

Department of Renewable Energy

(Formerly known as Centre for Energy and Environment)



Rajasthan Technical University, Kota

Rawatbhata Road, Kota-324010
Rajasthan, India

Annual Report
for the year
2016



VISIT OF STUDENTS TO A WIND FARM ON THE WAY FROM KANYAKUMARI TO KAYATHAR, TAMIL NADU.



I. Administrative Activities During the Year 2016:

1. Fifteen desktop computers were purchased for the department vide office order number RTU/PUR/F(9) TEQIP/DC/36/4307-10 dated 31/05/2016 (at a total cost of ₹8.10 lakh).
2. Mr. Bharat Kumar Saxena has been appointed as guest faculty for the academic session 2016-17.

II. Activities of Faculty Members:

- (a) Dr. K. V. S. Rao, *Professor & Head*, Department of Renewable Energy, RTU, Kota
 - i. Supervised five M.Tech. students leading to receive their degrees.
 - ii. Co-first authored 17 research publications.
 - iii. Attended *IEEE International Conference on Power and Energy Systems: Towards Sustainable Energy (PESTSE-2016)* held at Amrita University, Bengaluru Campus from 21st to 23rd Jan, 2016.
 - iv. Accompanied 18 students in educational tour from 12th to 25th Sept, 2016 for visiting various places of Tamil Nadu and during paper presentation at BIT campus, Anna University, Tiruchirappalli, Tamil Nadu.
 - v. Chaired the session at *National Conference on Green Energy and Technology for Sustainable Future (NCGET-16)* held at Department of Petrochemical Technology BIT Campus, Anna University, Tiruchirappalli, Tamil Nadu from 16th to 17th Sept, 2016.
 - vi. Participated as Chief Guest at *International Workshop on Fundamentals of Solar Thermal Technologies* organized by Department of Pure and Applied Physics, University of Kota on December 5-6, 2016 at Kota.
- (b) Mr. Bharat Kumar Saxena, *Guest Faculty*, Department of Renewable Energy, RTU, Kota
 - i. Attended one day training workshop on *Energy Conservation Building Code (E.C.B.C.)* organized by Rajasthan Renewable Energy Corporation on January 6th, 2016 at RTU, Kota.
 - ii. Attended AICTE recognized one-week short term course on *MATLAB and its Hardware Interface* organized by National Institute of Technical Teachers Training and Research, Chandigarh and conducted by Electrical Engineering Department of RTU, Kota from 11th to 15th Jan, 2016 through ICT.
 - iii. Attended AICTE recognized one-week short term course on *Smart Grid and Renewable Energy Sources* organized by National Institute of Technical Teachers Training and Research, Chandigarh and conducted by Electrical Engineering Department of RTU, Kota from 18th to 22nd Jan, 2016 through ICT.
 - iv. Attended *International Workshop on Fundamentals of Solar Thermal Technologies* organized by Department of Pure and Applied Physics, University of Kota on December 5-6, 2016 at Kota.
- (c) Contribution by Faculty Members of Other Departments:
 1. Dr. Vivek Shrivastava, Assoc. Professor, Department of Electrical Energy, RTU, Kota
 - i. Supervised two M.Tech. students leading to receive their degrees.
 - ii. Co-authored four research publications.
 2. Dr. Lata Gidwani, Assoc. Professor, Department of Electrical Engineering, RTU, Kota
 - i. Supervised one M.Tech. student leading to receive her degree.
 - ii. Co-authored four research publications.
 3. Dr. Namrata Sengar, Asst. Professor, University of Kota, Kota
 - i. Co-authored two research publications.



III. Academic Activities During the Year 2016

A. Research Papers Presented in Conferences:

S. No.	Name of the Conference	Paper Title	Authors
1.	<i>IEEE International Conference on Power and Energy Systems: Towards Sustainable Energy (PESTSE-2016)</i> held at Amrita University, Bengaluru Campus from 21 st to 23 rd Jan, 2016	“Relevance of Power from Small Wind Turbines: A Case Study For Torque -Speed Characteristics of Small Vertical Axis Wind Turbine For Kota Region of Rajasthan” DOI:10.1109/PESTSE.2016.7516368	Shahid Ali Khan and Dr. K.V.S. Rao
2.	<i>IEEE International Conference on Power and Energy Systems: Towards Sustainable Energy (PESTSE-2016)</i> held at Amrita University, Bengaluru Campus from 21 st to 23 rd Jan, 2016	“Social Acceptance of Biomass Plant In India” DOI:10.1109/PESTSE.2016.7516463	Sagar Patel and Dr. K.V.S. Rao
3.	<i>IEEE International Conference on Power and Energy Systems: Towards Sustainable Energy (PESTSE-2016)</i> held at Amrita University, Bengaluru Campus from 21 st to 23 rd Jan, 2016	“Levelized Electricity Cost of Two Grid Connected Biomass Power Plants” DOI:10.1109/PESTSE.2016.7516484	Sonali Chundawat and Dr. K.V.S. Rao
4.	<i>IEEE International Conference on Power and Energy Systems: Towards Sustainable Energy (PESTSE-2016)</i> held at Amrita University, Bengaluru Campus from 21 st to 23 rd Jan, 2016	“The Effect of Solar PV Module Price and Capital Cost on The Levelized cost of The Solar PV Power Plant in The Context of India” DOI:10.1109/PESTSE.2016.7516468	Tahira Bano and Dr. K.V.S. Rao
5.	<i>Critical Evaluation of Renewable Energy Sources: Potential, Techniques and Environmental Protection (CERESPTEP-2016)</i> held at Maharishi Arvind College of Engineering & Technology, Ranpur, Kota from 26 th to 27 th Feb, 2016	“An Evaluation of Growth of Power Sector in Rajasthan: Pacing with Solar Energy”	Manpreet Kaur Bhullar and Dr. Namrata Sengar
6.	<i>Global Conference on Renewable Energy (GCRE-2016)</i> held at NIT, Patna, Bihar from 4 th to 6 th March, 2016	“Social Acceptance Of Biomass Plant In India”	Sagar Patel and Dr. K.V.S. Rao



Paper Presentation in PESTSE-2016 at Bengaluru.



Paper Presentation in GCRE-2016 at Patna.



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S. No.	Name of the Conference	Paper Title	Authors
7.	<i>Global Conference on Renewable Energy (GCRE-2016)</i> held at NIT, Patna, Bihar from 4 th to 6 th March, 2016	“A review of renewable energy progress in SAARC countries”	Royal Roshan and Dr. K.V.S. Rao
8.	<i>IEEE International Conference on Computing for Sustainable Global Development (ICCSGD)</i> held at New Delhi from 16 th to 18 th March, 2016	“Improvement in Efficiency of PV Module Using Soft Computing Based MPPT”	Divya Modani and Dr. Vivek Shrivastava
9.	<i>IEEE International Conference on Computing for Sustainable Global Development (ICCSGD)</i> held at New Delhi from 16 th to 18 th March, 2016	“An Improve Efficiency of Li-ion Batteries Using Optimization Technique”	Nishi Swal and Dr. Vivek Shrivastava
10.	<i>International Conference on Recent Trends in Engineering and Material Sciences (ICEMS-2016)</i> held at Jaipur by Jaipur National University from 17 th to 19 th March, 2016	“Efficiency improvement of PV module with application of model based on MPPT”	Divya Modani and Dr. Vivek Shrivastava
11.	<i>IEEE International Conference on Energy Efficient Technologies for Sustainability (ICEETS-2016)</i> held at St. Xavier's Catholic College of Engineering, Nagercoil, Kanyakumari from 7 th to 8 th April, 2016	“An Application of HOMER Pro in Optimization of Hybrid Energy System for Electrification of Technical Institute” DOI: 10.1109/ICEETS.2016.7582899	Norat Mal Swarnkar, Ronak Sharma, and Dr. Lata Gidwani
12.	<i>IEEE International Conference on Energy Efficient Technologies for Sustainability (ICEETS-2016)</i> held at St. Xavier's Catholic College of Engineering, Nagercoil, Kanyakumari from 7 th to 8 th April, 2016	“Social acceptance of solar energy technology in India” DOI: 10.1109/ICEETS.2016.7582914	Sagar Patel and Dr. K.V.S. Rao



Participation in ICEMS-2016 at Jaipur, Rajasthan.

Paper Presentation in ICCSGD at New Delhi.



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S. No.	Name of the Conference	Paper Title	Authors
13.	<i>IEEE International Conference on Energy Efficient Technologies for Sustainability (ICEETS-2016)</i> held at St. Xavier's Catholic College of Engineering, Nagercoil, Kanyakumari from 7 th to 8 th April, 2016	"Performance analysis of 1 MW grid connected photovoltaic power plant in Jaipur, Rajasthan, India" DOI: 10.1109/ICEETS.2016.7582919	Tahira Bano and Dr. K.V.S. Rao
14.	<i>IEEE International Conference on Energy Efficient Technologies for Sustainability (ICEETS-2016)</i> held at St. Xavier's Catholic College of Engineering, Nagercoil, Kanyakumari from 7 th to 8 th April, 2016	"Estimation of Levelized Electricity Cost of Solar Chimney Power Plant in India by using approximate cost model of Pretorius and Kroger" DOI: 10.1109/ICEETS.2016.7582940	Zainab Akhtar and Dr. K.V.S. Rao
15.	<i>IEEE International Conference on Energy Efficient Technologies for Sustainability (ICEETS-2016)</i> held at St. Xavier's Catholic College of Engineering, Nagercoil, Kanyakumari from 7 th to 8 th April, 2016	"An Improve Efficiency of Li-ion Batteries with Harmony Search Algorithm" DOI: 10.1109/ICEETS.2016.7583784	Nishi Swal and Dr. Vivek Shrivastava
16.	<i>All India Seminar on Sustainable Development and Renewable Energy (SDRE)</i> held at Rajasthan Technical University Kota, Rajasthan from 14 th to 15 th May, 2016	"Analysis of Hybrid Energy System for Sustainable and Economical Energy Production"	Norat Mal Swamkar and Dr. Lata Gidwani
17.	<i>National Conference on Green Energy and Technology for Sustainable Future (NCGET-16)</i> held at Department of Petrochemical Technology BIT Campus, Anna University, Tiruchirappalli, Tamil Nadu from 16 th to 17 th Sept, 2016	"Optimization of off-grid SPV-Diesel Hybrid Energy System for Different Electric Loads at Jaipur in Rajasthan, India"	S. K. Saraswat and Dr. K.V.S. Rao



Paper Presentation in NCGET-16 at Tiruchirappalli.



Paper Presentation in ICEETS-2016 at Nagercoil, T. N.



S. No.	Name of the Conference	Paper Title	Authors
18.	<i>National Conference on Green Energy and Technology for Sustainable Future (NCGET-16)</i> held at Department of Petrochemical Technology BIT Campus, Anna University, Tiruchirappalli, Tamil Nadu from 16 th to 17 th Sept, 2016	“Flettner Rotor for ship propulsion: Progress and Current Status”	Akshay Lele and Dr. K.V.S. Rao
19.	<i>IEEE International Conference on Emerging Technological Trends – 2016 (ICETT-2016)</i> held at Basелиos Mathews II College of Engineering, Kollam, Kerala on 21 st Oct, 2016	“Ship Propulsion Strategies by using Wind Energy” DOI: 10.1109/ICETT.2016.7873693	Akshay Lele and Dr. K.V.S. Rao
20.	<i>IEEE International Conference on Emerging Technological Trends – 2016 (ICETT-2016)</i> held at Basелиos Mathews II College of Engineering, Kollam, Kerala on 21 st Oct, 2016	“Performance Analysis of a 7.2 MW Wind Farm at Sikar in Rajasthan” DOI: 10.1109/ICETT.2016.7873694	Rajendra Kumar and Dr. K.V.S. Rao
21.	<i>IEEE International Conference on Emerging Technological Trends – 2016 (ICETT-2016)</i> held at Basелиos Mathews II College of Engineering, Kollam, Kerala on 21 st Oct, 2016	“10 kW Solar Photovoltaic – Diesel Hybrid Energy System for Different Solar Zones of India” DOI: 10.1109/ICETT.2016.7873692	S. K. Saraswat and Dr. K.V.S. Rao
22.	<i>IEEE International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Control with Impact on Humanity (CIPECH-16)</i> held at KIET Group of Institutions, Ghaziabad, Uttar Pradesh from 18 th to 19 th Nov, 2016	“Survey of awareness of Renewable Energy Technology”	Sagar Patel and Dr. K.V.S. Rao



Paper Presentation in ICETT-2016 at Kollam, Kerala.



Paper Presentation in CIPECH-16 at Ghaziabad, U.P.



S. No.	Name of the Conference	Paper Title	Authors
23.	<i>IEEE International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Control with Impact on Humanity (CIPECH-16)</i> held at KIET Group of Institutions, Ghaziabad, Uttar Pradesh from 18 th to 19 th Nov, 2016	“Comparison of various off-grid Power System Models for a 10 kW load at Jaipur in Rajasthan”	S. K. Saraswat and Dr. K.V.S. Rao
24.	<i>IEEE International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Control with Impact on Humanity (CIPECH-16)</i> held at KIET Group of Institutions, Ghaziabad, Uttar Pradesh from 18 th to 19 th Nov, 2016	“Performance Analysis of a 2.1 MW Wind Turbine in a Wind farm at Mulana in Jaisalmer district of Rajasthan”	Rajendra Kumar and Dr. K.V.S. Rao
25.	<i>IEEE International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Control with Impact on Humanity (CIPECH-16)</i> held at KIET Group of Institutions, Ghaziabad, Uttar Pradesh from 18 th to 19 th Nov, 2016	“Pre-Feasibility Study for Solar Photovoltaic System of Residential Non-Teaching Staff Colony in RTU Kota”	Ronak Shama and Dr. Lata Gidwani
26.	<i>IEEE Second International Conference on Recent Advances and Innovations in Engineering (ICRAIE-2016)</i> held at Poornima University, Jaipur, Rajasthan from 23 rd to 25 th Dec, 2016	“Analysis of Hybrid Energy System for supplying Residential Electrical Load by HOMER and RETSCREEN: A Case in Rajasthan”	Norat Mal Swarnkar and Dr. Lata Gidwani



Visit to Rail Museum at KSR Railway Station, Bengaluru on the way to Tiruchirappalli, Tamil Nadu.

B. Research Papers Published in Journals:

S. No.	Name of the Journal	Title of the Paper	Authors
1.	International Journal of Recent Trends in Engineering & Research (IJRTR) <i>Volume 2, Issue 8; August 2016</i>	“Projection of the Future Electricity Demands (2021-2041) for Rajasthan, India and a Sustainable Development Energy Model for Developing States”	Dr. Namrata Sengar, Manpreet Kaur, and Kanwardeep Singh
2*.	Elixir International Journal <i>Elixir Renewable Energy 102(2017) 44216-44219, ISSN:2229-712X</i>	“Flettner Rotor for Ship Propulsion: Progress and Current Status”	Akshay Lele and Dr. K.V.S. Rao
3*.	Elixir International Journal <i>Elixir Renewable Energy 102(2017) 44242-44244, ISSN:2229-712X</i>	“Optimization of off- grid SPV – Diesel Hybrid Energy System for Different Electrical Loads at Jaipur in Rajasthan, India”	S.K. Saraswat and Dr. K.V.S. Rao

*Presented at NCGET-16, Department of Petrochemical Technology BIT Campus, Anna University, Tiruchirappalli, Tamil Nadu from 16th to 17th Sept, 2016.



Visit to off-shore wind mast at Dhanushkodi, Rameshwaram, Tamil Nadu.



C. Workshops/Conferences Attended by M.Tech.(Renewable Energy Technology) Students:

S. No.	Name of Workshop/Conference	Name of Students	Date of Workshop/Conference	Venue
1.	Energy Conservation Building Code	Ms. Akanksha Shama Mr. Bharatveer Singh Ms. Divya Mittal Mr. Harjot Singh Mr. Mayank Gautam Ms. Monika Agrawal Mr. Sonu Pankaj Ms. Yogita Sharma	Jan 6, 2016	RTU, Kota
2.	MATLAB and its Hardware Interface through ICT	Mr. Dhanesh Jain Mr. Ronak Sharma Ms. Jyoti Ms. Ayushi Khandelwal Mr. Norat Mal Swarnkar	Jan 11-15, 2016	RTU, Kota
3.	National Conference on Solar Thermal Energy Technologies	Ms. Akanksha Shama Mr. Bharatveer Singh Ms. Divya Mittal Mr. Harjot Singh Mr. Mayank Gautam Ms. Monika Agarwal Mr. Pushendra Singh Parihar Ms. Rashmi Sharma Mr. Shiv Shanker Mr. Vikas Verma	Feb 26-28, 2016	IIT, Jodhpur
4.	National Training Course on Wind Energy Technology	Mr. Mohammed Suhail Mr. Rajendra Kumar	Mar 14-18, 2016	National Institute of Wind Energy (NIWE), Chennai



Visit to Vivekananda Rock Memorial, Kanyakumari, Tamil Nadu.



Student of the department receiving certificate for training at NIWE, Chennai, Tamil Nadu.



S. No.	Name of Workshop/Conference	Name of Students	Date of Workshop/Conference	Venue
5.	International Conference Recent Trends in Engineering and Material Science	Ms. Nishi Swal	Mar 17-19, 2016	Jaipur National University, Jaipur
6.	Startup India for Young Entrepreneurs	Ms. Akanksha Sharma, Mr. Harjot Singh, Mr. Mayank Gautam	Mar 18, 2016	RTU, Kota
7.	One Week Short Term Course on LATEX: A Scientific Tool	Mr. Dhanesh Jain, Mr. Norat Mal Swarnkar	May 23-27, 2016	MNIT Jaipur
8.	National Conference on Green Engineering and Technologies for Sustainable Future	Ms. Akanksha Sharma, Ms. Ayushi Khandelwal, Mr. Bharatveer Singh, Ms. Divya Mittal, Ms. Gitika Dadhich, Mr. Harjot Singh, Mr. Mayank Bhardwaj, Mr. Mayank Gautam, Mr. Mohammed Suhail, Ms. Monika Agarwal, Mr. Rajendra Kumar, Ms. Rashmi Sharma, Mr. Ronak Sharma, Mr. Sonu Pankaj, Mr. Shiv Shanker, Ms. Yogita Sharma	Sep 16-17, 2016	Bharathidasan Institute of Technology, Anna University, Tiruchirappalli
9.	Fundamentals of Solar Thermal Technologies	Mr. S. K. Saraswat, Mr. Akshay Lele	Dec 5-6, 2016	Department of Pure and Applied Physics, University of Kota



Participation in NCGET-16 conference at BIT Campus, Anna University, Tiruchirappalli, Tamil Nadu.

D. Industrial Visits and Educational Tours Conducted:

1. Ten students namely Ms. Akanksha Sharma, Mr. Bharatveer Singh, Ms. Divya Mittal, Mr. Harjot Singh, Mr. Mayank Gautam, Ms. Monika Agrawal, Mr. Pushpendra Singh Parihar, Ms. Rashmi Sharma, Mr. Shiv Shanker, and Mr. Vikas Verma were on educational tour from 25th Feb to 2nd Mar, 2016. They attended conference at IIT Jodhpur from 26th to 28th Feb and visited the wind farm of Vedanta Hindustan Zinc at Osiyan, Jodhpur and another wind farm of Rajasthan Akshay Urja Nigam at Phalaudi on 1st March, 2016.
2. Eighteen students namely Ms. Akanksha Sharma, Mr. Akshay Lele, Ms. Ayushi Khandelwal, Mr. Bharatveer Singh, Ms. Divya Mittal, Ms. Gitika Dadhich, Mr. Harjot Singh, Mr. Mayank Bhardwaj, Mr. Mayank Gautam, Mr. Mohammed Suhail, Ms. Monika Agrawal, Mr. Rajendra Kumar, Ms. Rashmi Sharma, Mr. Ronak Sharma, Mr. Santosh Saraswat, Mr. Sonu Pankaj, Mr. Shiv Shanker, Ms. Yogita Sharma along with Prof. K.V.S. Rao were on educational tour from 12th to 25th Sept, 2016 during which they attended National Conference, NCGET-16 at BIT Campus, Anna University, Tiruchirappalli from 16th to 17th September. They toured Rameshwaram in Tamil Nadu on 18th September 2016 and visited Ram Setu (Pamban Bridge) and first offshore wind mast at Dhanushkodi. Then they stayed at Vivekananda Kendra in Kanyakumari and visited the Vivekananda Rock Memorial on 20th September. They visited Wind Turbine Test Station (WTTS) of National Institution of Wind Energy (formerly known as “Centre for Wind Energy Technology”) at Kayathar on 21st September 2016. They also visited the Kudankulam Nuclear Power Plant at Kudankulam on 22nd September 2016.



Visit to Wind Turbine Testing Station NIWE, Kayathar, Tamil Nadu.



E. Seminars Presented by Students at the Department:

S.No.	Roll Number	Student Name	Seminar Topic	Name of the Seminar Guide
1.	2015DER0809	Akanksha Sharma	Smart Grid and its Relevance in the High RE Mix Energy Scenario	Prof. K. V. S. Rao
2.	2015DER0838	Bharatveer Singh Chouhan	Low Carbon Energy Systems for Sustainable Development	Prof. K. V. S. Rao
3.	2015DER0854	Divya Mittal	Floating PV Systems	Prof. K. V. S. Rao
4.	2015DER0863	Harjot Singh	Small Wind Turbines: Design Aspects	Prof. K. V. S. Rao
5.	2015DER0893	Mayank Bhardwaj	Recent Advances in Materials and Systems for Solar Refrigeration	Prof. K. V. S. Rao
6.	2015DER0894	Mayank Gautam	Hydrogen for Electrical Energy Transport	Prof. K. V. S. Rao
7.	2015DER0896	Mohammed Suhail	Different Methods for Enhancing the Performance of Solar Still	Prof. K. V. S. Rao
8.	2015DER0898	Monika Agrawal	Rooftop PV	Prof. K. V. S. Rao
9.	2015DER0933	Rashmi Sharma	Progress in the Research of Solar Tower	Mr. B. K. Saxena
10.	2015DER0943	Seema Saroya	Biofuels/Biodiesel for Transportation Fuel	Mr. B. K. Saxena
11.	2015DER0947	Shiv Shanker	Multi Junction Photovoltaic System	Mr. B. K. Saxena
12.	2015DER0952	Sonu Pankaj	Smart Metering: From Concepts to Implementation	Mr. B. K. Saxena
13.	2015DER0974	Yogita Sharma	Green Building Concepts at the Design Phase Construction Phase and Utilization Phase	Mr. B. K. Saxena



Prof. K. V. S. Rao addressing at International Workshop on Fundamentals of Solar Thermal Technologies, held at University of Kota, Kota, Rajasthan.



Visit to Wind Farm of Hindustan Zinc Limited at Osiyan, Jodhpur, Rajasthan.



F. Thesis Examination and Viva-Voce of M. Tech. (RET) Students, Conducted at the Department:

S. No.	Name of Students	Thesis Title	Supervisor	Date of Oral Examination
1.	Mr. Burhanuddin Bohra Enrolment No.: 12E2UCREM4XP601	Feasibility Study on Disposal of Organic Waste Generated at Rajasthan Technical University Campus through Anaerobic Digestion	Prof. K.V.S. Rao	June 15 th , 2016
2.	Mrs. Seema Bai Enrolment No.: 12E2UCREF3XP610	Optimization of Hybrid Energy System for Drip Irrigation Pumping of Guava Crop in Kota Region	Prof. K.V.S. Rao	June 15 th , 2016
3.	Mr. Vishnu Meena Enrolment No.: 12E2UCREM4XP616	Viability of Rural Electrification through Gasification: A Case Study of Village Kund Habeli of Sheopur District in Madhya Pradesh	Prof. K.V.S. Rao	June 15 th , 2016
4.	Mr. Sagar Patel Enrolment No.: 13E2CEREM4XP610	Social Acceptance of Renewable Energy in India	Prof. K.V.S. Rao	June 15 th , 2016
5.	Ms. Aditi Pareek Enrolment No.: 13E2CEREF4XP601	Solar Radiation Data Modelling Using Curves Fitting Methods	Dr. Lata Gidwani	Oct 22 nd , 2016
6.	Ms. Divya Modani Enrolment No.: 13E2CEREF4XP604	Modeling & Simulation Of PV Array With Model Based And Fuzzy Logic Based MPPT Techniques	Dr. Vivek Shrivastava	Oct 22 nd , 2016
7.	Ms. Nishi Swal Enrolment No.: 13E2CEREF4XP608	Evolution Of Li-Ion Battery Parameters Using Optimization Techniques	Dr. Vivek Shrivastava	Oct 22 nd , 2016
8.	Ms. Tahira Bano Enrolment No.: 13E2CEREM3XP614	Performance Analysis Of Five Grid Connected Solar Photovoltaic Power Plants In India	Prof. K.V.S. Rao	Oct 22 nd , 2016

1. Mr. Burhanuddin Bohra has done his thesis work on, “Feasibility Study on Disposal of Organic Waste Generated at Rajasthan Technical University Campus through Anaerobic Digestion” under the supervision of Prof. K.V.S. Rao. In the thesis, experimentation was done by using 20 litre bottle digesters and by taking three waste streams: Kitchen Waste, Garden waste, and Paper waste. Proximate analysis has been done to measure different parameters of input like total solid, volatile solid and pH. Ultimate analysis has been done to find out the composition of C, H, O, N, and S from the food waste. Gas chromatography method is used for measurement of the volume and composition of biogas generated from different waste streams. Biogas plant design is proposed based on the chemical composition and experimentally obtained methane potential of organic wastes. Economic viability of biogas plant has been calculated by using cost benefit analysis.
2. Mrs. Seema Bai has done her thesis work on, “Optimization of Hybrid Energy System for Drip Irrigation Pumping of Guava Crop in Kota Region” under the supervision of Prof. K.V.S. Rao. In this study an attempt has been made for designing of drip irrigation system for horticulture crops such as guava in two hectares land at Kota. It involves the climatological and meteorological survey, the process of selection of drippers, sub main and main line pipe size, and determination of pump capacity. Depending on peak water requirement and total head losses, the designed pump size is found and for which the consumption of electric energy per day to irrigate the land is also found. Optimization of hybrid system is done by using HOMER software. O & M cost and LCOE is also obtained from HOMER. The hybrid energy system is also optimized for three other locations of the state of Rajasthan. The effect of wind speed and average global solar radiations with variable load on optimum system is also analysed.
3. Mr. Vishnu Meena has done his thesis work on, “Viability of Rural Electrification through Gasification: A Case Study of Village Kund Habeli of Sheopur District in Madhya Pradesh” under the supervision of Prof. K.V.S. Rao. The technical and economic feasibility of generating electric power from biomass energy system using crop residue for the needs of the village is discussed in this study. Calorific values of different crop residues have been evaluated by laboratory experiments.



Proximate analysis was carried out experimentally from the samples of crop residues. The capacity and size of biomass gasifiers required for power needs of village are calculated based on the connected load. LCOE is also estimated with the effect of parameters such as real discount rate, inflation rate, and overall system conversion efficiency. The net present value, benefit to cost ratio, internal rate of return, and reduction in CO₂ emission is also estimated.

4. Mr. Sagar Patel has done his thesis work on, “Social Acceptance of Renewable Energy in India” under the supervision of Prof. K.V.S. Rao. The aim of this thesis is to investigate the level of awareness of local people and local ownership towards renewable energy sources, technologies in Indian society. Focus of the thesis is on four aspects: (a) Discussion of relevant research literature, (b) Four case studies are presented on Social acceptance of 8 MW grid connected biomass plant near Kota (Raj.), 1400 m³ biogas plant near Anand (Gujarat), 2 MW solar energy plant near Bikaner (Raj.) and 7.2 MW wind energy plant near Sikar (Raj.), (c) Survey is done on the awareness using online and offline questionnaire survey methodology, (d) Survey related outcomes of studies.
5. Ms. Aditi Pareek has done her thesis work on, “Solar Radiation Data Modelling Using Curves Fitting Methods” under the supervision of Dr. Lata Gidwani. The aim of this thesis is to develop the best fit model for 10 MW solar photovoltaic plant at Kolayat in Rajasthan. In this thesis regression methods are used, then smoothing is done and tested by using different degrees of polynomial curve fittings. Error measurement is done by using the Root Mean Square Error (RMSE) method and MATLAB is used for carrying out polynomial fitting.
6. Ms. Divya Modani has done her thesis work on, “Modeling & Simulation of PV Array with Model Based and Fuzzy Logic Based MPPT Techniques” under the supervision of Dr. Vivek Shrivastava. This thesis investigates in detail the concept of Maximum Power Point Tracking (MPPT) to optimize the energy extractions in Photovoltaic Systems. In this research work she has designed and implemented PV Array with fuzzy logic controller (FLC) based and Novel Model-Based (MB) MPPT algorithms with DC-DC Boost Converter to increase the competence of PV array. For DC-AC conversion Full Bridge Based inverter is used. Finally, performance comparison has been carried out between fuzzy logic controller and Novel Model Based method.
7. Ms. Nishi Swal has done her thesis work on, “Evolution of Li-Ion Battery Parameters Using Optimization Techniques” under the supervision of Dr. Vivek Shrivastava. This thesis describes the battery modelling and improvement using optimization technique in renewable energy. A model of Li-ion battery has been designed and the battery parameter is calculated. Various battery models have been discussed and Thevenin based model has been carried out. Two optimization techniques genetic algorithm and harmony search algorithm are applied for modelling. From modelling and simulation, the battery parameters are calculated like state of charge, battery power, battery energy, used capacity, battery current, and battery voltage.
8. Ms. Tahira Bano has done her thesis work on, “Performance Analysis of Five Grid Connected Solar Photovoltaic Power Plants in India” under the supervision of Prof. K.V.S. Rao. This thesis investigates Performance Ratio (PR) results of five working SPV plants of different capacities ranging from 1 MW to 130 MW and is compared with simulation results for the same SPV plants. In this analysis, various performance parameters (such as PR, Cumulative Utilization Factor (CUF), reference yield, array yield, final yield of array etc.) are calculated based on the actual onsite power generation and meteorological data collected from the time of commissioning of the plants. The performance parameters and various types of power losses are calculated using Excel spread sheet and obtained from simulation software PV-syst and System Advisory Model (SAM). LCOE, reductions in CO₂ emissions and carbon credits have been estimated for all the five solar power plants.



Students during M. Tech. thesis defence on 15th June, 2016.



Summary of Academic Performance During 2016

- * 19 Research Publications in IEEE International Conferences.
- * 3 Research Publications in other International Conferences.
- * 4 Research Publications in National Conferences.
- * 3 Research Publications in Journals.
- * 9 Workshops/Conferences Attended.
- * 2 Industrial Visits and Educational Tours.
- * 13 Students Presented Seminars.
- * 8 Students Received M.Tech.(Renewable Energy Technology) Degree.

IV. Academic Performance of the Department During Last Four Years:

Centre for Energy and Environment was approved by Board of Management (BOM) of the RTU in November 2011. Formal orders for formation of the centre under RTU were issued in March 2013. Admissions in M.Tech. (Renewable Energy Technology) started from 2010 under Mechanical Engineering Department. Students of M.Tech. (RET) from Mechanical Engineering Department were transferred to Centre for Energy and Environment in April 2013.

All admissions to M.Tech. (Renewable Energy Technology) and Ph.D. (Renewable Energy Technology) courses were started by the centre from July 2013.

Centre for Energy and Environment was renamed as *Department of Renewable Energy* in May 2015 and is presently functioning as University Teaching Department of RTU, Kota.

	2013	2014	2015	2016	Total
Number of students received M.Tech. (Renewable Energy Technology) degree	00	01	04	08	13
Number of research papers published in International/ National level conferences and Journals	05	09	14	27	55



Dr. Dilip Sharma and Dr. G.D. Agarwal of MNIT, Jaipur visiting the department.



DEPARTMENT OF RENEWABLE ENERGY



Visit to Thiruvalluvar Statue at Kanyakumari, Tamil Nadu.



Visit to Kudankulam Nuclear Power Project at Kudankulam, Tamil Nadu.