. Kushal K. Shah	IIT Madras	M
38.	Dr. Shaunak Sen	Caltech	M
39.	Dr. Amit K. Jain	IISc Bangalore	M
40.	Dr. Sumeet Agarwal	Univ. of Oxford	M
41.	Dr. Saif K. Mahammed	IISc Bangalore	M
42.	Dr. Turbo Majumder	Washington State University	M
43.	Dr. Uday Kiran Khankhoje	Caltech	M
44.	Dr. Abhisek Dixit	IMEC/D.U.Leuven, Belgium	M

(c) Procedure for faculty searches.

The Department faculty members are on the lookout for bright faculty candidates. They try to find candidates who are about to complete Ph.D or doing Post Doctoral when they visit other institutes or attend conferences, speak to them, and follow up with them asking them to apply to IIT Delhi. They also contact bright candidates, recommemded by piers and ask them to apply to IIT Delhi.

(d) Result of faculty searches- area-wise (as in Annexure IV), number of applicants, short-listed and offered a position, their educational qualifications & experience.

S. No.	**Year**	**No. of applicants**	**No. of short-listed candidates *(for Interview)***	**Offered a position**	**Their qualifications & Experience**
1.	2009	66 (Asst. Prof.)	07	Dr. Amit Sethi Dr. Vipin Narang Dr. Bhaskar Choubey	Ph.D & 3Y 4M Ph.D & 2Y Ph.D & 3Y 1M
2.	2010	4 (Prof.) 14 (Assoc. Prof) 48 (Asst. Prof.)	03 03 08	- **Assoc. Professor** Dr. Swades De Dr. B. Lall Dr. B.K.Panigrahi **Asst. Professor** Dr. A.R.Abhyankar Dr. Manav Bhatnagar Dr. Nilesh Madhu Dr. Prashant Joshi Dr. Akhilesh Kumar	 Promoted Promoted Promoted Confirmed from Contract Confirmed from Contract Ph.D & 1Y+ Ph.D & 2Y 2M Ph.D

				Dr. Shakti Singh	Ph.D & 0Y 4M
3.	2011	2 (Prof.)	02	**Professor**	
				Prof. G.Bhuvaneswari	Promoted
				Prof. M.Veerachary	Promoted
		7 (Assoc. Prof.)	01	-	
		94 (Asst. Prof.)	15	**Asst. Professor**	
				Dr. Anuj Dhawan	Ph.D & 3Y 11M
				Dr. Munish Goyal	Ph.D & 5Y 4M
				Dr. Shaunak Sen	Ph.D & 0Y 1M
				Dr. S.Bhasin	Ph.D
				Dr. M. Sarkar	Ph.D & 1Y 11M
4.	2012	06 (Prof.)	02	**Professor**	
				Prof. S. Prakriya	Promoted
				Prof. Sukumar Mishra	Promoted
		09 (Assoc. Prof.)	05	**Assoc. Professor**	
				Dr. Manav Bhatnagar	Promoted
				Dr. N. Senroy	Promoted
				Dr. M. Nabi	Promoted
				Dr. S. Chatterjee	Promoted
				Dr. Madhusudan Singh	Ph.D & 7Y 07M
		95 (Asst. Prof.)	26	**Asst. Professor**	
				Dr. Uday K. Khankhoje	Ph.D & 1Y 03M
				Dr. Kushal K. Shah	Ph.D & 1Y 06M
				Dr. Amit Kumar Jain	Ph.D & 0Y 06M
				Dr. Prashanta K. Ghosh	Ph.D
				Dr. Ketan Rajawat	Ph.D
				Dr. Sumeet Agarwal	Ph.D
				Dr. Abhisek Dixit	Ph.D & 4Y 11M
				Dr. Saif K Mohammed	Ph.D & 1Y 11M
5.	2013	77 (Asst. Prof.)	11	**Asst. Professor**	
				Dr. Turbo Majumder	Ph.D & 0Y 01M
				Dr. Stefano Rini	Ph.D & 2Y+
				Dr. Yogesh B. Karandikar	Ph.D & 1Y
				Dr. Himanshu Tyagi	Ph.D
				Dr. R. Maheshwari	Ph.D & 1Y 06M
				Dr. Shidhartha Das	Ph.D

(e) Success in recruitment (data for last 5 years), and offers that the persons had from other IITs/IISc/TIFR.

We have recruited 12 faculty (01 Associate Professors and 11 Assistant Professors). 08 faculty are promoted for higher post (01 Professor, 07 Associate Professors) 02 faculty are confirmed for regular Assistant Professor from Contracutal Assistant Professor.

In the above recruitment the following faculty had offers from other IITs/IISc/TIFR:
Dr. Kushal K. Shah (IIT Guwahati, IIT Mandi)
Dr. M. Sarkar (IIT Guwahati)
Dr. Turbo Majumder (IIT Kharagpur)
Dr. Saif K. Mohammed (IIT Bombay)
Dr. Uday Khankhoje (IIT Bombay)

(f) Faculty lost to other institutions post selection.

S. No.	Year	Faculty lost post selection before joining	Faculty lost post selection after joining
1.	2009	Dr. Amit Sethi Dr. Vipin Narang Dr. Bhaskar Choubey	Dr. Suresh Sundaram (18.12.2009)
2.	2010	Dr. Nilesh Madhu Dr. Prashant Joshi Dr. Akhilesh Kumar Dr. Shakti Singh	
3.	2011	Dr. Munish Goyal	
4.	2012	Dr. Prashanta K. Ghosh Dr. Ketan Rajawat	
5.	2013	*Joining still awaited*	

(g) Faculty time utilization- in class, in meetings, project management, Ph.D guidance, Masters project guidance, UG project guidance.

Faculty time utilization has been **35**% in class, **10**% in meetings, **15**% in project management, **30**% thesis guidance, and **10**% in administrative work.

The time utilization of some faculty are given below:

1. Prof. S. D. Joshi - 30% teaching, 20% meeting & project management, rest 50% Ph.D, M.Tech, UG guidance.
2. Dr. Anuj Dhawan - 35% Ph.D + Masters, 35% Courses, 15% project management, 15% meetings.
3. Prof. S. Mishra - 30-40% teaching, 50% Ph.D, M.Tech, UG guidance & research and 10% for meetings.
4. Prof. M.Veerachary - 30% teaching, 30% research, 30% Ph.D, M.Tech & UG Guidance, 10% meetings,.
5. Prof. V.K.Jain - 30-40% teaching, 20% meeting & project management, 50-40% Ph.D, M.Tech, UG guidance.
6. Prof.Bhim Singh - 35% teaching, 25% meetings & project management & rest 40% for Ph.D guidance, Masters project guidance and UG project guidance.
7. Dr. S. Bhasin - 40% teaching, 10% meetings & project management, 35% Ph.D guidance, 15% Master's project guidance.
8. Dr. S. Sen - 20% in class, 10% in meetings, 20% project management, 20% Ph.D guidance, 15% Masters project guidance & 15% UG Project guidance.
9. Dr. A.R.Abhyankar - 20% in class, 5% in meetings, 20% project management, 30% Ph.D guidance, 15% Masters project guidance & 10% UG Project guidance.
10. Dr. M. Bhatnagar - 20% in class, 5% in meetings, 20% project management, 30% Ph.D guidance, 15% Masters project guidance & 10% UG Project guidance.
11. Dr. B.K.Panigrahi - 20% in class, 5% in meetings, 20% project

		management, 30% Ph.D guidance, 15% Masters project guidance & 10% UG Project guidance.
12. Prof.G.S.Viswewaran	-	35% teaching, 25% meetings & project management & rest 40% for Ph.D guidance, Masters project guidance and UG project guidance.
13. Prof. B. Bhaumik	-	Administration 50%, 25% teaching and 25% Research

(h) Level of harmony amongst department faculty.
Excellent

7.4. Students

1. Criteria for short-listing and selecting students for admission to Master's and Ph.D programmes for past 5 years.
Attached as ***appendix No. 13.***

2. Facilities provided to students and their maintenance/ management system.
All students are provided laboratory and computing access round the clock seven days in a week. All facilities are administered by Senior Research Scholars with support from Technical staff and Facutly.
M.Tech and Ph.D students are encouraged to participate in the department sponsored research activities and paid approved amount as top-up on the scholarship.

3. Mentoring seminars/sessions held for Ph.D students for prospective faculty careers.
Ph.D students give one seminar on their research work every semester. All seminars given by Ph.D students every semester are open to all students. The project evaluation for both M.Tech and Ph.D students are open to all students specializing in the relevant area.

8) Benchmarking

8.1. Identify departments/centres within IITD as peers.
1. Department of Computer Science & Engineering.
2. Centre for Applied Research in Electronics.

8.2. Identify departments/centres/schools/divisions from other IITs, IISc, NITs, private universities as peers, and reasons/criteria there for.
1. IISc - ECE, EE, CSA
2. IIT – IIT Bombay, IIT Kanpur, IIT Madras, IIT Kharagpur

8.3. Identify departments/centres from institutions in other countries as peers.
1. MIT, Department of Electrical Engineering and Computer Science.
2. Caltech, Department of Electrical Engineering.
3. Technische Universitat Munchen (TUM), Faculty for Electrical Engineering and Information Technology.

4. Ecole Polytechnique Federale de Lausanne (EPFL), Electrical Engineering.
5. The Hong Kong University of Science and Technology (HKUST), Department of Electronic and Computer Engineering.
6. Nanyang Technological University (NTU), School of Electrical and Electronic Engineering.

8.4. Define parameters for benchmarking (i) research, (ii) curriculum – separately for UG, Masters, and Ph.D programmes, (iii) teaching-learning processes.

(i) Research

1. Publications:
   (a) Conference papers - Around 150 paper per year.
   (b) Reputed Journal - Around 100 paper per year.
2. Patent - Around 10 patent per year.
3. Research project - 40 project per year.
4. Ph.D guidance - 20 students per year.

(ii) Curriculum – separately for UG, Masters, and Ph.D programmes.

The curriculum review is conducted every ten years, first a committee, comprising of faculty members from all the departments, called '*Curriculum Review Committee'* is formed under the Chairmanship of Dean (Academic Affairs). Based on feedback from Industry, faculty members, Alumni and other stake holders, this committee prepares concept paper which is finalized by having extensive discussions with the departments. Once the *'Concept Paper'* is finalized, the departments are asked to frame the different programmes in tune with the concept paper. The concept paper for the recent curriculum review process and the document prepared by the EE Department are attached here as ***appendix No. 01*** to provide complete picture of the process.

(iii) Teaching-learning processes

1. Class participation.
2. Student feedback regarding the course.
3. Class attendance.
4. Performance of the students in the exam and test.
5. For PG courses external registration from industry and research labs.

8.5. Perform benchmarking and report the analysis/findings for the last 5 (or 10) years.

Nil

9) Feedback Systems and results

9.1. System for feedback from UG students and its results.

Students give their feedback in the prescribed forms i.e. (i) Mid- semester feedback sheet, (ii) Course Appraisal Form for Lectures, (iii) Course Appraisal Form for Tutorials and (iv) Course Appraisal Form for Practicals.

Student feedback is used to make teaching more effective.

9.2. System for feedback from PG, Master's and Ph.D., students, and their outcome.

Students give their feedback in the prescribed forms i.e. (i) Mid- semester feedback sheet, (ii) Course Appraisal Form for Lectures, (iii) Course Appraisal Form for Tutorials and (iv) Course Appraisal Form for Practicals.

Student feedback is used to make teaching more effective.

Ph.D students give seminars every semester to the SRC (Student Research Committee) to obtain feedback and guidance.

9.3. System for feedback from recruiters (i) on-campus, and (ii) off-campus – separately for UG and PG graduates, and the results.

A major feedback from Industry can be accessed through the number of graduates, they employ. In last five year 120 companies have hired B.Tech graduates. Total number of B.Tech, who joined in these company, is 277 students.

In last five years 72 companies have hired Master students (M.Tech & M.S.(R)) including interdisciplinary program (JOP & JVL). Total number of Master students, who jonined in these company, is 176 students.

Also there are 32 companies who have hired both UG and PG Graduates (including interdisciplinary program). Total number of students, who joined in these company, is 197 students.

Most of the companies are recruiting our graduates more than one year in the last five years. Details regarding company student intake are given in ***appendix No. 14(a), 14(b) and 14(c)*.**

Kindly note that the data presented are of those students who have got placement through Training & Placement Cell, IIT Delhi. There are also considerable numbers of graduates who have got jobs or taken employment through off-campus selections and not through Training & Placement Cell of IIT Delhi.

9.4. Mechanism of obtaining industry feedback and the findings.

No formal mechanism for obtaining feedback is taken from Training & Placement Cell of IIT Delhi. However, from the data of our employment of our graduates in Industry, one can guess their feedback and the detail regarding this is given in point No. 9.3.

9.5. Alumni feedback mechanism and its outcome.

Alumni have been extensively involved in many informal ways. We have been interacting with them in events of the Electrical Engineering Society, events related to training and placement, and occasions such as TRYST, the science and technology festival. Silver and pearl reunions offer another occasion for obtaining such feedback.

We also have alumni members in programme advisory committees, such as for the VDTT programme. We have also tried to involve them in the evaluation of M.Tech and MS(R) dissertations on a fairly regular basis.

Some alumni have been, and some continue to be, adjunct faculty. Some have been visiting faculty and have been involved in courses. Such alumni also attend moderation committee meetings where they have also given inputs on grading, etc.

9.6. Placement records- Ph.D., M.Tech. and B.Tech.

Attached as ***appendix No. 15.***

10) Vision for next 5-10 years

10.1. Goals and benchmarking for future in relation to (i) curricula, (ii) research, (iii) outreach, and (iv) processes for regular internal assessment.

(i) Curricula

The curriculum review is conducted every ten years, first a committee, comprising of faculty members from all the departments, called '*Curriculum Review Committee'* is formed under the chairmanship of Dean (Academic Affairs). Based on feedback from Industry, faculty members, Alumni and other stake holders, this committee prepares concept paper which is finalized by having extensive discussions with the departments. Once the *'Concept Paper'* is finalized, the departments are asked to frame the different programmes in tune with the concept paper. The concept paper for the recent curriculum review process and the document prepared by the EE Department are attached as ***appendix No. 01*** to provide complete picture of the process.

(ii) Research

1. Publications:
   - (c) Conference papers - Around 150 paper per year.
   - (d) Reputed Journal - Around 100 paper per year.
2. Patent - Around 10 patent per year.
3. Research project - 40 project per year.
4. Ph.D guidance - 20 students per year.

(iii) Outreach

Interaction with Industries, R&D Labs, Government Organizations, Professional Societies and Sister Organizations.

(iv) Processes for regular internal assessment.

There should be annual self appraisal of the department based on the self assessment of faculty members.

10.2. Vision of curricula and teaching-learning processes – UG, PG and Ph.D.; innovations proposed.

Vision of curricula:

It is part of the 'Concept paper'. Please refer to the copy of senate approved paper, for the curriculum effective from 2013, is attached as ***appendix No. 16*** for UG and ***appendix No. 17*** for PG.

Vision of teaching-learning processes:

Teaching:

Student Response: Student response may be arrived at based on both students' feedback and students' performance. The performance will be indexed consisting (i) performance in the examinations/ tests (ii) class participation and (iii) class attendance. One needs to find out the reason for absence of students with poor attendance and initiate necessary measures to make attendance healthy and voluntary. This could include measures to enhance the student motivation for the course.

Course Organization: It is preferable to distribute a tentative schedule at the beginning of the course. There may be marginal changes in the schedule. There should be sufficient number of reading / design assignment associated with each course. To this end we need to put in place strong TA program (including training and delegation). The exam question paper should reflect the teaching in the class. It is preferable to set questions that test the students' understanding and application of concept learnt in the class. Reproduction of questions from the back of a text book shoud be avoided.

Approach to Teaching: Approach to teaching could be either information driven or knowledge and design driven. A teacher needs to balance the two to ensure a better learning and performance by the students. A balance needs to be struck between students and faculty centric teaching.

Learning:

Class Participation: Class participation should be encouraged. Any student not participating should be sufficiently encouraged to join the discussion in the class. A weekly or at the end of a predefined block of lectures a review should be initiated to monitor the response of the students. This may be in the form of a small test.

Strong Class Committee: A strong class committee needs to be formed that would meet atleast three times in a semester to present course feedback to enable midstream changes in approach to teaching to ensure larger attendance (as oppose to the mere physical presence).

A correlation between presence or absence in the class as well as class participation need to be evaluated and reported at the end of each examination to ensure better learning.

10.3. Areas identified for improvement in (i) curriculum, (ii) teaching-learning processes.

Area identified for (i) Curriculum:

1. The course structure and content.
2. The course scheduling.
3. Relevance to industrial, academic and research needs.

Area identified for (ii) teaching-learning processes:

1. Addressing a large class size.
2. Delivery to take cogniscense of heterogeneity in a large class.
3. Allocation of office hours outside the classroom for discussions.
4. Fix class hour to preparation time ratio.

10.4. New areas for research and Masters programme, and industry participation in these.

The research in the following areas needs to be enhanced:
Renewable Energy, Smart Grid, Green Communcations, Nano Technology.

10.5. Projections for (i) funded projects, (ii) journal publications.

(i) 40 projects per year,
(ii) 100 journal publications per year.

10.6. Projected graduation numbers – Ph.D, M.Tech. and B.Tech.

Ph.D	:	25-30 per year,
M.Tech	:	160 per year;
B.Tech	:	EE1- 89 & EE3- 32 per year.

10.7. Projected faculty profile, and areas for recruitment of faculty.

The Department needs faculty members in the areas of Power Electronics; Control Engineering; Integrated Electronics & Circuits; Communication Engineering; Computer Technology. The Department needs to recruit about 10 new faculty per year for next five years.

10.8. Projections for future benchmarking (for comparison after 5 years) – institutions in India and abroad, and parameters for future comparison.

Institutions in India and abroad:

1. IISc, Bangalore - ECE, EE, CSA
2. IITs – IIT Bombay, IIT Kanpur, IIT Madras, IIT Kharagpur
3. MIT, Department of Electrical Engineering and Computer Science.
4. Caltech, Department of Electrical Engineering.
5. Technische Universitat Munchen (TUM), Faculty for Electrical Engineering and Information Technology.
6. Ecole Polytechnique Federale de Lausanne (EPFL), Electrical Engineering.

7. The Hong Kong University of Science and Technology (HKUST), Department of Electronic and Computer Engineering.
8. Nanyang Technological University (NTU), School of Electrical and Electronic Engineering.

Parameters for future camparison:

The following are the parameters for future comparison:

1. Student teacher ratio; 2. Research papers; 3. Citations; 4. Curriculum.

10.9. Infrastructure and governance – limiting factors that affect achievement of benchmarks and methods to overcome these.

Infrastructure

1. **Faculty**
   The faculty strength should be fixed on the basis of one faculty for 10 students. Projected effective students number is about 1000. We would require a total number of faculty to be in place around 100 in the next 5 years.
2. **Space**
   With the projected increase in faculty strength we would need additional sitting space. With increasing number of M.S (R) and Ph.D students we require more sitting/ working space for research work.
3. **Laboratory Manpower**
   We need a sufficient and appropriate technical manpower for laboratory classes and class projects.

Governance

Purchase rules and procedures needs to be simplified by reducing long run procedure and exessivce restrictions. There are consumable items instructed to be procured from a single source. This leads to fear of improper supply practice, when identifying rate contract that should be more than one vendor contactable. Furthermore, there should be provision to procure items from outside the identified vendors if the same item can be procured at the lower cost.

We understand the issues discussed in Dean's Committee and ECS pertain to proper governance and execution for betterment of the Institute, this directly has a bearing on the faculty of the Institute. It is envisaged that it will be more comfortable if the faculty of the Institute are given an access to minutes of these committee meetings.

10.10. Working with other departments/centres and institutions in teaching and research.

1. Department of Computer Science & Engineering
2. Centre for Applied Research in Electronics (CARE)
3. Physics Department
4. Centre for Energy Studies (CES)
5. Instrument Design Development Centre (IDDC)
6. Centre for Biomedical Engineering (CBME)

7. Department of Textile Technology
8. Department of Mechanical Engineering

10.11. New initiatives that the department/centre will undertake.

New initiatives that department will undertake are in the following research areas:

- ***Cyber Security:***

  Cyber security is becoming an increasingly important area for global business and modern society. *Information technology has become omnipresent in all spheres of our lives, from our phones, our enterprise networks, to the infrastructure that runs our economy.* In this data-centric world, where information technology and associated communications' networks and services pervade every aspect of our lives, the protection of our digital assets and activities in cyberspace is of critical importance, whether for individual life experience or a prosperous and sustainable society. The challenges to understand cyber risk and deliver effective and accessible security becomes harder as technology continues to rapidly evolve and our systems become ever more complex. We are increasingly dependent upon such information and communications infrastructures. The threats we face are organised and exploit our dependency on this information-centric world.* Improvements to the security of this information technology are essential for our future. Addressing this current requirement, the government released the National Policy on Cyber Security in July 2013.

  IIT Delhi has taken a lead role in addressing the various issues related to all aspects of Cyber Security, Cyber Systems and Information Assurance. This has led to the establishment of a Center of Excellence in Cyber Systems and Information Assurance (CSIA) at IIT Delhi. This center of excellence will take up challenges related to different aspects of Cyber Security. One of the primary aims of this centre would be to carry out cutting-edge research, and to explore potentially disruptive ideas. The centre will drive major developments in the theory and practice of cyber security, and aims to help in the creation of a safe, secure and prosperous cyberspace through collaborations with academia, industry and government. Yet another objective is to develop information assurance professionals in India. Outreach and capacity building form important activities of this centre. Ultimately, this will improve the posture of information assurance awareness locally, regionally and nationally.

  The mission of this Center of Excellence is:
  - To conduct *basic and applied research* in the area of Cyber Systems and Information Assurance.
  - To train *professionals* in India through degree, non-degree, and public education programs.
  - To *collaborate* with industry, government and academia on both the theory and practice of information assurance and cyber-security.
  - To provide community outreach.

- ***Molecular Communications***

  Molecular communication refers to the transfer of information by means of molecules. It occurs at nanoscale where biochemically engineered cells (nanomachines) perform the job of transmitter and receiver. It has a low energy consumption, slow-speed and operates over smaller distances. Nano-sensors, interconnected through nanonetworks, can enable collection of fine-grained data within objects and from hard-to-access areas. Unlike

traditional technologies, molecular communication is a radically new paradigm, and it can provide solutions to many potential biomedical, industrial, and surveillance applications such as DDS (drug-delivery systems), monitoring and controlling the formation of biofilms (aggregate of micro-organisms adhered onto a surface), prevention against nuclear, biological and chemical attacks at the nanoscale etc. Current work in this area includes the use of DNA data embedding techniques for security and tracking applications, study of neuro-spike communications (communications between neurons), communication systems based on multi-hop bacteria and virus nanonetworks etc.

- ***Wireless Optical Communication:***
  In the laboratory environment, experimental facility for creating atmospheric turbulence in an Optical Turbulence Generating Chamber (OTG) has been created. The Aeronautical Development Agency (ADA) and Indian Space Research Organization (ISRO) have shown a great interest in this kind of work and funded some projects on the study of ground-to-satellite and intersatellite links.

- ***Computational Electromagnetics for Remote Sensing:***
  To get the maximum science return out of expensive remote sensing missions, it is necessary to build sophisticated electromagnetic scattering models that can convert radar backscattering data into useful quantities. These can be, for instance, terrestrial soil moisture, biomass content over forested areas, sub-surface ice structure of distant icy moons – all of which can be derived from microwave synthetic aperture radar data. With the advent of fast computing resources, and by utilizing ideas from allied areas such as machine learning and compressive sensing, we can attempt to use more realistic scattering models in unlocking the true potential of satellite remote sensing.

- ***Energy Harvesting***
  Energy harvesting from ambient sources has become a thrust area of research. Successfully harvesting energy from waste heat, ambient sound, ambient RF energy and indoor lighting to power meaningful electronics and wireless sensor nodes and allowing battery-less operation is the key objective. Researchers at the Electrical Engineering department have developed circuits that can harvest energy from sources as low as 300nW, with an objective to develop battery-less circuits.

- ***Restructured Power Systems:***
  Restructuring of power systems has changed the way of operation of it. The vertically integrated utilities have slowly started unbundling leading to creation of new, for profit entities. Under this new competitive environment, the system operator has to come out with new set of rules/ algorithms to operate the system/ settle the market. This area of research encompasses the added dimension of economics to the technical solution practices of conventional era. Ancillary services management, congestion management, loss & transmission pricing, new market settlement models, etc. are the research topics under this initiative. Operation of distribution systems under restructured environment & the demand participation are important initiatives under this research era. Smart grid solutions need to be customized so as to accommodate new set of rules under the restructured environment.

- ***Smart Grid:***
  Smart grid research encompasses a broad spectrum of engineering challenges facing modern power systems. These include wide area monitoring, protection and control, active distribution networks, distributed generation, renewable energy integration and interfacing with the grid, microgrids, advanced metering and load management, power quality issues, data mining and statistical signal processing of measured data. These also include innovative electromechanical conversion systems, power electronic converters and drive.

- ***Renewable Energy:***
  Design, Modeling, Analysis and implementation of solar PV – single stage and two stage configurations – both grid-interfaced and stand-alone, MPPT, use of multi-level inverters in PV integration to grid and its interaction with grid. Different control strategies to improve general functioning, grid-integration and power quality aspects.
  Design, Modeling, Analysis and implementation of wind energy conversion systems based on SCIG, DFIG and PMSG in both stand alone and grid-interfaced mode, MPPT, fault-ride thru in grid connected mode, different control strategies to improve general functioning, grid-integrated and power quality aspects.
  Design, Modeling, Analysis and implementation of micro and pico hydro generating units mainly using SEIGs in stand-alone configuration. Voltage and frequency control strategies, power quality aspects.

- ***Networked Control Systems:***
  Emerging problems in system design require a combination of control and computation as well as communication over networks. Due to their complex distributed nature and associated resource constraints, the analysis and design of these systems is a major challenge using conventional control and dynamical system theory. Our research aim is to develop tools to model and analyze such complex networked systems, and to generate viable design solutions. Applications areas include Robotics, Haptics, Smart Grids, Green buildings, Intelligent Transportation Systems, Biological Circuits and Bio-Inspired technologies.

- ***Design of Biomolecular Circuits:***
  Design and control of biomolecular circuits inside cells is an emerging area of research. Challenges include ensuring robustness of circuit function in face of various environmental perturbations as well as in ensuring scalability of designs. Through a combination of theoretical and computational methods, we aim to investigate robustness of design functions to perturbations, in particular temperature. In addition to facilitating efforts to design diomolecular circuits, this research is expected to directly benefit the study of how such systems function in nature as well as develop tools that may have impact in the study of other complex engineered systems.

- ***Flexible Opto-electronics and Low Cost Fabrication Technology:***
  In contrast with traditional methods of semiconductor manufacture and device fabrication centered in clean-room intensive processes, solution-processed and printable electronics,

displays, lighting and photovoltaics offer a compelling alternative method for large-scale manufacture of large-area and flexible devices. To address the global energy problem, a combination of advances and an understanding of issues in device design, materials and processing are necessary. Dr. Madhusudan Singh's area of research expertise and interest includes maskless lithography, solution and printing-based high-throughput deposition methods, flexible and printable electronics, sensors, optoelectronics, energy harvesting methods, organic solar cells and LEDs, thermoelectrics, electronic and spin transport, nanoelectronic measurements, semiconductor device physics and device design. Further, his research expertise and interest includes different material systems that he has worked with throughout his career: II-VI, organic, and III-V semiconductors materials at different levels of dimensionality - bulk, 2D and quasi-zero D (nanoparticles and quantum dots) and biomaterials. India's existing strengths in chemical manufacture, pharmaceuticals, and fertilisers makes this set of approaches more relevant for immediate industrial uptake.

- ***Massively Parallel Multicores***

  Large-scale integration of multiple cores on a single chip is the current answer to the challenge of attaining higher computation throughput while restricting power consumption within acceptable limits. This has found acceptance both in commercial end-user applications as well as in the high-performance scientific computing domain. Network-on-chip is a scalable interconnect paradigm that can support integration of hundreds of cores using a wide range of interconnection topologies to achieve desired throughput and latency. Such platforms are going to the cornerstones of emerging cloud-based computing frameworks that are predicted to be ubiquitous in the near future. This field presents a wide range of problems right from efficiently interfacing applications with many-core platforms,to building low power, low-latency and resilient on-chip interconnects.Broad directions in this field include (but are not limited to) low-power on-chip interconnect technologies, heterogeneous multicores, application-level traffic analysis and optimisation on many-cores, on-chip-network-reconfigurability, low-power system architectures, etc. Interdisciplinary research is the key to solving many problems in this field. This kind of research will have a significant impact in the development of low-power, high-performance computing.

10.12. Outreach goals and anticipated limitations in the attainment of these.

Outreach goals are Interaction with Industries, R&D Labs, Government Organizations, Professional Societies and Sister Organizations. We have limited number of faculty members overloaded with teaching, research and administrative work. This leaves limited time for outreach.

10.13. Mechanisms for effective changes based on feedback received and development and implementation of corrective measures.

The feedback received should be collated. The views expressed need to be sorted and addressed for initiating corrective measures. To this end an administrative faculty committee should be formed with the Chairman and representative from each of the stake holder group.

10.14. Questions to which the department seeks answers from the Review Committee.

Relative weightage of different sections in the report for benchmarking of the department.

11) Information in public domain

11.1. Minutes of all meetings.

Minutes of all meetings (DFB, COP, DRC) are kept in EE Office.

11.2. All reports archived in the central/department/centre libraries.

Departmental Library keeps B.Tech thesis, M.Tech thesis and Ph.D thesis.

11.3. Past vision documents, review documents, Standing Review Committee documents.

Past vision document prepared in 2008 is attached as ***appendix No 18.***

No review was done, since no Standing Review Committee document is available.

11.4. Any other documents developed by the department, a group/section of the department/centre.

Based on the feedback send by different groups a presentation was given during Director's visit in February, 2012. Copy of PPT is attached in ***appendix No. 19.***

11.5. Feedback documentation and action taken on the same, and its outcome.

Feedback received orally. No documentation is maintained.