

**(DEPARTMENT OF ELECTRICAL ENGINEERING)**

1 **Name** **Dr. Sabha Raj Arya**



2 **Official Address** Associate Professor,  
Electrical Engineering Department,  
Sardar Vallabhbhai National Institute of  
Technology (S.V.N.I.T.), Dumas Road,  
Surat -395007 (Gujarat)

3 **Email** sabharaj1@gmail.com, sra@eed.svnit.ac.in  
**Phone No: 08511034177 (M) and 09512534809 (M)**

4 **Date of birth** 03/10/1979

5 **Research Area**

“Power Quality- Filters, Custom Power Devices, Power Electronics Converters for Power Quality, Application of ANN and adaptive control in Power Electronics System, Distributed Power Generation System”

6 **Academic Qualifications**

Degree	Year	Specialization	Name of Board/Institute
10 <sup>th</sup> Class	1994	-	M.P. Boards (1 <sup>st</sup> Rank in School)
B. E./B. Tech.	2002	Electrical Engineering	Govt. Engg. College Jabalpur (M.P.)
M.E./M. Tech.	2004	Power Electronics and ASIC design	MNNIT Allahabad
Ph. D.	2010-2013 26 March 2014	Electrical Power Quality	EED, I.I.T. Delhi

## 7 Recognitions received

Sr. No.	Name of award	Name of society/institute	Year
(i)	Young Engineer Award-2014	Indian National Academy of Engineering (INAE)- Delhi	2014
(ii)	POSO CO Power System Award (PPSA-2014)	Power System Operation Corporation (POSO CO) –A subsidiary of Power Grid Corporation of India Ltd (POWERGRID)-Delhi.	2014
(iii)	Amit Garg Memorial Research Award-2014	From Indian Institute of Technology (IIT) Delhi for the High Impact Publication in a quality journal during the session 2013-2014	2014
(iv)	IEEE-Senior Member	IEEE Industry Applications Society	2015
(v)	Associate Editor	IET <i>Renewable Power Generation</i>	2018
(vi)	Best Paper Award on “Talada Appala Naidu, <b>Sabha Raj Arya</b> , and Rakesh Maurya, "Control of DVR using Variable Step-size Griffith's LMS with Optimized tuning of Proportional Integrator Gains” in <b>Proc. International conference on power electronics applications and technology in present energy scenario (PETPES-2019) organized by Electrical and Electronics Engineering Department, NITK Surathkal, 29-31 August 2019.</b>		2019
(vii)	Best Paper Award on “Jayadeep Srikakolapu, <b>Sabha Raj Arya</b> and Rakesh Maurya, " DSTATCOM using Limit Cycle Oscillator FLL with Optimized Gains of Voltage Error Controllers," in <b>Proc. 1st International Conference on Innovation in Electrical Power Engineering, Communication, and Computing Technology) for LNEE, Springer, Bhubaneswar, 13<sup>th</sup>-14<sup>th</sup> December 2019, pp.1-13</b>		2020

## 8 Details of Research and Development Projects

Sr. No.	Name of Project	Funding Agency	Durations
(i)	Development of Adaptive control algorithm for shunt compensator (Minor Project)	Gujarat Council on Science and Technology (GUJCOST) Gandhinagar (Gj.) -382011	<b>Sanctioned</b> for 2 Year ( from: March 2016)

(ii)	Development of Control Algorithms for Shunt and Series connected Custom Power Devices, Applied	Science and Engineering Research Board -New Delhi (Under Extra Mural Research Funding Scheme)	<b>Sanctioned for 3 Year (from June :2016)</b>
------	--	---	--

## 9 Positions held (from 2004 to present)

Sr. No.	Name of Department/ Institute	Positions	Duration	Nature of work
(i)	(Electrical Engineering Department) Kalinga Institute of Industrial Technology-Patia (Deemed university)- Bhubaneswar-751024	Lecture	<b>27<sup>th</sup> July 2004 to 27<sup>th</sup> Nov. 2006</b>	Teaching and Research (Supervisor for M.Tech. and B.Tech. students)
(ii)	(Electrical Engineering Department) S.V. National Institute of Technology, Dumas Road, Ichchhanath, Surat-395007	Assistant Professor	<b>1<sup>st</sup> Dec.2006 to 27<sup>th</sup> January 2019</b>	Teaching and Research (Supervisor for Ph. D, M.Tech. and B.Tech. students)
(iii)	(Electrical Engineering Department) S.V. National Institute of Technology, Dumas Road, Ichchhanath, Surat-395007	Associate Professor	<b>28<sup>th</sup> January 2019</b>	Teaching and Research (Supervisor for Ph. D, M.Tech. and B.Tech. students)

## 10 Membership of professional bodies

Sr. No.	Name of society	From	Grade /Member ship number
(i)	Institute of Electrical and Electronics Engineers (IEEE)	2012 to continuous	Senior Member (2015) /92074574
(ii)	The Institution of Engineers (INDIA)	2010 to continuous	Associate member /AM0984518
(iii)	The System society of India	2008 to continuous	Member/ LM28471
(iv)	The Institution of Electronics and Telecommunication Engineers (IETE)	January 2016 to continuous	Member/LM 500011

## 11 Short term courses /Seminars Organized at SVNIT (work as Coordinator and Delivered Expert Lecture)

- 1) Power Electronics For Distributed Generation and Electrical Drives 2nd march 2020 to 06th March -2020
- 2) Organized on week short term course on smart energy systems: operational and control (SESOC-2019), Dec 2019, at MMMUT –Gorakhpur (worked as course coordinator)
- 3) Expert talk from Prof. (Dr.) D.P. Kothari , Ex head and Professor, Centre for energy studies, IIT Delhi, in the area of power system and power electronics, (06 May 2019)
- 4) Power Electronics For Distribution System and Electric Drives, June-July 2018
- 5) Power Quality and Distributed Power Generation, Dec. 2017
- 6) Design and Control of Power Electronic Circuits using OPAL- Real Time Simulators- March 2017
- 7) Power conditioning and Distributed Power Generation-Dec.-2016
- 8) Power Electronic: Circuits and Control-Dec.2015
- 9) Power Electronics: System and Control –Dec. 2014
- 10) Power Filter Technology and Control- June 2014
- 11) Advance Control System Education – Feb.2014

## 12 Complete lists of refereed Journal papers and papers presented in Conferences

### Summary of Publication in International/National Journals

IEEE Transactions	IET-UK	Elsevier	Other International Journals	Total
<b>21</b>	<b>12</b>	<b>02</b>	<b>27</b>	<b>62</b>
TIE-3, TPE-6 TII-1, TPWD-1 TIA-4, JESTPE-4,CPSST-1 , CSEE-1	IET(PEc) -4 IET(GTD) -5 IET(RPG)-2 IET (EPA)-1	EPSR-1 IJEPES-1	ITEES-5,JAPE-2 IJEST-1 ,IJEEPS-6 EPCS-3,IEIB-2,JGE-5, JCSE-1, IJPEC-1,JES-1	

### Summary of Publication in International/National conferences and communicated papers

International / National conferences	Book Chapters	Communicated Papers in Journals/ conferences	Total
<b>48</b>	<b>03</b>	<b>10</b>	<b>61</b>

## (i) Publications in IEEE Transactions /IET Journals =33

- [1] **Sabha Raj Arya**, Sayed Javed Alam and Papiya Ray, "Control algorithm based on limit cycle oscillator-FLL for UPQC-S with optimized PI gains," Accepted for Publication in *IEEE-CSEE Journal of Power and Energy Systems*.
- [2] Talada Appala Naidu, **Sabha Raj Arya** and Rakesh Maurya, "Compensation of Voltage based Power Quality Problems using Sliding Mode Observer with Optimized PI controller Gains," Accepted for Publication in *IET Generation, Transmission & Distribution*.
- [3] Jyoti Gupta, Rakesh Maurya and **Sabha Raj Arya**, "Improved Power Quality On-Board Integrated Charger with Reduced Switching Stress, Accepted for Publication in *IEEE Transactions on Power Electronics*.
- [4] Jyoti Gupta, Rakesh Maurya and **Sabha Raj Arya**, "On-Board EV Battery Charger with Improved Power Quality and Reduced Switching Stress, **Accepted for publication in IET Power Electronics (Dec.2019)**.  
(<https://digital-library.theiet.org/content/journals/10.1049/iet-pel.2019.0962>)
- [5] Ashutosh k. Giri , **Sabha Raj Arya**, Rakesh Maurya and B Chitti Babu, "Control of Voltage Source Converter for Enhancement of Power Quality in off-Grid Distributed Power Generation,"*IET Renewable Power Generation*, vol. 14, no. 5, pp. 771-778, 2020.  
(<https://digital-library.theiet.org/content/journals/10.1049/iet-rpg.2019.0497>)
- [6] Ashutosh K Giri, **Sabha Raj Arya**, Rakesh Maurya, and B. Chitti Babu, "VCO less PLL Control Based VSC for Power Quality improvement in Distributed Generation System,"*IET Electric Power Applications*, vol. 13, no. 8, pp. 1114-1124, 2019.
- [7] Talada Appala Naidu, **Sabha Raj Arya** and Rakesh Maurya, " Dynamic Voltage Restorer with Quasi Newton Filter based Control Algorithm and Optimized values of PI Regulator Gains, *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 7, no. 4, pp. 2476-2485, Dec. 2019.
- [8] Ashutosh K. Giri, **Sabha Raj Arya** and Rakesh Maurya, "Compensation of Power Quality Problems in Wind based Renewable Energy System for

- Small Consumer as Isolated loads, *IEEE Transactions on Industrial Electronics*, vol. 66, no. 11, pp. 9023-9031, Nov. 2019.
- [9] T. Appala Naidu, **Sabha Raj Arya** and Rakesh Maurya, "Multi-Objective Dynamic Voltage Restorer with Modified EPLL Control and Optimized PI Controller Gains," *IEEE Transactions on Power Electronics*, vol. 34, no. 3, pp. 2181-2192, March 2019
- [10] Ashutosh K Giri, **Sabha Raj Arya**, Rakesh Maurya and Ramakanta Mehar, " Variable Learning Adaptive Gradient Based Control Algorithm for VSC in Distributed Generation," *IET Renewable Power Generation*, vol. 12, no. 16, pp. 1883 – 1892, 2018.
- [11] **Sabha Raj Arya**, Rakesh Maurya and Talada Appala Naidu, "Amplitude Adaptive Notch Filter with Optimized PI Gains for Mitigation of Voltage based Power Quality Problems," *IEEE-CPSS Transactions on Power Electronics and Applications*, vol. 3, no. 4, pp.313-323, December 2018.
- [12] Sanjay Kumar Patel, **Sabha Raj Arya**, Rakesh Maurya and B. C. Babu, "Control Scheme for DSTATCOM based on Frequency Adaptive Disturbance Observer," *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 6, no.3, pp. 1345-1354, 2018.
- [13] Ashutosh K. Giri, **Sabha Raj Arya**, Rakesh Maurya and B. C. Babu, "Power Quality Improvement in Stand-alone SEIG based Distributed Generation System using Lorentzian Norm Adaptive Filter," *IEEE Transactions on Industry Applications*, vol. 54, no. 5, pp. 5256-5266, March 2018.
- [14] B. R. Ananthapadmanabha, Rakesh Maurya and **Sabha Raj Arya**, "Improved Power Quality Switched Inductor Cuk Converter for Battery Charging Application," *IEEE Transactions on Power Electronics*, vol. 33, no.11, pp. 9412-9423, 2018.
- [15] Ashutosh K. Giri ,Amin Qureshi, **Sabha Raj Arya**, Rakesh Maurya and B.Chitti Babu,"Features of Power Quality in Single Phase Distributed Power Generation using Adaptive Nature Vectorial Filter,"*IEEE Transactions Power Electronics*, vol. 33 No.11 pp. 9482-9495, 2018.

- [16] Sanjay Kumar Patel, **Sabha Raj Arya**, Rakesh Maurya, "Nonlinear adaptive volterra filter for control of distribution static compensator," *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 5, no. 1, pp.559 - 567, March 2017.
- [17] **Sabha Raj Arya**, Bhim Singh, Ram Niwas, Ambrish Chandra and Kamal Al-Haddad, "Power quality enhancement using DSTATCOM in distributed power generation system," *IEEE Transactions on Industry Applications*, vol. 52, no. 6, pp. 5203-5212, Nov.-Dec. 2016
- [18] Sanjay Kumar Patel, **Sabha Raj Arya**, Rakesh Maurya and Bhim Singh, "An interior point algorithm for optimal control of DSTATCOM under distorted supply voltage conditions," *IET Generation, Transmission and Distribution*, vol. 10, no. 8, pp. 1778-1791, 2016.
- [19] **Sabha Raj Arya** and Bhim Singh "Implementation of kernel incremental meta-learning algorithm in distribution static compensator," *IEEE Transactions Power Electronics*, vol.30, no.3, pp.1157-1169, March 2015.
- [20] Sabha Raj Arya, Ram Niwas, Krishan Kant, Bhim Singh, Ambrish Chandra and Kamal Al-Haddad "Power quality improvement in isolated distributed generation system using DSTATCOM," *IEEE Transactions on Industry Applications*, vol. 51, no.06, pp. 4766-4774, Nov/Dec. 2015
- [21] Bhim Singh, Krishan Kant Bhalla and **Sabha Raj Arya**, "Notch filter based fundamental frequency component extraction to control DSTATCOM for mitigating current related power quality problems" *IET power Electronics*, vol.8, no.9, pp.1758-1766, 2015.
- [22] **Sabha Raj Arya** and Bhim Singh, "Neural Network based conductance estimation control algorithm for shunt compensation," *IEEE Transactions on Industrial Informatics*, vol.10, no.1, pp.569-577, Feb. 2014.
- [23] **Sabha Raj Arya**, Bhim Singh, Ambrish Chandra, and Kamal Al-Haddad "Learning based Anti-Hebbian learning algorithm for control of distribution static compensator," *IEEE Transactions on Industrial Electronics*, vol. 61, no.11, pp. 6004-6012, Nov. 2014.
- [24] Bhim Singh and **Sabha Raj Arya**, "Back-Propagation control algorithm for

- power quality improvement using DSTATCOM,"*IEEE Transactions on Industrial Electronics*, vol.61, no.3, pp.1204-1212, March 2014.
- [25] Bhim Singh, **Sabha Raj Arya**, Ambrish Chandra, and Kamal Al-Haddad "Implementation of adaptive filter based control algorithm for distribution static compensator,"*IEEE Transactions on Industry Applications*, vol. 50, no.5, pp.3026-3036, Sept / Oct 2014.
- [26] Bhim Singh, **Sabha Raj Arya** and Chinmay Jain "Simple peak detection control algorithm of DSTATCOM for power quality improvement,"*IET power Electronics*, vol. 7, no.7, pp. 1736-1746, 2014.
- [27] Bhim Singh, **Sabha Raj Arya**, Chinmay Jain and Sagar Goel "Implementation of four leg distribution static compensator," *IET Generation, Transmission and Distribution*, vol.8, no.6, pp. 1127-1139, 2014.
- [28] Bhim Singh, Sunil kumar, Sabha Raj Arya, "Hyperbolic tangent function-based least mean-square control algorithm for distribution static compensator"*IET Generation, Transmission and Distribution*, vol.8, no.12, pp.2102-2113, 2014.
- [29] **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.
- [30] **Sabha Raj Arya** and Bhim Singh,"An Implementation of DSTATCOM for power quality enhancement using learning vector quantization," *IET Generation, Transmission and Distribution*, vol. 7, no.3, pp.1244-1252, 2013.
- [31] 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.
- [32] 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, Aug. 2013.
- [33] 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, Feb. 2013.

## (ii) Publications in other Journals =29

- [34] Aliva Routray, Khyati D Mistry and **Sabha Raj Arya**, "Power Loss Minimization in Radial Distribution Systems with Obstructed Solar Astronomical Model and Temperature Effect Using GWO Technique," Accepted for publication in *Journal Energy Sources, Part A: Recovery, Utilization, and Environmental effects*.
- [35] Sayed Javed Alam and **Sabha Raj Arya**, "Observer based Control for UPQC-S with Optimized Gains of PI Controller," *International Transactions on Electrical Energy Systems*, 2020. <https://doi.org/10.1002/2050-7038.12406>
- [36] **Sabha Raj Arya**, Mittal M. Patel, Sayed Javed Alam, Jayadeep Srikakolapu and Ashutosh K. Giri, "Phase lock loop–based algorithms for DSTATCOM to mitigate load created power quality problems," *International Transactions on Electrical Energy Systems*, 2019; e12161. <https://doi.org/10.1002/2050-7038.12161>.
- [37] Ashutosh K. Giri<sup>1</sup>, **Sabha Raj Arya**, Rakesh Maurya and B. Chitti Babu, "Mitigation of power quality problems in PMSG-based power generation system using quasi-Newton–based algorithm," *International Transactions on Electrical Energy Systems*, 2019, DOI:e12102. <https://doi.org/10.1002/2050-7038.12102>
- [38] Talada Appala Naidu, **Sabha Raj Arya** and Rakesh Maurya, "Phase Locked Loop based on Third Order SSI for Compensation of Voltage Related Power Quality issues using DVR," *Journal of Electrical Power and System Components*, vol. 47, no. 4-5, pp.329–344, 2019.
- [39] Sanjay K. Patel, **Sabha Raj Arya** and Rakesh Maurya, "Control of three phase DSTATCOM using optimal step LMS algorithm," *Journal of Electrical Power and System Components*, vol. 47, no. 8, pp. 704–720, 2019.

- [40] **Sabha Raj Arya**, Nunsavath Sharath Kumar, Ashutosh Giri and Amin Qureshi, "Fuel Cell Integration with Grid using Voltage Source Converter and its Control," *International Journal of Power and Energy Conversion*, vol.11,no.2,pp.132-151, 2020.
- [41] **Sabha Raj Arya**, Rakesh Maurya and Talada Appala Naidu, "Phase Locked Loop based Techniques for Compensation of Voltage Based Power Quality issues in Distribution System," *International Journal of Emerging Electric Power*, vol. 19, no.5, 2018. (DOI: <https://doi.org/10.1515/ijeeps-2017-0278>)
- [42] **Sabha Raj Arya**, Rakesh Maurya and Ashutosh K Giri, "Enhancement of Power Quality in Wind based Distributed Generation System using Adaptive Vectorial Filter," *International Journal of Emerging Electric Power*, vol. 19, no.5, 2018. (DOI: <https://doi.org/10.1515/ijeeps-2018-0008>)
- [43] B.R. Ananthapadmanabha, Rakesh Maurya, **Sabha Raj Arya** and B.Chitti Babu, "Smart Battery Charging Station for Electric Vehicle using Half Bridge Power Converter," *International Journal of Emerging Electric Power*, vol. 19, no.4, 2018. (DOI: <https://doi.org/10.1515/ijeeps-2017-0257>)
- [44] Papia Ray, **Sabha Raj Arya** and Debani Prasad Mishra,"Intelligence Scheme for Fault Location in a Combined Overhead Transmission Line and Underground Cable," *International Journal of Emerging Electric Power*, vol. 19, no.5, 2018. (DOI: <https://doi.org/10.1515/ijeeps-2017-0277>)
- [45] Ashish Patel, **Sabha Raj Arya** and Ashutosh Giri, "Isolated power generation system using permanent magnet synchronous generator with improved power quality," Accepted for Publication in *Institution of Engineers Section-B*, vol. 99, no. 3, pp,281–292, June 2018.
- [46] B.R. Ananthapadmanabha, Rakesh Maurya and **Sabha Raj Arya**, "Hybrid converter for electric vehicle battery Charging with power quality features," Accepted for Publication in *International Journal of Computational Systems Engineering*

<https://doi.org/10.1504/IJCSYSE.2019.098416>)

- [47] Vishal E. Puranik and **Sabha Raj Arya**, “Load conductance estimation based control algorithm for shunt connected custom power devices,” **Asian Power Electronics Journal**, Vol. 11, No. 1, pp. 14-20, July 2017.
- [48] Sanjay Kumar Patel, **Sabha Raj Arya**, Rakesh Maurya, Chinmay Jain and Bhim Singh, “Control of distributed static compensator using extended structure enhanced phase-locked loop–based algorithm under nonideal AC mains,” **International Transactions on Electrical Energy Systems**, DOI 10.1002/etep.2354, pp. 1-10, 2017.
- [49] **Sabha Raj Arya** and Bhim Singh, “Power quality improvement under nonideal AC mains in distribution system,” **Journal of Electric Power System Research**, vol.106, pp.86-94, 2014.
- [50] Sanjay Kumar Patel, **Sabha Raj Arya**, Rakesh Maurya and Bhim Singh, “Control of DSTATCOM using three phase enhanced phase-locked loop,” **Journal of Electrical Power and System Components**, vol. 44, no. 13, pp. 1515-1529, 2016.
- [51] Bhim Singh, **Sabha Raj Arya** and Pankaj K. Verma “An implementation of double-frequency oscillation cancellation technique in control of DSTATCOM,” **International Transactions on Electrical Energy Systems**, DOI 10/1002/EETEP, 2013.
- [52] Bhim Singh and **Sabha Raj Arya**, “Adaptive control of four-leg VSC based DSTATCOM in distribution system,” **International Journal of Emerging Electric Power Systems**, vol. 15, no.1, pp. 93-99, 2014.
- [53] Bhim Singh, G Bhubaneswari and Sabha Raj Arya “Review on power quality solution technology,” **Asian Power Electronics Journal**, vol. 6, no.2, pp.19-27, 2012.
- [54] 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. 74-86, 2012.
- [55] Vishal Puranik and **Sabha Raj Arya**, “SOGI-FLL Based adaptive filter for DSTATCOM under variable supply frequency,” **Institution of Engineers**

**Section-B**, DOI 10.1007/s40031-016-0274-0.

- [56] B.R. Ananthapadmanabha, Rakesh Maurya and **Sabha Raj Arya**, "Magnetic energy recovery switch based power quality AC-DC converters," *International Transactions on Electrical Energy Systems*, DOI 10.1002/ETEP.2350.
- [57] Bhim Singh, Sunil kumar and **Sabha Raj Arya**, "An improved control algorithm of DSTATCOM for power quality improvement," *International Journal of Electrical Power and Energy Systems*, vol. 64, pp.493-504, 2015.
- [58] Papia Ray, **Sabha Raj Arya** and Shobhit Nandkeolyar, " Electric load forecasts by metaheuristic based back propagation approach," *Journal of Green Engineering*, vol. 7,no.1 & 2,pp. 61-82, January 2017.
- [59] **Sabha Raj Arya**, Nunsavath Sharath Kumar and B. R. Ananthapadmanabha, "Power generation using fuel cell in the application of sensor power supply," *Journal of Green Engineering*, vol. 7,no.1 & 2,pp. 159-188, January 2017.
- [60] J. Bangarraju, V. Rajagopal, **Sabha Raj Arya** and B. Subhash, "Enhancement of PQ Using adaptive theory based improved linear tracer sinusoidal control strategy for DVR," *Journal of Green Engineering*, vol. 7,no.1 & 2,pp. 189-212, January 2017.
- [61] B. R. Ananthapadmanabha, Rakesh Maurya, **Sabha Raj Arya** and B. Chitti Babu, "Electric Vehicle battery charger with improved power quality Cuk-Derived PFC converter," *Journal of Green Engineering*, vol. 7,no.1 & 2,pp. 255-284, January 2017.
- [62] **Sabha Raj Arya** and Nunsavath Sharath Kumar, "Grid connected fuel cell based distributed power generation system," *Journal of Green Engineering*, vol. 7, no.1 & 2, pp. 285-310, January 2017.

### **(iii) Publications in International/National Conferences = 48**

- [63] Sayed Javed Alam and **Sabha Raj Arya**, "Control of UPQC Through Observer Based System Integrated with Frequency Adaptive Loop and Optimized PI Gains," in Proc. **9th IEEE Power India International Conference (PIICON-2020)**, march 2020, pp.1-6.
- [64] Jayadeep Srikakolapu, **Sabha Raj Arya** and Rakesh Maurya, "DSTATCOM using Limit Cycle Oscillator FLL with Optimized Gains of Voltage Error Controllers," in Proc. **1st International Conference on Innovation in Electrical Power Engineering, Communication, and Computing Technology) for LNEE, Springer, Bhubaneswar, 13<sup>th</sup>-14<sup>th</sup> December 2019, pp.1-13 (Best Paper Award)**
- [65] Talada Appala Naidu, **Sabha Raj Arya** and Rakesh Maurya, "Control of DVR using Variable Step-size Griffith's LMS with Optimized tuning of Proportional Integrator Gains," in Proc. of **IEEE Power Electronics Applications & Technology in Present Energy Scenario (PETPES 2019)**, 2019, pp.1-7. **(Best Paper Award)**
- [66] Akhil Raj P. and **Sabha Raj Arya**, "Solar-Fed Single-Input Three-Output DC-DC Converters for Low Power applications," in Proc. **1st International Conference on Innovation in Electrical Power Engineering, Communication, and Computing Technology) for LNEE, Springer, Bhubaneswar, 13<sup>th</sup>-14<sup>th</sup> December 2019, pp.1-12.**
- [67] Aliva Routray, Khyati D. Mistry and **Sabharaj Arya**, "Loss minimization in a radial distribution system with dg placement using jaya optimization technique," in Proc. of **IEEE International Conference on Sustainable Energy Technologies and Systems (ICSETS)**, 2019, pp.1-6
- [68] **Sabha Raj Arya**, Rakesh Maurya, Ashutosh K. Giri, Amin Qureshi and B.Chitti Babu, "Control Approach to Improve the Power Quality for Effective Utilization of Single Phase Induction Generator," in Proc. of **IEEE 1<sup>st</sup> International Conference on Energy, Systems and Information Processing (ICESIP2019)**, IIITDM Kancheepuram,

**Chennai – 600127, 2019, pp.1-6.**

- [69] Akhil Raj P. and **Sabha Raj Arya**, “Solar Fed DC-DC Converter for Small Power Applications,” in **Prof. of IEEE 1st International Conference on Energy, Systems and Information Processing (ICESIP2019), IITDM Kancheepuram, Chennai – 600127, 2019, pp.1-6.**
- [70] Jayadeep Srikakolapu, **Sabha Raj Arya** and Rakesh Maurya. “Algorithm for DSTATCOM using Cascaded Delayed Signal Cancellation effect in Three Wire System,” in **Prof. of IEEE 1st International Conference on Energy, Systems and Information Processing (ICESIP2019), IITDM, Kancheepuram, Chennai – 600127, 2019, pp.1-6.**
- [71] Aliva Routray Khyati D. Mistry and **Sabha Raj Arya**, “Analysis of Wake Effect on Wind Power Generation for Loss Minimization in Distribution System,” in **Prof. of IEEE 1st International Conference on Energy, Systems and Information Processing (ICESIP2019), IITDM Kancheepuram, Chennai– 600127, 2019, pp.1-6.**
- [72] Aliva Routray Khyati D. Mistry and **Sabha Raj Arya**, “Loss Minimization in Distribution System Considering Hourly Data Driven Probabilistic Solar Astronomical Model with GWO Technique,” in **Prof. of IEEE 1st International Conference on Energy, Systems and Information Processing (ICESIP2019), IITDM Kancheepuram, Chennai – 600127, 2019, pp.1-6.**
- [73] Papia Ray, Debani Prasad Mishra and **Sabha Raj Arya**, “An Intelligent Approach for Protection Coordination of Overcurrent Relay in Smart grid,” in **Prof. of IEEE 1st International Conference on Energy, Systems and Information Processing (ICESIP2019), IITDM Kancheepuram, Chennai– 600127, 2019, pp.1-6.**
- [74] Debani Prasad Mishra, Papia Ray and **Sabha Raj Arya**, “Comparative Analysis Of Classification And Location Of Faults In A Long Transmission Line Using Random Forest Technique,” in **Prof. of IEEE 1st International Conference on Energy, Systems and Information Processing (ICESIP2019), IITDM Kancheepuram, Chennai –**

**600127, 2019, pp.1-6.**

- [75] Aliva Routray, Khyati D. Mistry and **Sabharaj Arya**, "Loss minimization in a radial distribution system with dg placement using jaya optimization technique," **in Proc. of IEEE International Conference on Sustainable Energy Technologies and Systems (ICSETS), 2019, pp.1-6.**
- [76] Sanjay K. Patel, **Sabha Raj Arya** and Rakesh Maurya, "Harmonic Mitigation Technique for DSTATCOM using Continuous Time LMS Adaptive Filter," **in Proc. 3rd IEEE Uttar Pradesh Section International Conference on Electrical, Computer and Electronics (UPCON), 2016, pp. 1-8.**
- [77] Ashish Patel, **Sabha Raj Arya** and Anjana Jain, "Variable step learning based control algorithm for power quality in PMSG based power generation system," **in Proc. IEEE Power India Conference (PIICON), 2016, pp. 1-7.**
- [78] Parlee Doley, Sanjay K Patel and **Sabha Raj Arya**, "Control algorithm based on amplitude adaptive filter for DSTATCOM," **in Proc. IEEE Power India Conference (PIICON), 2016, pp.1-7.**
- [79] J.Bangarraju, V. Rajagopal, Sabha Raj Arya, B. Subhash and V. Nagamalleswari, "Control of DVR Using SPLL Strategy in Distribution System" **in Proc. IEEE Power India Conference (PIICON), 2016, pp. 1-6.**
- [80] Ashish Kumar Patel and **Sabha Raj Arya**, "Distributed power generation system using PMSG with power quality features," **in Proc. International Conference on Next Generation Intelligent Systems, 2016, pp. 1-7.**
- [81] Krishan Kant, **Sabha Raj Arya** and Bhim Singh, "A current sensorless control algorithm of DSTATCOM for power quality improvement," **in Proc. of Annual IEEE India Conference (INDICON), 2015, pp.1-6.**
- [82] Vishal. E. Puranik, Sabha Raj Arya and Anjana Jain, "Comparative study of compensation techniques of DVR with composite observer," **in Proc. of International conference on Power and Energy Systems: Towards Sustainable Energy (PESTSE), 2016, pp. 1-6.**
- [83] Sabha Raj Arya, Krishan Kant, Ram Niwas, Bhim Singh, Ambrish Chandra and Kamal Al-Haddad" Power quality improvement in isolated

- distributed generation system using DSTATCOM," *in Proc. of IEEE Industry Applications Society Annual Meeting (IAS)*, 2014, pp.1-8.
- [84] Bhim Singh, **Sabha Raj Arya**, Ram Niwas, Ambrish Chandra, and Kamal Al-Haddad, "Distributed power generation system and power quality improvement using DSTATCOM," *in Proc. of 2014 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Dec. 2014, pp.1-6
- [85] **Sabha Raj Arya**, and Bhim Singh, "Kurtosis driven variable learning adaptive filter for suppression of power quality problems," *in Proc. of INDICON*, 2013, pp. 1-6.
- [86] Bhim Singh, Sabha Raj Arya, Sunil Kumar, Ambrish Chandra and Kamal Al-Haddad, "Implementation of DSTATCOM using neural network based radial basis function," *in Proc. of IEEE Industry Applications Society Annual Meeting (IAS)*, 2013, pp.1-8.
- [87] 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 5<sup>th</sup> International Conference on Power and Energy Systems*, 2013, pp.1-9.
- [88] Bhim Singh, Sabha Raj Arya, "Adaptive control of four-leg VSC based DSTATCOM in distribution system," *in Proc. of 5<sup>th</sup> International Conference on Computer Applications in Electrical Engineering (CERA)*, 2013, pp.1-5.
- [89] Bhim Singh, Sunil kumar, **Sabha Raj Arya**, Ambrish Chandra and Kamal Al-Haddad, "A comparative study of adaptive control algorithm in distribution static compensator," *in Proc. of 39<sup>th</sup> Annual Conference on IEEE Industrial Electronics Society*, 2013, pp. 1-6.
- [90] Bhim Singh, Sabha Raj Arya, Ambrish Chandra and Kamal Al-Haddad "Variable step learning control algorithm for VSC Based Shunt," *in Proc. of IEEE 4<sup>th</sup> International Symposium on Power Electronics for Distributed Generation Systems*, Rogers, Arkansas 2013, pp.1-6.
- [91] **Sabah Raj Arya**, Bhim Singh, Ambrish Chandra, and Kamal Al-Haddad "Power factor correction and zero voltage regulation in distribution system using DSTATCOM," *in Proc. of 2012 IEEE*



- International Conference on Power Electronics, Drives and Energy Systems (PEDES)***, Dec. 2012, pp.1-6
- [92] Bhim Singh, **Sabha Raj Arya**, Ambrish Chandra and Kamal Al-Haddad“Implementation of adaptive filter based control algorithm for distribution static compensator,” ***in Proc. of IEEE Industry Applications Society Annual Meeting (IAS)***, 2012, pp.1-8.
- [93] Bhim Singh and Sabha Raj Arya“Admittance based control algorithm for DSTATCOM in three phase four wire system,” ***in Proc. of 2<sup>ed</sup> International Conference on Power, Control and Embedded Systems (ICPCES)***, Dec. 2012, pp.1-8.
- [94] **Sabha Raj Arya**, Bhim Singh, Ambrish Chandra, and Kamal Al-Haddad“Control of DSTATCOM using adjustable step least mean square control algorithm,” ***in Proc. of IEEE Fifth Power India Conference***, Dec.2012, pp.1-6.
- [95] **Sabha Raj Arya**, Bhim Singh, Ambrish Chandra, and Kamal Al-Haddad“Control of shunt custom power device based on Anti-Hebbian learning algorithm,” ***in Proc. of 38<sup>th</sup> Annual Conference on IEEE Industrial Electronics Society***, Oct. 2012, pp.1246-1251.
- [96] Bhim Singh and **Sabha Raj Arya**,“ Software PLL based control algorithm for power quality improvement in distribution system,” ***in Proc. of 2012 IEEE 5<sup>th</sup> India International Conference on Power Electronics (IICPE)***, pp.1-6, 6-8 Dec. 2012.
- [97] Sabha Raj Arya, and Bhim Singh“CTF control algorithm of DSTATCOM for Power factor correction and zero voltage regulation,” ***in Proc. of 2012 IEEE Third International Conference on Sustainable Energy Technologies (ICSET)***, pp.157-162, Sept.2012.
- [98] M.R. Dhandhara, **Sabha Raj Arya**, “Comparison between Peak current and Hysteresis current control input power factor correction techniques in rectifier system,” ***in Proc. of International Conference on Control, Automation, Communication and Energy conversion***, vol.-2, 2010, K.E.C. Perundurai, Erode pp. 816-823.
- [99] Bhim Singh, **Sabha Raj Arya**, Chinmay Jain, Sagar Goel, Ambrish Chandra, and Kamal Al-Haddad, Four leg VSI based active filter in

- distribution system” *in Proc. of National Power System Conference, Dec. 2014, pp.1-6.*
- [100] Bhim Singh, Krishan Kant Bhalla and **Sabha Raj Arya**, “Voltage Sensorless control algorithm for power quality improvement in distribution network” *in Proc. of National Power System Conference, Dec. 2014, pp.1-6.*
- [101] 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 National system Conference, IIT Jodhpur, 2013, pp.1-6.*
- [102] Bhim Singh and **Sabha Raj Arya**, “A New Isolated Topology of DSTATCOM with Unipolar Switching,” *in Proc. of National Power System Conference, 2012, IIT-BHU Varanasi, pp.1-6.*
- [103] Bhim Singh and **Sabha Raj Arya**, “Design and control of DSTATCOM for power quality improvement using cross correlation function approach,” *in Proc. of National Electrical Engineering Conference, 2011, KNIT Sultanpur, pp.1-8.*
- [104] **Sabha Raj Arya** and Bhim Singh “MWLSE control algorithm of DSTATCOM for power quality improvement,” *in Proc. of National Electrical Engineering Conference (NEEC-2011) on Power and Energy Systems for Tomorrow, 2011, DTU Delhi, pp.1-6.*
- [105] M.R. Dhandhara and **S.R. Arya**, “Design, and Analysis of Border line Current Control Technique for Input Power Factor Correction,” *in Proc. of National Conference on Recent Advances in Electrical Engineering, Dec. 26<sup>th</sup> and 27<sup>th</sup> 2008, J.N.T.U. college of Engg. Anantpur.*
- [106] M.R. Dhandhara and **S.R. Arya**, “Design, analysis and implementation of input power factor correction technique in uncontrolled rectifier system,” *in Proc. of National Conference on Recent Advances in Electrical Engineering, Dec. 26<sup>th</sup> and 27<sup>th</sup> 2008, J.N.T.U. college of Engg. Anantpur.*
- [107] **Sabha Raj Arya** and Rakesh Maurya, “Analysis of chopper fed D.C. Drive with PWM and hysteresis current control scheme,” *in Proc. of 31<sup>st</sup>*

**National Systems Conference**, P-133, 2007.

- [108] Rakesh Maurya, **S.R.Arya** and S.P.Srivastava, "Analysis of grid connected power converter for variable speed wind energy conversion," *in Proc. of 31st National Systems Conference*, p-147, 2007.
- [109] **Sabha Raj Arya** and P.Samuel, "Harmonic power flow analysis and suppression of harmonics using harmonic filter," *in Proc. of National Conference on Soft Computing and Machine*, C.O.B. Bhubaneswar , 24<sup>th</sup> to 26<sup>th</sup> march 2006.
- [110] Biswajit Nayak and S. R. Arya, "Analysis of chopper fed DC drive with PID and Fuzzy logic controller," *in Proc. of National Conference on Soft Computing and Machine*, C.O.B. Bhubaneswar, 24<sup>th</sup> to 26<sup>th</sup> march 2006.

**(iii) Publication as Book Chapters =03**

- [111] **Sabha Raj Arya** and Sayed Javed Alam, "Phase Lock Loops For UPQC In Distribution system along with optimized PI-Controller Gains," Accepted Book Chapter in **Nova Science Publishers, Inc, NY:11788-3619, USA**
- [112] Bhim Singh, **Sabha Raj Arya**, Chinmay Jain, Sagar Goel, Ambrish Chandra and Kamal Al-Haddad, "Application of voltage source converter for power quality improvement," **Lecture Notes in Electrical Engineering**, vol. 327, Chapter 29, pp.335-346, Springer India, New Delhi.
- [113] Ashutosh K Giri, **Sabha Raj Arya**, Rakesh Maurya and Papia Ray, "Performance of Control Algorithms in Wind-Based Distributed Generation System with Power Quality Features: A Review," *Microgrid: Operation, Control, Monitoring and Protection, Lect. Notes Electrical Eng.*, Vol. 625, Papia Ray and Monalisa Biswal (Eds), chapter-3, **Springer Nature Singapore Pvt. Ltd. 2020** ([https://doi.org/10.1007/978-981-15-1781-5\\_3](https://doi.org/10.1007/978-981-15-1781-5_3))

**(iv) Communicated in International/National Journals/  
Conference = 10**

- [1] Sayed Javed Alam and **Sabha Raj Arya**, “Biogeography Based Optimization strategy for UPQC PI tuning on Full Order Adaptive Observer based Control,” **Communicated to IET Generation, Transmission & Distribution.**
- [2] **Sabha Raj Arya**, Mittal M. Patel, Sayed Javed Alam and Jayadeep Srikakolapu, "Classical Control Algorithms for Permanent Magnet Synchronous Generator driven by Diesel Engine for Power Quality," **Communicated to Journal of Energy and Environment after second revision (R2).**
- [3] Sayed Javed Alam and **Sabha Raj Arya**, " Compensation of Power Quality Problems through UPQC-S using Enhanced Complex Coefficient Filter," **Communicated to IEEE Journal of Emerging and Selected Topics in Power Electronics.**
- [4] Sayed Javed Alam and **Sabha Raj Arya**, “Control of UPQC based on Steady State Linear Kalman Filter for Compensation of Power Quality Problems,” **IEEE Chinese Journal of Electrical Engineering after first revision (R1).**
- [5] Talada Appala Naidu, **Sabha Raj Arya** and Rakesh Maurya "Compensation of Voltage based Power Quality in Problems using Forward Backward LMS Control Algorithm in DVR” **Communicated to IEEE Transactions on Power Electronics after R2.**
- [6] Talada Appala Naidu, **Sabha Raj Arya**, Rakesh Maurya, Bhim Singh and Ahmed Al-Durra, Combined Variable Step Size LMS for DVR with Error Regulator Gain Tuning Through Ant-Lion Optimization, **Communicated to Industrial Automation and Control Committee ,IAS Meeting 2020.**
- [7] Jayadeep Srikakolapu, **Sabha Raj Arya** and Rakesh Maurya, “Distribution Static Compensator using an Adaptive observer based control algorithm with Salp Swarm Optimization Algorithm, **Communicated to IEEE CPSS Transactions on Power Electronics and Applications.**
- [8] Jayadeep Srikakolapu, **Sabha Raj Arya** and Rakesh Maurya, “An Algorithm for DSTATCOM with Optimized values of PI Gain using Adaptive Internal Mode,” **Communicated to Journal of Electrical Power and System**

### Components after First revision (R1).

- [9] Sayed Javed Alam, **Sabha Raj Arya** and B.Chitti Babu, "Control Algorithm of UPQC-S for Power Quality in Distribution System," **Communicated to Journal of Electrical Power and System Components.**
- [10] **Sabha Raj Arya**, Rakesh Maurya, Amin Qureshi and Ashutosh K. Giri, "Design of distributed power generation system using single phase induction generator and its control," **Communicated to Journal of Electrical Power and System Components.**

### 13 Conference/Seminars/Short term course Attended

Sr. No.	Conference /Seminars	Organized By	Sponsor	During	Day	Weeks
1	Short term course on <b>Modern Optimization Technique in Power system</b>	University College of Engineering Burla (Orissa)	-	Dec.,19-31, 2005	12	2
2	<b>Testing in Electrical Engg.</b>	SVNIT –Surat	-	January, 3-5 2007	3	-
3	National workshop on <b>Power Electronics</b>	IIT- Bombay		September,6-7 2007	2	-
4	Short term course on <b>VLSI And Embedded System</b>	Cental Institute of Tool design , Hyderabad (A.P.)		Dec17-22, 2007	5	1
5	Short term course on <b>Electric power quality: monitoring, analysis and mitigation</b>	IIT Kanpur		April 07-11 ,2008	5	1
6	Staff training program <b>infrastructural and curricular development of electrical drives laboratory</b>	N.I.T. Warangal (A.P.)	-	September-24-26, 2008	3	-
7	Short term course on <b>Application of</b>	SVNIT	-	Dec, 8-12, 2008	5	1

	<b>mathematical sciences and soft computing</b>					
8	Short term course on <b>Advance Engineering Optimization Through Intelligent Techniques</b>	SVNIT	-	Dec, 14-18, 2009	5	1
9	Participation certificate <b>Tutorials PEDES2010</b>	IIT Delhi		20 <sup>th</sup> Dec 2010	1	0
10	Short term course on <b>Building Integrated Photovoltaic Thermal System</b>	IIT Delhi		Feb., 8-14, 2011	7	1
11	Short term course on <b>Research Methodology and Intellectual Property Rights (IPR)</b>	EQUATE	-	Feb.,4-7, 2014	5	1
12	Short term course on <b>Application of Evolutionary Computation Techniques on Power System</b>	SVNIT	-	July, 14-18, 2014	5	1
13	Short term course on <b>Mathematical Modeling in Science and Engineering</b>	SVNIT	-	June,23-27, 2014	5	1
14	Short term course on <b>Power Electronics Applications for Renewable Integration</b>	IITK		30 <sup>th</sup> March,30 to April, 1, 2015	3	-
15	Short term course on <b>Advance Power Electronics and Electrical Drives</b>	MANIT – Bhopal		3 <sup>rd</sup> to 7 <sup>th</sup> Jan 2016	5	1
16	Short term course on <b>Mathematical Modeling, Optimization, Fractional Calculus and their Computations in Engg. and Science</b>	SVNIT – Surat		21 <sup>st</sup> -25 <sup>th</sup> June 2016	5	1

## 14 Supervision of M. Tech students in the area of Power Electronics

(A) Total number of student supervised up to 2019 = 16

Sr. No.	Thesis title	Year
1	Design and Implementation of Solar fed Single-Input Multi-Output DC-DC Converters	2019
2	Design and Implementation Power Converters for Electric Vehicles	2019
3	Distribution Static Compensator and its application in Distributed Power Generation	2018
4	Wireless Charging System for an Electric Vehicle Battery Charging	2018
5	Fuel Cell based DPG System	2017
6	Solar Based power generation system with Power Quality	2017
7	Single phase SEIG with Power Quality Features	2017
8	Power Generation System using Permanent Magnet Synchronous Generator with Power Quality Features	2016
9	Design and Control of Shunt Connected Custom Power Devices	2016
10	Design and implementation of shunt and series connected custom power devices	2015
11	Solar system with power quality features and its application in water pumping	2015
12	Analysis of load performance and power quality improvement in inverter fed induction fed induction motor drives	2010
13	Design and analysis of input power factor correction converters for low and medium power application in AC/DC converters	2009
14	Design and analysis of input power factor correction technique in uncontrolled rectifier system	2008
15	Design and Analysis Chopper Fed DC drives	2006
16	Design and analysis of single phase full bridge SPWM inverter	2006

(B) Number of M. Tech student supervision ongoing (2019-2020) = 02

## 15 Supervision of Ph D. students in the area of Power Electronics/ Electrical Power Quality

(i) Number of Ph. D student supervision ongoing up to 2020 = **10+ 04 (Completed)**

Sr. No.	Name of student/ research scholar	Topic/ Research Area	Year of registration	Co-guide (If any)
(1)	Sanjay Kumar Patel (D14EL002)	Control Algorithms for DSTATCOM to Mitigate Power Quality Problems	2014-2018 (Completed)	as a Principal Guide
(2)	B. R. Ananthapadmanabha (D14EL009)	Improved Power Quality Converters for Electric Vehicle Battery Charging	2014-2019 (Completed)	as a Co-Guide
(3)	Ashutosh Giri (D16EL006)	Control Algorithms for Power Quality Improvement in Wind based Distributed Power Generation System	2016-2019 (QIP) (completed)	as a Principal Guide
(4)	T A Naidu (DS16EL001)	Control Algorithms for Dynamic Voltage Restorer to Mitigate Voltage based Power Quality Problems	2017-2019 (JRF) ( completed)	as a Principal Guide
(5)	Aliva Routray	Reduction of power losses in distribution line	2017 (Under Progress)	as a Co-Guide
(6)	Alam Sayed Javed	Design and control of UPQC	2017 (Under Progress)	as a Guide
(7)	Jayadeep Srikakolapu Manikyala Rao	DSTATCOM and its Application in DG system	2017	as a Principal Guide
(8)	Jyoti Gupta	Battery charging and discharging system	2018	as a Co-Guide
(9)	Bindra Dawar	Custom Power Devices	2018 (QIP)	as a Guide
(10)	Hardik Pandya	Power Electronics and Power Quality	2019 (PEC)	as a Guide



(11)	Hareesh K. Kairumkonda	Power Electronics and Power Quality	2019 (PEC)	as a Guide
(12)	Vamireddy Malleswari	DVR control	2019 (PEC)	as a Co-Guide
(13)	Prashant Kumar	Design and control of DVR using Soft computing	2019	as a Principal Guide
(14)	Riucha Dubey	Control of Induction motor drives	2019 (PEC)	as a Co-Guide

## 16 Reviewer for the Journals

IEEE Transactions on Industrial Electronics

IEEE Transactions on Power Electronics

IET Power Electronics

International Transactions on Electrical Energy Systems

IEEE Journal of Emerging and Selected Topics in Power Electronics

Journal of Electric Power Components and Systems

Journal of Electric Power System Research

**PLACE: SURAT**  
**DATE: 15 April 2020**

**Dr. Sabha Raj Arya**