

### 7.1 Actions taken based on the results of evaluation of each of the COs, POs & PSOs

Identify the areas of weaknesses in the program based on the analysis of evaluation of COs, POs & PSOs attainment levels. Measures identified and implemented to improve POs & PSOs attainment levels for the assessment year including curriculum intervention, pedagogical initiatives, support system improvements, etc. Actions to be written as per table in 3.3.2

**Examples of analysis and proposed action** *Sample 1*-Course outcomes for a laboratory course did not measure up, as some of the lab equipment did not have the capability to do the needful (e.g., single trace oscilloscopes available where dual trace would have been better, or, non-availability of some important support software etc.). Action taken-Equipment up-gradation was carried out (with details of up-gradation)

*Sample 2*-In a course on EM theory student performance has been consistently low with respect to some COs. Analysis of answer scripts and discussions with the students revealed that this could be attributed to a weaker course on vector calculus. Action taken-revision of the course syllabus was carried out (instructor/text book changed too has been changed, when deemed appropriate).

*Sample 3*-In a course that had group projects it was determined that the expectations from this course about PO3 (like: "to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations") were not realized as there were no discussions about these aspects while planning and execution of the project. Action taken- Project planning, monitoring and evaluation included in rubrics related to these aspects.

### POs Attainment Levels and Actions for improvement – CAYm1 (2021-22) only (2019-2023 Batch).

POs	Target Level	Attainment Level	Observations
<b>PO1: Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	70	66.54	<ol style="list-style-type: none"> <li>Basic science courses like Electronic devices &amp; circuits, Electronic circuit analysis, Transformation techniques &amp; vector calculus, Complex variables &amp; Statistical Methods, Applied Chemistry and Engineering science courses Java Programming, Data structures, Program core subjects like Network theory-I and Power generation &amp; Utilization have contributed to the attainment of PO1 value.</li> <li>Students Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO1.</li> </ol>
<p><b>Action 1:</b> Online classes were conducted for some of the basic and engineering science courses during Pandemic situation of COVID-19; Virtual Labs were utilized for Laboratory experiments.</p> <p><b>Action 2:</b> Online webinars, certificate programs, workshops, as well as the carrier guidance training classes &amp; Test for students have been conducted as part of their co-curricular activities.</p>			
<b>PO2: Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and			



engineering sciences.			
<b>PO2</b>	70	66.63	<ol style="list-style-type: none"> <li>1. Program core subjects like Power Systems Operation and control, Digital Logic Circuit Design, Power Electronics, Power Systems Lab, Power System Protection, Analog and Digital Signal Processing and Program Elective courses like Energy Conservation and Audit, High Voltage Engineering, Electrical Reliability Engineering, Electrical Safety have contributed to the direct attainment of PO2.</li> <li>2. Students Extra-Curricular and Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO2.</li> </ol>
<p><b>Action 1:</b> Faculty are encouraged to use teaching aids like ICT Tools for better understanding of concepts related to higher order learning skills in some of the Program core courses by the students.</p> <p><b>Action 2:</b> Online Workshops and certificate programs on Programming skills have been conducted for the students, to improve the implementation skills of students in the laboratory experiments.</p>			
<p><b>PO3: Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.</p>			
<b>PO3</b>	70	67.88	<ol style="list-style-type: none"> <li>1. Program Core courses like Digital Logic Circuit Design, Power Electronics, Power Systems Lab, Power System Protection, Analog and Digital Signal Processing, Electric And Magnetic Fields, Electrical Machines-II, Add-on Courses like Electrical Reliability Engineering, Electrical Safety and Program Elective courses like Embedded System Design, Intelligent Control Systems and Industrial Engineering &amp; Management have contributed to the direct attainment of PO3.</li> <li>2. Integrated Learning Practices like technical Seminar, Mini-project, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the indirect attainment of PO3.</li> </ol>
<p><b>Action 1:</b> Problem assisted learning (PAL) and problem based learning (PBL) are implemented to strengthen the design abilities of students.</p> <p><b>Action 2:</b> Students are encouraged to improve their design and innovative ideas by participating in various national and state level HAKATHONS conducted by AICTE, JNTUK University.</p>			
<p><b>PO4: Conduct investigations of complex problems:</b> 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.</p>			
<b>PO4</b>	70	68.74	<ol style="list-style-type: none"> <li>1. Program core laboratory courses like Power Systems Lab, Electrical Machines-II Lab, Power Electronics Lab, Electronic Circuits and ICS Lab, Linear and Digital Integrated Circuits, Microprocessors and Microcontrollers Lab and Integrated Learning Practices like technical Seminar, Mini-project, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the direct attainment of PO4.</li> <li>2. Students Extra-Curricular and Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO4.</li> </ol>
<p><b>Action 1:</b> Curriculum laboratories are being updated with research equipment; sophisticated software tools to enable students learn content beyond the syllabus.</p> <p><b>Action 2:</b> Students are encouraged to participate in the Extra-curricular activities, NSS &amp; NCC and improve their Intra &amp; Extra-Personal skills by allotting few hours per week in academic time-table.</p>			



<b>PO5: Modern tool usage:</b> 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.			
<b>PO5</b>	70	66.08	<ol style="list-style-type: none"> <li>1. Program core laboratory courses like Power Electronics Lab, Electronic Circuits and ICS Lab, Control Systems Lab, Electrical Networks Lab, Electrical Machines-I Lab and Integrated Learning Practices like technical Seminar, Mini-project, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the direct attainment of PO5.</li> <li>2. Students Extra-Curricular and Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO5.</li> </ol>
<p><b>Action 1:</b> To give better understanding of core concepts to student's, analysis of concepts using simulation tools is introduced in R17 Regulation.</p> <p><b>Action 2:</b> Students are motivated to participate in the Department AEEL activities and IEEE-LBRCE student branch Guest lectures to improve the presentation skills as well as get awareness about the latest developments in research in field of Electrical &amp; Electronics Engineering.</p>			
<b>PO6: The engineer and society:</b> 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.			
<b>PO6</b>	70	70.48	<ol style="list-style-type: none"> <li>1. Program core &amp; elective courses like Energy Conservation and Audit, Environmental Science, Renewable Energy Technologies, English Communication Skills Lab, Engineering Economics and Accountancy and Integrated Learning Practices like technical Seminar, Main &amp; Mini-project, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the direct attainment of PO6.</li> <li>2. Students Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC activities have contributed to the indirect attainment of the PO6.</li> </ol>
<p><b>Action 1:</b> Best project work awards are given to Students and Project Guides in implementing the Mini &amp; Main projects considering the problems of societal, safety issues with engineering solutions.</p> <p><b>Action 2:</b> Placements &amp; Training activities for better selections of students in multinational companies have been strengthened by providing Carrier guidance training and Campus Training Recruitment classes as well as off-line &amp; Online Tests for improvement in student's performance.</p>			
<b>PO7: Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			
<b>PO7</b>	65	68.76	<ol style="list-style-type: none"> <li>1. Program core &amp; elective courses like Energy Conservation and Audit, Environmental Science, Renewable Energy Technologies, English Communication Skills Lab, Engineering Economics and Accountancy and Integrated Learning Practices like technical Seminar, Main &amp; Mini-project, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the direct attainment of PO7.</li> <li>2. Students Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC activities have contributed to the indirect attainment of the PO7.</li> </ol>
<p><b>Action 1:</b> Guest Lectures on Energy Efficiency, Energy conservation &amp; Auditing and Skill Oriented Training program on PCB Design are conducted for Students to improve their technical skills in Electrical &amp; Electronics Engineering problems.</p> <p><b>Action 2:</b> Students are encouraged to participate in Green Energy club, LBRCE-Environmental club activities</p>			



to get awareness about the impact of the professional engineering knowledge and solutions in contexts of society and environment.

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

<b>PO8</b>	65	66.31	<ol style="list-style-type: none"> <li>1. Program core laboratory courses like Power Electronics Lab, Electronic Circuits and ICS Lab, Control Systems Lab, Electrical Networks Lab, Electrical Machines-I Lab and Integrated Learning Practices like technical Seminar, Mini &amp; Main-projects, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the direct attainment of PO8.</li> <li>2. Students Extra-Curricular and Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO8.</li> </ol>
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**Action 1:** Workshop on PSPICE, LAB-VIEW & PSCAD, Guest lecture on Developments in Installation capacity, Stages, working of various subsystems of Thermal power generating station, Applications of IOT in Thermal power plant and one day workshop on "Advances in Emerging Technologies – Hands-on experience on Industrial Robot" have been conducted to gain knowledge of practical industrial implementation of technologies.

**Action 2:** Students are encouraged to participate at National and state level NSS and NCC Activities and maintain ethical principles and commit to professional ethics in engineering practice.

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

<b>PO9</b>	65	68.26	<ol style="list-style-type: none"> <li>1. Integrated Learning Practices like technical Seminar, Mini &amp; Main-projects, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships and Program core laboratory courses like Power Electronics Lab, Electronic Circuits and ICS Lab, Control Systems Lab, Electrical Networks Lab, Electrical Machines-I Lab have contributed to the direct attainment of PO9.</li> <li>2. Students Extra-Curricular and Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO9.</li> </ol>
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**Action 1:** Students are encouraged to register for online courses offered by NPTEL.

**Action 2:** Students are encouraged to participate in the Extra-curricular activities, NSS & NCC and improve their Intra & Extra-Personal skills by allotting few hours per week in academic time-table.

**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.

<b>PO10</b>	65	71.23	<ol style="list-style-type: none"> <li>1. Humanities Science courses like Professional Communication – I, Presentation skills Lab, Professional Communication – II, English Communication Skills Lab, Integrated Learning Practices like technical Seminar, Mini &amp; Main-projects, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships and Program core laboratory courses have contributed to the attainment of PO10.</li> <li>2. Extra-Curricular and Co-curricular activities of Students, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO10.</li> </ol>
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**Action 1:** Students are encouraged to present their Internships, Mini & Main project works presentations in the department as well as they are motivated to present their works at National & International Conferences and publish them in reputed proceedings/Journals.

**Action 2:** It is mandatory for all students to participate in AEEL activities.


**PO11: Project management and finance:** Demonstrate knowledge and understanding of the 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	65	71.59	<ol style="list-style-type: none"> <li>1. Program core &amp; elective courses like Energy Conservation and Audit, Environmental Science, Renewable Energy Technologies, English Communication Skills Lab, Engineering Economics and Accountancy, Industrial Engineering &amp; Management and Integrated Learning Practices like technical Seminar, Main &amp; Mini-project, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the direct attainment of PO11.</li> <li>2. Students Extra-Curricular and Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO11.</li> </ol>
<p><b>Action 1:</b> In the conduct of various department/institution activities students are involved to plan and execute the events so as to acquire managerial and leadership abilities.</p> <p><b>Action 2:</b> Students are Encourage to participate in Ideation Feast, activities conducted by Innovation &amp; Incubation cell at national level competitions.</p>			
<b>PO12: Life-long learning:</b> 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	65	67.89	<ol style="list-style-type: none"> <li>1. Program core &amp; elective courses like Energy Conservation and Audit, Environmental Science, Renewable Energy Technologies, English Communication Skills Lab, Engineering Economics and Accountancy, Industrial Engineering &amp; Management and Integrated Learning Practices like technical Seminar, Main &amp; Mini-project, Problem assisted learning (PAL) and Problem based Learning (PBL), Internships have contributed to the direct attainment of PO12.</li> <li>2. Extra-Curricular and Co-curricular activities of Students, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PO12.</li> </ol>
<p><b>Action 1:</b> Students are motivated to register for NPTEL courses to acquire self learning skills.</p> <p><b>Action 2:</b> Students are encouraged to participate in the Extra-curricular activities, NSS &amp; NCC and improve their Intra &amp; Extra-Personal skills by allotting few hours per week in academic time-table.</p>			
<b>PSO1: Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power</b>			
PSO1	65	67.07	<ol style="list-style-type: none"> <li>1. Program core Courses like Power Generation And Utilization, Power Electronics, Power Systems Operation and control, Power System Protection, Electrical Machines-II, Control Systems, Power System Analysis, and Laboratory courses like Power Electronics Lab, Electronic Circuits and ICS Lab, Linear and Digital Integrated Circuits, Microprocessors and Microcontrollers Lab have contributed to the attainment of PSO1.</li> <li>2. Students Extra-Curricular and Co-curricular activities, Placements &amp; Higher studies, NSS &amp; NCC have contributed to the indirect attainment of the PSO1.</li> </ol>
<p><b>Action 1:</b> To enable students acquire the higher order learning outcomes, curricular labs are being up-graded with latest equipment.</p> <p><b>Action 2:</b> Encouraged students to participate in national conference, seminars and project work presentations as part of co-curricular activities.</p>			
<b>PSO2: Design and analyze electrical machines, modern drive and lighting systems</b>			
PSO2	65	67.15	<ol style="list-style-type: none"> <li>1. Program core courses like Solid State Drives, Power Electronics, Electrical Machines-I &amp; II, Power Generation and</li> </ol>



			Utilization, Program Elective courses like Energy Conservation and Audit, Intelligent Control Systems have contributed to the attainment of PSO2. 2. Students Extra-Curricular and Co-curricular activities, Placements & Higher studies, NSS & NCC have contributed to the indirect attainment of the PSO2.
<b>Action 1:</b> To enable students acquire the higher order learning outcomes, labs are being up-graded with latest equipment.			
<b>Action 2:</b> Students are encouraged to participate in NSS activities and NCC certification as part Extra-curricular activities.			
PSOs	Target Level	Attainment Level	Observations
<b>PSO3: Specify, design, implement and test analog and embedded signal processing electronic systems</b>			
PSO3	65	67.89	1. Basic Science courses such as Electronic Circuits And Devices, Electronic Circuit Analysis and Program core courses like Digital Logic Circuit Design, Analog and Digital Signal Processing, Microprocessors and Microcontrollers, Linear and Digital Integrated Circuits, Electronic Circuits and ICS Lab, Digital Logic Circuit Design Lab, Program Elective courses like Embedded System Design, Intelligent Control Systems have contributed to the attainment of PSO3. 2. Extra-Curricular and Co-curricular activities of Students, Placements & Higher studies, NSS & NCC have contributed to the indirect attainment of the PSO3.
<b>Action 1:</b> To improve the higher order core competencies of the students, MPMC and PE labs are up-graded.			
<b>Action 2:</b> To enhance the technical advancements in the field of electrical and electronics engineering students are motivated to attend Online workshops and webinars.			
<b>PSO4: Design controllers for electrical and electronic systems to improve their performance</b>			
PSO4	65	71.91	1. Program core courses such as Solid State Drives, Power Systems Operation and control, Power Electronics, Power System Protection, Microprocessors and Microcontrollers, Control Systems, Measurements and Instrumentation and Program Electives like High Voltage Engineering, Intelligent Control Systems, Electrical Reliability Engineering have contributed to the attainment of PSO4. 2. Extra-Curricular and Co-curricular activities of Students, Placements & Higher studies, NSS & NCC have contributed to the indirect attainment of the PSO4.
<b>Action 1:</b> To enable students acquire the higher order learning outcomes, labs are being up-graded with latest equipment.			
<b>Action 2:</b> Students are encouraged to develop proto type models of their project works to enhance their practical implementation skills engineering systems with the knowledge gain from theory courses.			

  
NBACriteria-7 Coordinator

  
HOD EEE



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(An Autonomous Institution Since 2010)

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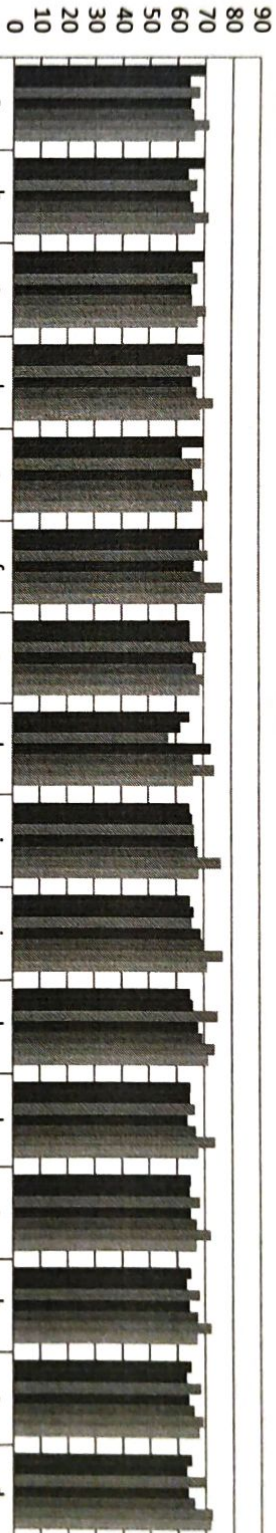
Department of Electrical and Electronics Engineering

Accredited by NBA under Tier-I

Date: 01/07/2023

## 2019-23 Batch

Percentage PO Attainment



	a	b	c	d	e	f	g	h	i	j	k	l	a	b	c	d
■ Target	70	70	70	70	70	70	65	65	65	65	65	65	65	65	65	65
■ 2014 Admitted Batch	64.584	64.08	65.572	63.946	62.079	68.577	64.96	61.681	65.853	66.375	65.903	64.784	64.553	63.361	63.266	63.094
■ 2015 Admitted Batch	68.101	67.254	67.509	68.859	69.062	71.737	70.807	57.351	66.623	65.577	74.891	66.584	68.288	68.083	68.458	69.809
■ 2016 Admitted Batch	64.913	64.792	65.283	65.691	65.784	66.464	66.192	72.737	66.657	68.889	67.853	63.728	64.856	64.422	64.02	63.71
■ 2017 Admitted Batch	65.937	65.828	65.577	67.411	66.413	69.374	67.247	66.278	67.954	69.887	69.324	66.822	67.059	67.374	65.8	65.939
■ 2018 Admitted Batch	71.345	71.537	70.712	73.56	71.499	76.85	69.866	73.998	76.3	76.797	73.749	73.847	72.118	72.298	69.153	72.38
■ 2019 Admitted Batch	66.537	66.633	67.879	68.735	66.077	70.478	68.755	66.313	68.26	71.229	71.59	67.885	67.069	67.152	67.886	71.913

PAC-Coordinator

Head of the Department