INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Department of Electrical and Electronics Engineering

Attainment of Program Outcomes (POs) and Program Specific Outcomes (PSOs) of 2019 - 2023 batch (IARE - R18)

Subject Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
AHSB01	English										2.80					
AHSB02	Linear Algebra and Calculus	2.40	2.30													
AHSB03	Engineering Chemistry	1.70	2.20					2.90								
AHSB08	English Language and Communication Skills Laboratory										3					
AHSB09	Engineering Chemistry Laboratory	3	3													
AMEB02	Engineering Graphics and Design Laboratory	.9				0.9										
AHSB11	Mathematical Transform Techniques	2.40	2.20		2.90									2.60		
AEEB03	Electrical Circuits	1.50	1.50		1.30										1	
AHSB04	Waves and Optics	1.80	1.80		1								1.60			
AEEB07	Electrical Circuits Laboratory	2.7	2.70	2.70	2.70	2.70	2.70		2.70	2.70	2.70		2.70	2.70		

ACSB02	Programming for Problem Solving Laboratory	3	3	3		3	3					3				
AMEB01	Workshop Manufacturing Practices Laboratory	3		3		3						3				3
AHSB10	Engineering Physics Laboratory	3	3		3	3										3
AEEB09	NETWORK ANALYSIS	1.40	1.70	1.50										1.20		
AEEB10	ELECTROMAGNETIC FIELDS	2.30	2.30	2.20	2.20						2.30		2.20	2.30		
AEEB11	ELECTRICAL MACHINES-I	2.40	2.40	2.80										2.30		
AEEB12	NETWORK ANALYSIS LABORATORY	2.00	2.00			2.00			2.00	2.00	2.00		2.00	2.00		2.00
AECB04	ANALOG AND DIGITAL ELECTRONICS LABORATORY	.90	.90								.90			0.90		
AEEB13	ELECTRICAL MACHINES LABORATORY - I	2.30	2.30	2.30	2.30	2.30	2.30		2.30	2.30	2.30		2.30	2.30		
AEEB14	ELECTRICAL POWER GENERATION SYSTEMS	1.60	1.60											1.60		
AEEB15	ELECTRICAL MACHINES - II	2.40	2.30	2.10										2.50		
AEEB16	CONTROL SYSTEMS	2.40	2.40	2.50	2.50		2.50		1.90		2.20		2.20	2.10	2.50	2.90
AEEB18	CONTROL SYSTEMS LABORATORY	1.60	1.60	1.60	1.60	1.60	1.60		1.60	1.60	1.60		1.60	1.60	1.60	1.60
ACSB03	DATA STRUCTURES	2.9										2.9	2.9	2.9		
AEEB17	ELECTRICAL MACHINES LABORATORY - II	3	3	3	3	3	3		3	3	3		3	3		3

AEEB19	Electrical Power Transmission Systems	1.90	1.90	1.60							1.90			1.90		
ACSB05	DATA STRUCTURES LABORATORY	3.00	3.00	3.00	3.00						3.00		3.00	3.00	3.00	3.00
AHSB14	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS	1.20	1.20							1.20	1.20		1.20			
AEEB19	Electrical Power Transmission Systems	1.6	1.7	1.8							1.6			1.9		
AEEB20	Power Electronics	1.06	1.50	1.20	2.30		2.90			1.60	1.60		1.50	1.60	1.4	
AEEB34	Electrical Energy Conservation and Auditing	2.7	2.6	2.9	2.7		2.7		2.7		2.7		2.7	2.7	2.8	
AEEB46	Wind and Solar Energy Systems	1.60	1.60	1.20				1.80						1.80	1.50	
ACSB34	Relational Database Management Systems	2	1.8	1.7	2.20									1.7		
AHSB15	Project Based Learning (Prototype / Design Building)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
AEEB21	Power Electronics Laboratory	3.00	3.00	3.00	3.00	3.00	3.00		3.00	3.00	3.00		3.00	3.00	3.00	3.00
AECB26	Microprocessors and Microcontrollers Laboratory	1.60	1.60	1.60		1.6				1.6	1.6				1.6	
AMEB56	Introduction to Robotics	2.6	2.21	1.2	1.2											2.3
AEEB22	Power System Analysis	1.50	1.50	1.60	1.50					1.50	1.60		1.50	1.50		1.50
AEEB23	Electric Drives and Static Control	1.20	1.20	1.20	1.20		1.20		1.20			1.20	1.20		1.20	
AEEB24	Electrical Measurements and Instrumentation	1.60	1.60	170							1.6.0			1.60		

AEEB45	Power Electronics in Renewable Energy Sources	1.20	1.20	1.20	1.20			1.20						1.20	1.20	
AEEB51	Utilization of Electric Power	2.20	2.10	1.80		1.20									2.90	
AHSB16	Research Based Learning (Fabrication / Model Development)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
AEEB25	Electrical Measurements and Instrumentation Laboratory	2.30	2.30	2.30	2.30	2.30			2.30	2.30	2.30		2.30	2.30		2.30
AEEB26	PLC and Industrial Automation Laboratory	3.00	3.00	3.00	3.00	3.00	3.00		3.00	3.00	3.00		3.00	3.00	3.00	3.00
AEEB58	Industrial Automation and Control	1.90	2.20	2.20	2.20		2.30	2.30		2.10	1.90		2.30		1.70	1.90
AEEB27	Power System Protection	2.20	1.80	1.00	2.20	1.20	2.20		2.90	2.20	2.20		2.30	2.20		
AEEB28	Power System Operation and Control	1.30	1.30	1.30	1.20		1.30	1.20		1.30	1.30		1.30	1.20	1.40	
AEEB41	Electrical Safety and Safety Management	2.10	2.10				2.10	2.10								
AEEB47	High Voltage Engineering	1.40	1.30	1.40			1.30		1.40		1.30		1.10	1.30	1.50	
AEEB43	HVDC Transmission	2.70	2.70	2.60							2.70			2.60		
AEEB49	Power Quality and FACTS	2.90	2.90	2.90		2.90									2.90	2.90
AEEB29	Electrical Power Systems Laboratory	3.00	3.00	3.00	3.00		3.00		3.00	3.00	3.00		3.00	3.00		3.00
AEEB30	Power System Simulation Laboratory	3.00		3.00		3.00										2.30
AEEB61	Project Work - (phase - I)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

AHSB22	Intellectual Property Rights	2.90					2.90		2.90		2.90		2.90			
AEEB62	Project Work - (phase - II)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Direct Attainment		2.2	2.2	2.2	2.4	2.5	2.5	2.4	2.5	2.4	2.4	2.5	2.4	2.2	2.2	2.7

Overall Attainment

S No.	Assessment Component(Direct + Indirect)	Program Outcomes												PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1.	Direct Assessment (CIA + SEE + Course End Survey) (a)	2.3	2.4	2.4	2.3	2.7	2.6	2.6	2.4	2.8	2.5	2.8	2.7	2.5	2.5	2.3
2.	Student Program exit surveys (b)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
3.	Employer surveys (c)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
4.	Alumni Survey (d)	2.6	2.5	2.6	2.5	2.4	2.5	2.5	2.5	2.6	2.5	2.5	2.4	2.6	2.6	2.6
Overall attainment = a*0.8 + b*0.1 + c*0.05 + d*0.05		**2.4**	**2.4**	**2.4**	**2.4**	**2.7**	**2.6**	**2.6**	**2.4**	**2.8**	**2.5**	**2.8**	**2.7**	**2.5**	**2.5**	**2.4**

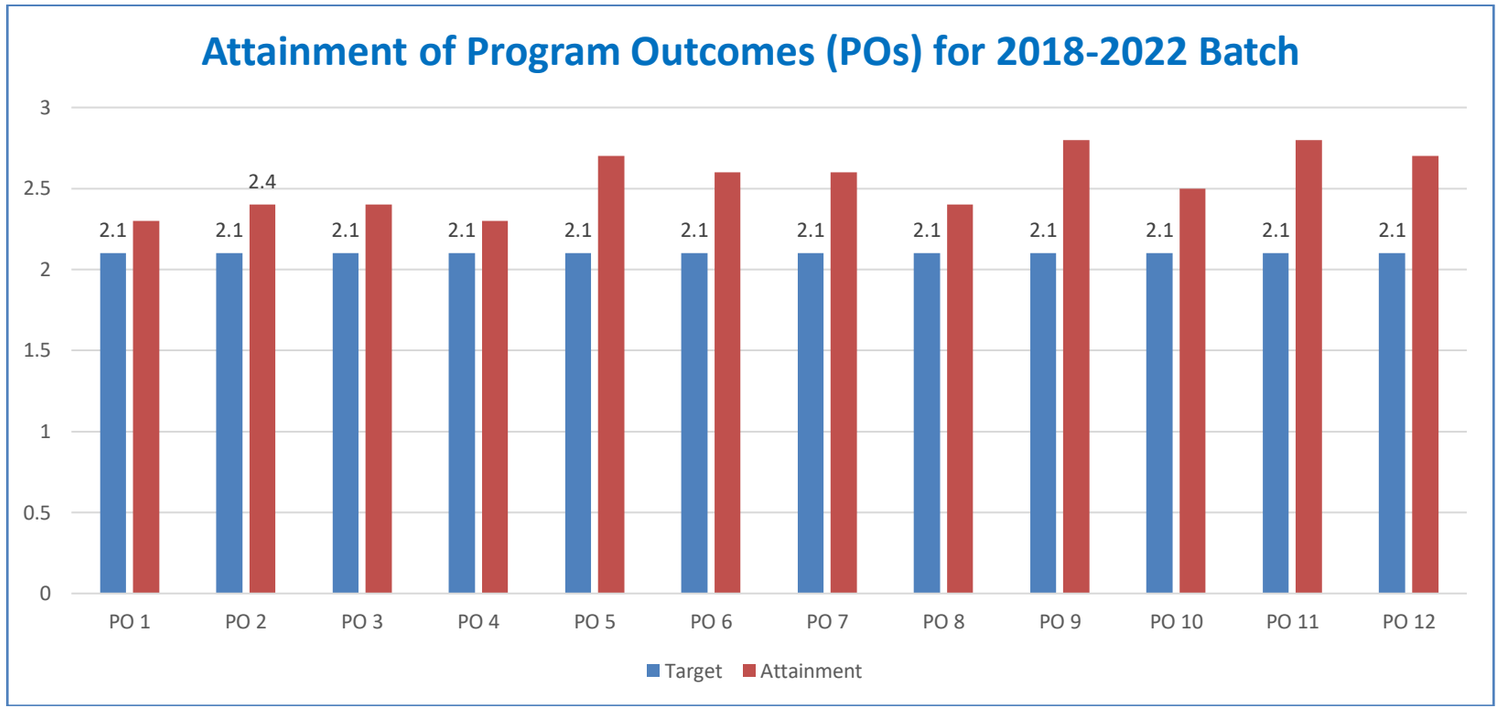
Action taken to improve the attainment of Pos and PSOs:

POs	Target Level	Attainment Level	Observations
PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	**2.1**	**2.3**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Tutorial classes on applied mathematics have been arranged for the students to solve complex engineering problems in electronics and communication subjects. **Action 2:** A few new FPGA hardware kits have been purchased and their uses have been demonstrated during the theory classes of digital system design course to help the students understand the utilization and functions of the FPGA kits. **Action 3:** Expert lectures on signal &system and electronic circuit analysis have been arranged for the students in order to reinforce their knowledge about the application of the subject.			
PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
PO2	**2.1**	**2.4**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: IEEE research papers were assigned to students in electromagnetic theory and transmission lines and antennas and wave propagation course to analyze and review the research papers. **Action 2:** Application oriented problems were solved in electronic circuit analysis, VLSI design, microprocessor and microcontroller and embedded systems to improve logical thinking. **Action 3:** In signal and systems and digital communication, tutorial sessions were taken for the application of theory to real life problem.			
PO3: Design/development of Solutions: Design solutions for complex engineering problems and design systemcomponents or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
PO3	**2.1**	**2.4**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Societal and environmental design problems were given as self-study to students in open elective courses. **Action 2:** In electronic devices and circuit and antennas & wave propagation, assignments were given to students to solve real field design problems. **Action 3:** The remedial sessions were arranged to enhance the performance of the students in electronic devices and circuit and control systems courses.			
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	**2.1**	**2.3**	Target is achieved. The following actions were taken to enhance the target level.

Action 1: Several workshops were conducted on the design of electronic devices and circuits, embedded system and microprocessor & microcontroller lab experiments. **Action 2:** In VLSI design, special attention was given to demonstrate how to analyze and interpret experimental data and synthesize a research conclusion/outcome. **Action 3:** Research based complex problems were given as assignment in VLSI design, signals & system, digital communication , to improve practical skills of the students			
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	**2.1**	**2.7**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Complex design problem using modern tool were given as assignment to the students in digital signal processing, digital image processing and embedded system design courses. **Action 2:** Workshops were conducted on several electronics and communication engineering software packages like PCB Design, antenna design(HFSS) and Cadence. **Action 3:** Hands-on sessions on MATLAB-simulink engineering tool were given to students to understand the concept of analog communication, digital communication and digital signal processing courses.			
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	**2.1**	**2.6**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Awareness program on clean and renewable energy was organized to inculcate a strong sense of responsibility among the budding student engineers. **Action 2**: Students will be encouraged to participate in social clubs like sports club, cultural club			
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	**2.1**	**2.6**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Short video were presented to encourage sense of responsibility among the students and also to promote sustainable environment. **Action 2:** Awareness program on effect of electronics circuit to nature will be given to promote a sustainable environment. **Action 3:** Proper guidance were given to the students to implement renewable energy projects using optimized material that would guarantee sustainable development.			
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
PO8	**2.1**	**2.4**	Target is achieved. The following actions were taken to enhance the target level.

Action 1: Guest lectures were arranged on topics related to professional ethics / value based education. **Action 2:** Online video links on ethical principles in electronics subjects were shared to students. **Action 3:** Students were encouraged to get their major project and internship reports for plagiarism check to ensure proper practice of professional ethics.			
PO9 : Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
PO9	**2.1**	**2.8**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Students were motivated to participate in various club activities where they will learn to function effectively both as individuals and as team members in a group. **Action 2:** Several students' professional chapter activities were organized to demonstrate their abilities as team members in a group. **Action 3:** Students were motivated to work in a team in project work/Internship.			
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	**2.1**	**2.5**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Students were given training to write effective reports and make effective presentations on projects undertaken. **Action 2:** Students were encouraged to participate in class room presentations and national/international conferences/seminars/symposia/ hackathon / ideathon. **Action 3:** Guest lecturers were organized on personality development/life skills/public speaking of the students.			
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	**2.1**	**2.8**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Students were encouraged to do multidisciplinary project involving allied departments. **Action 2:** Students were motivated to handle financial management during major project and club activities.			
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	**2.1**	**2.7**	Target is achieved. The following actions were taken to enhance the target level.

Action 1: The recent technology like FIN-FET technology, 5G wireless communication, cyber security, machine learning, artificial intelligence, will be introduced to the students. **Action 2:** Students were motivated to take up NPTEL certification on python, networking, RF design, communication, VLSI related subjects. **Action 3:** Students were motivated to pursue higher studies in areas of wireless communication, RF design, semiconductor technology in premier institution.			
PSO1: Build embedded software and digital circuit development platform for robotics, embedded systems and signal processing applications.			
PSO1	**2.1**	**2.5**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: 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. **Action 2**: Students were given design-oriented activities in emerging fields of electronics and communication engineering Action 3: Students were encouraged to take up MOOC courses as part of co curricular activities.			
PSO2: Focus on the application specific integrated circuit prototype designs, virtual instrumentation and system on chip designs.			
PSO2	**2.1**	**2.5**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Hands on workshop were conducted from industry experts on latest hardware and software for getting real time exposure. **Action 2:** Short term training program were conducted on program specific courses **Action 3:** Students were motivated to take up industry related project to get understanding of advanced industry tools.			
PSO3: Make use of high frequency structure simulator for modeling and evaluating the patch and smart antennas for wired and wireless communication applications.			
PSO3	**2.1**	**2.3**	Target is achieved. The following actions were taken to enhance the target level.
Action 1: Hands on workshop were conducted from industry experts on latest hardware and software for getting real time exposure. **Action 2:** Short term training program were conducted on program specific courses **Action 3:** Students were motivated to take up industry related project to get understanding of advanced industry tools.			


Attainment of Program Outcomes (POs) for 2018-2022 Batch
3
2.5
2
1.5
1
0.5
0
2.1
2.1
2.4
2.1
2.1
2.1
2.1
2.1
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2.1
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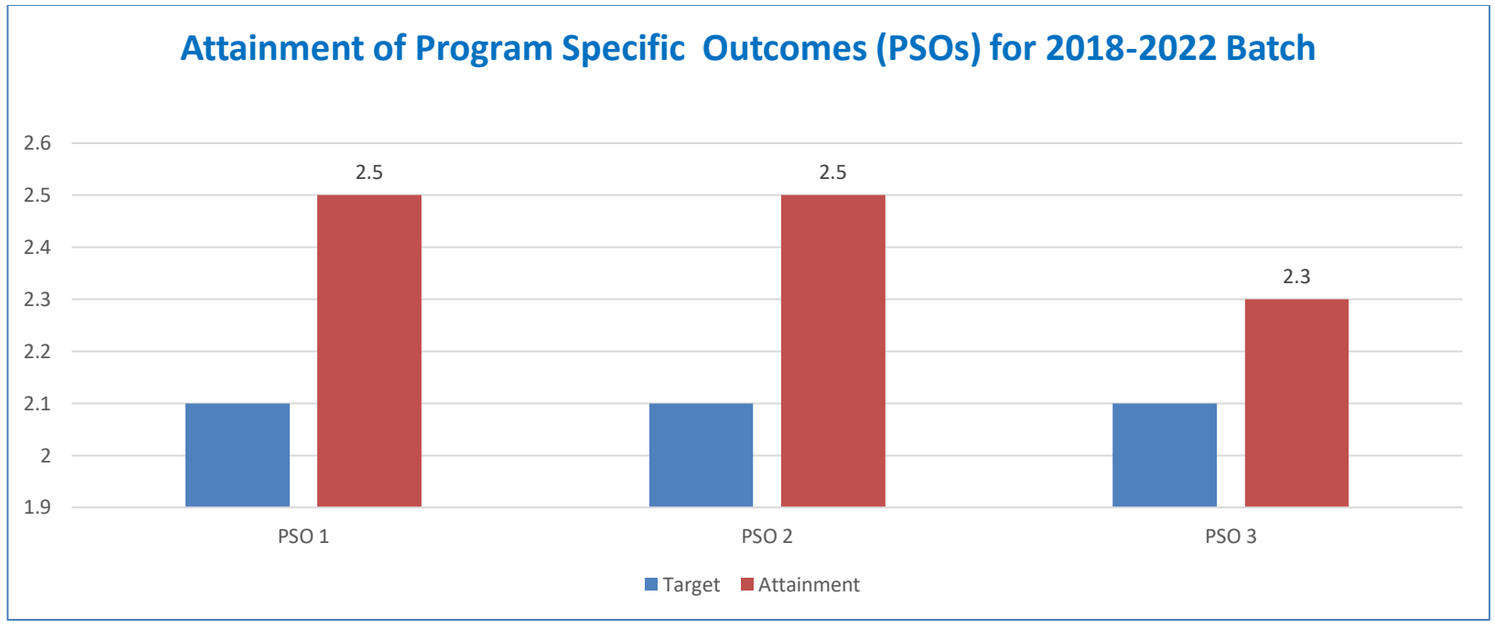
PO 1
PO 2
PO 3
PO 4
PO 5
PO 6
PO 7
PO 8
PO 9
PO 10
PO 11
PO 12
Target
Attainment


Attainment of Program Specific Outcomes (PSOs) for 2018-2022 Batch
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
2.5
2.5
2.3
PSO 1
PSO 2
PSO 3
Target
Attainment

HOD, EEE