7.1. Actions taken based on the results of evaluation of each of the POs & PSOs (30)

It has been observed that POs 1, 3, 4, 6, 11 and 12, and PSOs 1, 2, and 3 have been meeting target levels, particularly in the latest assessment year, 2019-2020. Furthermore, POs 2 and 7, have also been maintained close to target levels. Attainment levels in POs 5, 8, 9, and 10 have not been significantly good, owing to less socio-cultural interactions of students in the academic atmosphere, and the raging COVID pandemic in Spring 2020. These POs are mostly of social or managerial nature. While students have been fairing well in the technical spheres, lack of exposure to social challenges faced by an engineer is the reason behind this shortfall. To combat this challenge, group activities, counselling sessions, interactions and technical tours are encouraged, where emphasis is laid on the environmental, social and political impacts of electrical engineering facilities. Extracurricular activities such as debates, technical and cultural events are held for honing communication skills of students while teaching them to work as a team.

It was seen that CO attainments were poor in Power Electronics. This was attributed to weak fundamentals in mathematical tools such as Fourier series, transform theory etc. To address the issue, more practice sets were given to students per semester, and emphasis was laid on mathematical techniques used in the subject. Similarly, in the course on Electrical Machine Design, video lectures, animations, and laboratory visits were facilitated, that enabled a better understanding through vivid imagination.

POs & PSOs Attainment Levels and Actions for improvement

Assessment/Analysis of Programme Outcomes (Pos)			
POs	Target and Attainment Level 2017-18	Target and Attainment Level 2018-19	Target and Attainment Level 2019-20	Observations
PO1: Engineering Knowledge: To Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	Target: 2.1	Target: 2.15	Target: 2.15	Electrical engineering curriculum requires the strong foundation of theoretical and practical knowledge of science and mathematics, which the

	Attainment: 2.11	**Attainment: 2.07**	**Attainment: 2.15**	students study in their first year and are able to apply and correlate well over the next years. A marginal dip is observed in CAY 2018-2019, and subsequently attainment level is observed to improve above target level.

Action 1: Mathematical analysis of engineering problems is encouraged so that students can learn fundamental concepts and be able to apply them in problem solving

PO2: Problem analysis: Identify, formulate, review research literature, and analyse complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO2	**Target: 2**	**Target: 2**	**Target: 2**	Although students are mostly capable to understanding and analysing text book literature, they are seen to slightly lag in amalgamating their knowledge with state of art research. There is a dip and then gradual improvement in attainment levels, to meet the target level in near future.
	Attainment: 1.90	**Attainment: 1.88**	**Attainment: 1.96**	

ACTION 1: Industrial visits are expected to help students gain knowledge on complex engineering problems
ACTION 2: Students are encouraged to observe, their homes and surroundings to gain insight into real life engineering problems and think of possible approaches/solutions to these problems.
ACTION 3: Research oriented final year B.Tech Projects are encouraged to develop and hone their research skills.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate considerations for the public health and safety, and the cultural, societal, and environmental considerations.

PO3	**Target: 1.75**	**Target: 1.75**	**Target: 1.75**	Some of the projects developed by students as minor projects/major projects (final year) are not very industry compatible in terms of economy or footprint. Due to actions and measures taken, target level has been met in the latest assessment year.
	Attainment: 1.61	**Attainment: 1.58**	**Attainment: 1.75**	

ACTION1: Students are motivated to include all standard parameters and constraints according to National and International safety norms and to address environmental concerns, while focussing on innovative designs for their projects. PCB based converter designs have been initiated to make the

work of students at par with industrial standards.				
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.				
PO4	**Target: 1.7**	**Target: 1.7**	**Target: 1.7**	It is observed that most of the project abstract and literature survey are addressing the research based approach but does not end with valid conclusions. Due to actions and measures taken, target level has been met in the last assessment year.
	Attainment: 1.60	**Attainment: 1.59**	**Attainment: 1.71**	
ACTION1: Students are encouraged to participate in building small experimental kits which can be used to teach future students and their juniors. This gives them an initial exposure to hardware implementation and experimentation, thereby enabling better productivity during final year project				
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.				
PO5	**Target: 2**	**Target: 2**	**Target: 2**	It is observed that up-gradations of tools and resources are necessary to meet the industry standards and research. There is a dip and then gradual improvement in attainment levels, to meet the target in near future.
	Attainment: 1.36	**Attainment: 1.29**	**Attainment: 1.40**	
ACTION1: Continuous up gradation of lab infrastructure is undertaken so as to meet the rapidly going needs of academia. Some purchases include power quality analysers, DSpace, FPGA boards etc. **ACTION2:** Simulation software such as Matlab/Simulink, MiPower, are been taught to students and simulation of circuits is encouraged in many courses, such as Power Electronics, High Voltage Engineering, Control Systems. **ACTION3:** B.Tech projects using latest modeling and control techniques, such as machine learning, predictive control, and optimization techniques etc, are encouraged.				
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.				
PO6	**Target: 1.5**	**Target: 1.60**	**Target: 1.65**	The courses floated in the department are addressing the needs of, health, safety and social concerns regarding

				engineering practices in real life. Target level has been consistently met.
	Attainment: 1.57	**Attainment: 1.60**	**Attainment: 1.66**	

ACTION1: To understand the safety concerns and social aspects, student industry visits are encouraged to expand their practical knowledge with the effect of improved practices in engineering. Besides this some mandatory humanities courses ensure that students are repeatedly reminded of their social responsibilities as electrical engineers.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO7	**Target: 1.5**	**Target: 1.5**	**Target: 1.5**	The issues of global and environmental awareness among the student should be improved, and they should be made more aware of their responsibilities towards energy efficiency.
	Attainment: 1.32	**Attainment: 1.31**	**Attainment: 1.42**	There is gradual improvement in attainment levels to meet the target levels in near future.

ACTION1: Students are encouraged to indulge in projects, in which global and environmental issues are improved, with respect to consumption of energy and utilization of renewable energy resources. Also a course of Non-Conventional Energy Sources is floated to present renewable energy as the next main technology for electrical engineers.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO8	**Target: 1.5**	**Target: 1.5**	**Target: 1.5**	The students are doing better in improving the overall expertise in field of engineering but due to lack of communications and other ethical and moral knowledge, some are lagging in real life situations.
	Attainment: 0.81	**Attainment: 0.81**	**Attainment: 1.00**	There is gradual improvement in attainment levels to meet the target in near future.

ACTION1: Career readiness program, corporate lectures and motivational talks are arranged to

overcome the above observations. Class Assessments are encouraged via Open Book exams to help students become self-reliant.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO9	Target: 1.5	Target: 1.5	Target: 1.5	There is gradual improvement in attainment levels, and it is expected that target levels will be met in near future.
	Attainment: 1.04	Attainment: 1.04	Attainment: 1.24	

ACTION1: Institute holds cultural programs and alumni meets where students are encouraged to volunteer as organisers. This provides them with a platform to work as individuals as well as in groups, helping students groom their skills like leadership and team spirit.
ACTION2: Final Year projects are also aligned in such a way that students learn to work and operate as a team.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO10	Target: 1.5	Target: 1.5	Target: 1.5	The communication, presentation and report writing skills are to be further improved among the students. There is gradual improvement in attainment levels, and with more concentrated efforts, it is expected that the target level will be met in future.
	Attainment: 1.00	Attainment: 1.01	Attainment: 1.08	

ACTION1: Soft skills training is imparted to students to enhance various aspects of communication/technical talks by group discussions, presentations and new learning outcomes. Regular seminars and presentations are held to help students communicate technical ideas well.

PO11: Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO11	Target: 1.6	Target: 1.65	Target: 1.6	Few humanities based courses of the curriculum are directed towards teaching management principles, project management and financial

	Attainment: 1.60	**Attainment: 1.50**	**Attainment: 1.62**	implications and in multidisciplinary environments. Target levels are mostly met.

ACTION1: Awareness is created among the student regarding the management principles and managing projects. Also, with many management based recruiters offering placements in the campus, students are expected to realise the importance of management in engineering.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.

PO12	**Target: 1.5**	**Target: 1.5**	**Target: 1.5**	Pre-final year and final year courses of the programme are demonstrating resources for contemporary issues and lifelong learning. There is gradual improvement in attainment levels and target levels have been met in the latest assessment year.
	Attainment: 1.48	**Attainment: 1.45**	**Attainment: 1.60**	

ACTION1: Through advanced level courses that are expected to hold relevance throughout their careers, students are eased into learning skills that have long term benefits.

Assessment/Analysis of Programme Specific Outcomes (PSOs)
PSO1: Students should be competent, creative and imaginative electrical engineers employable in fields of design, research, manufacturing, safety, quality and technical services.

PSO1	**Target: 1.8**	**Target: 1.9**	**Target: 1.85**	Although students are made well aware and equipped with basic understanding of simulation software that are used in various spheres of electrical engineering, they are observed to slightly lag in experimentation, hardware development, and research skills. Barring a small dip in the assessment year 2018-2019, attainment levels have mostly been maintained above target level.
	Attainment: 1.89	**Attainment: 1.80**	**Attainment: 1.89**	
ACTION1: Workshops for technical writing and simulation of electrical systems are being				

organised. More hardware based projects are being undertaken.

PSO2: Students should be able to progress through advanced degree, certificate programs or participate in continuing education in electrical engineering, business, and other professionally related fields.

PSO2	Target: 1.9	Target: 2	Target: 1.95	The courses of the program are demonstrating the resourcefulness for contemporary issues. The project titles of the final year students are addressing the real life problems. Target levels are mostly met.
	Attainment: 1.96	**Attainment: 1.87**	**Attainment: 1.99**	

ACTION1: Students are motivated to take up the real life problems during their project work so that they can design, analyze and find solution which gives exposure to latest technologies.

PSO3: Students should take lead in innovation and entrepreneurship activities with high professional standards and moral ethics and prove themselves beneficial to society at large.

PSO3	Target: 1.5	Target: 1.6	Target: 1.6	It is required to inculcate ethics, good interpersonal relationships, ability to communicate, leadership and project management skills in students. There is gradual improvement in attainment levels to meet the target in near future.
	Attainment: 1.55	**Attainment: 1.46**	**Attainment: 1.65**	

ACTION1: Motivational lectures are arranged to encourage students regarding these activities.

7.2. Academic Audit and actions taken thereof during the period of Assessment (15)

Claimed 14

7.2.1. Details of the Assessment based on conduct and actions taken in relation to continuous Improvement, Academic Year 2019-2020

No Academic Audit was carried out due to following reasons:

1. *The abrogation of Article 370 in J&K state by the Central Government and remaining incommunicado for around six months following August 5, 2019.*

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2. *The surge of COVID-19 cases and subsequent lockdown of the whole country from March-2010 till August-2020.*

7.2.2. Details of the Assessment based on conduct and actions taken in relation to continuous Improvement, Academic Year 2018-2019 and Academic Year 2017-2018.

(a) Course files Evaluation

Frequency	Conduct Mechanism	Action Plan	Implementation
1. Formulation of Departmental Undergraduate Committee (DUGC) at the start of each session with HOD as a chairman, some faculty of the department as members of the committee and one faculty from a sister department as Director's nominee, besides student member(s). **2.** Formation of Programme Assessment committee (PAC) at the start of each semester consisting of HOD as chairman and two senior faculties as members.	**1**. The DUGC during their random checks of the lecture halls, observe and check the mode of delivery of course material by a concerned faculty member. Emphasis is given to the delivery of lectures as per the lesson plan, teaching aids used, communication skills and classroom management etc. **2.** Regular analysis of the results of mid-term and major examinations of all subjects is done.	Faculty members incorporate changes suggested by the DUGC and PAC for any gaps and recommends actions to be initiated to ensure quality deliverables.	**1.** Faculty members have to match the pace of their deliverables as per the students requirements as well as they have to schedule the lecture plans in such a way that the syllabus is completed in time. To achieve this they can arrange extra lectures on appropriate times. **2.** Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of teaching-learning. **3.** Regular analysis of the results of mid-term and major examinations of all subjects is done and concerned faculty is guided to initiate necessary actions. **4.** Remedial classes are scheduled in reference to academic progress of the student, who appear for supplementary examinations

(b) Lectures/ Lab Evaluation

Frequency	Conduct Mechanism	Action Plan	Implementation
1. Formulation of Departmental Undergraduate Committee (DUGC) at the start of each session with HOD as a chairman, some faculty of the department as members of the committee and one faculty from a sister department as Director's nominee, besides student member(s). **2.** Formation of Programme Assessment committee (PAC) at the start of each semester consisting of HOD as chairman and two senior faculties as members.	**1.** The committee performs audit of laboratory files i.e. verify the contents of the lab course file, experimental plan, evaluation procedure etc. **2.** The PAC undertakes random checks of the laboratories during experiments to assess the quality of the delivery and evaluation. **3**. Moreover a safety audit is conducted by the PAC in addition to the conduct of laboratory experiments.	The parameters are assessed to ensure the teaching methods of benchmarked standards are being used throughout the institute. Feedback is communicated to the concerned faculty member.	Each faculty member is encouraged to undergo at least one FDP per year. The FDP is mainly focussed to improve the communication skills and to train the faculty in improvised methods of Experimentation & exposure to newer techniques of analysis. The FDPs are carried out at the institute level itself by the learning and development team mainly sponsored under TEQIP-III.

(c) Academic Audit Report through External Experts

In addition to the above exercise an academic audit by an expert committee from outside the department was initiated from the last few years. The report and the actions taken are summarised as under:

Proposed	*Action*
Purchasing of few sophisticated instruments like: DSPACE RTI CONTROLLERS, OPAL RT, Power Quality Analyzers etc	Items Purchased: (a) DSPACE MicrolabBox (b) Opal RT

	(c)Typhoon HIL was won through a worldwide competition. (d) Fluke Power Quality Analyzers.
The trend started by department faculty members of publishing research papers in reputed journals like IEEE Transactions, Elsevier, IET, Taylor-Francis.	The trend has been taken initiated as suggested and details of published papers are given in criteria 5.
The department should initiate interaction with different stake-holders through academia-industry interaction sessions/workshops.	A number of short term workshops and training programmes were conducted by the department.
It is recommended that new M.Tech programme should be started in Power Electronics and Electric Drives, to further enhance the research stronghold of the department	Implemented. M.Tech in PEED started from July 2020.
Renovation of all laboratories of the department may be initiated.	All departmental labs renovated.

7.3. Improvement in Placement, Higher Studies and Entrepreneurship (10) [Claimed 8]

Improvement in Placement: (5)

Item	CAY (2019-2020)	CAYm1 (2018-19)	CAYm2 (2017-18)
Total No. of Final Year Students	49	72	73
No. of Students Placed on Campus	11	22	27
Percentage of Placed Students	22.44%	30.55%	36.9%

It is observed that placement data is slightly unpromising for CAY 2019-2020. This can be attributed to the unfortunate COVID-19 pandemic in Spring 2020, that negatively affected the placement drives as well as job market. However, this was compensated with a larger percentage of students opting for higher studies.

Improvement in Higher Studies: (3)

Item	CAY (2019-2020)	CAYm1 (2018-19)	CAYm2 (2017-18)
Total No. of Final Year Students	49	72	73
No. of Students who opted for	8	6	11

higher studies			
Percentage of students who opted for higher studies	16.32%	8.33%	15.06%

Many students are still applying/writing exams for higher studies and the numbers are expected to rise.

7.4. Improvement in the quality of students admitted to the program (20) Claimed 19

Student quality is assessed through the opening and closing rank in JEE Mains, of students admitted into the undergraduate program of electrical engineering department.

Opening and closing rank analysis:-

Item		Latest 2020 entry	CAY 2019 entry	CAYm1 2018 entry	CAYm2 2017 entry
Joint Entrance Examination, main (JEE main)	No. of Students admitted	111	84	78	69
	Opening Rank(GN)	OP-24003 OBC- 9084 SC-5039 ST-1776	OP-19431 OBC- 7816 SC-4069 ST-1247	OP-23227 OBC-7866 SC-3174 ST-1493	OP-18008 OBC-6585 SC-4222 ST-2163
	Closing Rank(GN)	OP-83853 OBC-385875 SC- 25971 ST-3496	OP- 81354 OBC- 355890 SC- 21404 ST- 2328	OP-76853 OBC-303507 SC-20069 ST-1810	OP-67005 OBC-112833 SC-28304 ST-2063

Academic Performance IN 10+2 (PCM percentage):-

Item	Latest 2020 entry	CAY 2019 entry	CAYm1 2018 entry	CAYm2 2017 entry
No. of Students admitted	111	84	78	69
Average PCM Percentage	83.6%	82.624	84.33%	82.68%

SUMMARY:

Sub-Criterion	Max. Score	Claimed Score
7.1	30	28
7.2	15	14
7.3	10	8
7.4	20	19
Total	75	69