INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Department of Electronics and Communication Engineering

Attainment of Program Outcomes (POs) and Program Specific Outcomes (PSOs) of 2016 - 2020 batch (IARE - R16)

Subject Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
AHS002	Linear Algebra and Ordinary Differential Equations	2.40	2.00	-	-	-	-	-	-	-	-	-	-	-	-	-
AHS003	Computational Mathematics And Integral Calculus	2.20	2.20	-	-	-	-	-	-	-	-	-	-	-	-	-
AHS005	Engineering Chemistry	1.60	1.70	-	-	-	-	2.30	-	-	-	-	-	-	-	-
AHS006	Engineering Physics	2.60	2.60	-	2.70	-	-	-	-	-	-	-	-	2.30		
ACS001	Computer Programming	1.00	1.00	0.90	-	1.00	-	-	-	-	1.00		1.00	-	-	-
ACS101	Computer Programming Laboratory	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90		0.90	0.90	0.90	0.90
AME103	Computer Aided Engineering Drawing	2.30	-	2.30	-	2.30	-	-	-	2.30	2.30	-	2.30	-	-	2.30
AHS104	Engineering Physics and Chemistry Laboratory	2.10	2.10		2.10	-	-	-	-	-	-	-	-	2.10	-	-
AHS102	Computational Mathematics Laboratory	2.30	2.30	-	2.30	-	-	-	-	-	-	-	-	2.30	-	-
AHS001	English For Communication	-	-	-	-	-	-	-	-	-	1.50	-	-	-	-	-
AHS004	Complex Analysis and Probability Distribution	2.40	2.10	-	2.60	-	-	-	-	-	-	-	-	-	-	-
AHS009	Environmental Studies	2.00	-	-	2.30	-	-	2.00	-	-	-	-	-	-	-	-
ACS002	Data Structures	1.20	1.20	1.30	1.10	1.40	-	-	-	-	1.40		1.20	-	-	-
AEE002	Electrical Circuits	1.40	1.50	1.50	-	-	-	-	-	-	1.40		1.40	-	-	-
AHS101	Communication Skills Laboratory	-	-	-	-	-	-	-	-	3.00	3.00	-	-	-	-	-
ACS102	Data Structures Laboratory	1.60	1.60	1.60	1.60	1.60	1.60	-	1.60	1.60	1.60	-	1.60	-	-	-
AEE102	Electrical Circuits Laboratory	2.00	2.00	2.00	2.00	2.00	2.00	-	2.00	2.00	2.00	-	2.00		2.00	

Code	Course Name															
ACS112	Engineering Practice Laboratory	1.70	1.70	1.70	1.70	1.70	1.70	-	-	-	1.70	-	-	1.70	-	1.70
AEC001	Electronic Devices And Circuits	1.30	1.20	1.30	-	-	-	-	-	-	1.30	-	-	1.30	-	-
AHS011	Mathematical Transform Techniques	1.70	1.30	-	1.20	-	-	-	-	-	-	-	-	1.50	-	-
AEC002	Digital System Design	1.50	1.40	1.20	1.20	-	-	-	-	-	1.50	-	-	-	1.20	-
AEC003	Probability Theory and Stochastic Processes	1.90	2.00	2.00	-	-	-	-	-	-	1.90	-	-	-	-	1.90
AEC101	Electronic Devices and Circuits Laboratory		2.30	-	-	2.30	-	-	-	-	2.30	-	-	2.30	-	-
AEE114	Electrical Technology Laboratory	2.00	2.00	2.00	2.00	2.00	-	-	-	2.00	2.00	-	-	-	-	-
AHS107	Simulation Laboratory	2.30		2.30	2.30	2.30	-	-	-	2.30	2.30	-	-	2.30	-	-
AEC004	Electronic Circuit Analysis	2.00	2.00	1.80	-	-	-	-	-	-	2.00	-	-	1.80	-	-
AEC005	Analog Communications	1.60	1.60	1.80	-	-	-	-	-	-	1.60	-	-	-	-	1.70
AEE009	Control Systems	1.60	1.40	1.20	-	-	-	-	-	-	1.60	-	-	1.20	-	-
AEC006	Pulse and Digital Circuits	1.20	1.20	1.30	-	-	-	-	-	-	1.30	-	-	1.00	-	-
AEC007	Electromagnetic Theory and Transmission Lines	2.00	2.00	1.90	-	-	-	-	-	-	2.00	-	-	-	-	2.10
AEC102	Electronic Circuit and Pulse Circuits Laboratory	2.30	2.30	2.30	2.30	2.30	-	-	-	2.30	2.30	-	-	2.30	-	-
AEC103	Digital System Design Laboratory	2.40	2.40	2.40	-	2.40	-	-	-	2.40	2.40	-	2.40	-	2.40	-
AEC104	Analog Communications Laboratory	-	2.70	-	-	2.70	-	-	-	2.70	2.70	-	2.70	-	-	2.70
AEC008	Integrated Circuits Applications	1.50	1.50	1.20	-	-	-	-	-	-	1.50	-	-	-	1.00	-
AEC009	Digital Communications	1.60	1.70	1.60	-	-	-	-	-	-	1.60	-	-	-	-	1.40
AEC010	Computer Organization	1.60	1.50	-	-	-	-	-	-	-	1.50	-	-	1.60	-	-
AEC011	Antennas and Propagation	1.40	1.30	1.60	1.50	-	-	-	-	-	1.40	-	-	-	-	1.30
AHS015	Business Economics and Financial Analysis	2.20	2.20	-	-	-	-	-	1.50	1.70	-	1.80	-	-	-	1.80
AEC105	Digital Communications Laboratory	2.00	2.00	2.00	2.00	2.00	2.00		2.00	2.00	2.00	2.00	2.00	2.00		
AEC106	Integrated Circuits Applications Laboratory	2.00	2.00		2.00	2.00	-	-	-	2.00	-	-	-	-	2.00	

Code	Course														
AHS106	Research and Content Development	-	2.30	-	-	2.30	-	-	-	2.30	2.30	-	2.30	2.30	2.30	2.30
AEC507	Digital Signal Processors and Architecture	2.70	2.70	-	2.80	-	-	-	-	-	2.70	-	-	2.70	-	-
AEC508	Digital Image Processing	2.00	1.80	1.40	1.40	-	-	-	-	-	2.00	-	2.00	1.70	-	-
AEC516	Digital IC Applications Using VHDL	1.80	1.90	1.60	2.10	1.90	-	-	-	-	1.90	-	-	-	1.90	-
AIT003	Computer Networks	2.90	2.90	2.90	2.90	-	-	-	-	-	2.90	-	-	2.90	-	-
AEC012	Digital Signal Processing	1.80	1.70	0.90	-	0.90	-	-	-	-	1.70	-	-	0.90	-	-
AEC013	Microprocessors and Microcontrollers	1.80	1.30	1.30	-	-	-	-	-	-	1.70	-	-	1.50	-	-
AEC014	Electronic Measurement and Instrumentation	2.00	2.00	2.00	-	-	-	-	-	-	2.00	-	-	-	1.80	2.40
AEC520	Cellular and Mobile Communications	2.00	2.00	2.10	-	-	-	-	-	-	2.10	-	-	-	-	1.90
AEC521	Radar Systems	2.00	1.90	1.60	1.70	-	-	-	-	-	2.00	-	-	-	-	1.10
AEC522	Satellite Communication	2.20	2.20	-	2.30	-	-	-	-	-	2.20	-	-	-	-	2.60
AEC524	Wireless Communications and Networks	1.70	1.40		1.10	-	-	-	-	-	1.80	-	-	-	-	1.10
AEC107	Digital Signal Processing Laboratory	-	2.00	2.00	-	2.00	-	-	-	2.00	2.00	-	-	2.00	-	-
AEC108	Microprocessors and Microcontrollers Laboratory	2.30	2.30	2.30	-	2.30	-	-	-	2.30	2.30	-	-	2.30	-	-
AEC109	Instrumentation Laboratory	2.30	2.30	2.30	2.30	2.30	-	-	-	-	2.30	-	-	-	2.30	-
AEC201	Ideation and Product Development	2.40	2.40	2.40	2.40	2.40	-	-	-	2.40	2.40	-	2.40	2.40	-	2.40
AEC018	Optical Communication	2.90	2.90	-	-	-	-	-	-	-	2.90	-	-	-	-	2.90
AHS552	Research Methodologies	2.80	2.80	2.80	2.80	-	-	-	2.80	2.80	2.80	-	-	2.80	2.80	2.80
ACS552	Java Programming	1.70	1.90	-	1.80	1.80	-	-	-	-	2.30	-	1.80	1.80	-	2.30
AEC015	Microwave Engineering	1.60	1.40	-	1.20	-	-	-	-	-	1.60	-	-	-	-	2.40
AEC017	VLSI Design	2.00	1.70	1.80	1.40	1.40	-	-	-	-	2.00	-	-	2.30	2.10	
AEC110	Microwave Engineering Laboratory	1.70	1.70	1.70	-	1.70	-	-	-	1.70	1.70	-	-	-	-	1.70
AEC111	Embedded System Laboratory		2.00	2.00	-	2.00	-	-	-	2.00	2.00	-	-	2.00	-	-

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
AEC112	VLSI Design Laboratory	-	2.30	-	2.30	2.30	-	-	-	2.30	2.30	-	2.30	-	2.30	-
AEC401	Comprehensive Examination	2.00	2.00	2.00	2.00	2.00	2.00	2.00	-	-	-	2.00	2.00	2.00	2.00	2.00
AEC302	Project Work	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
	Direct Attainment Value	**1.9**	**1.9**	**1.8**	**2**	**2**	**1.8**	**2**	**1.9**	**2.2**	**2**	**2.1**	**1.9**	**2**	**1.9**	**2**

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)	1.9	1.9	1.8	2	2	1.8	2	1.9	2.2	2	2.1	1.9	2	1.9	2
2.	Student Program exit surveys (b)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
3.	Employer surveys (c)	2.6	2.6	2.7	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	2.8	2.5	2.4	2.4	2.7	2.6	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	Overall attainment = a*0.8 + b*0.1 + c*0.05 + d*0.05	**2.1**	**2.1**	**2**	**2.1**	**2.1**	**2**	**2.1**	**2**	**2.3**	**2.1**	**2.2**	**2**	**2.1**	**2**	**2.1**

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	**1.9**	**2.1**	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	**1.4**	**2.1**	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	**1.3**	**2**	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	**1.3**	**2.1**	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	1.3	2.1	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	1	2	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	1.7	2.1	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	1.4	2	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	1.4	2.3	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	1	2.1	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	1.9	2.2	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	1.3	2	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	1.6	2.1	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.
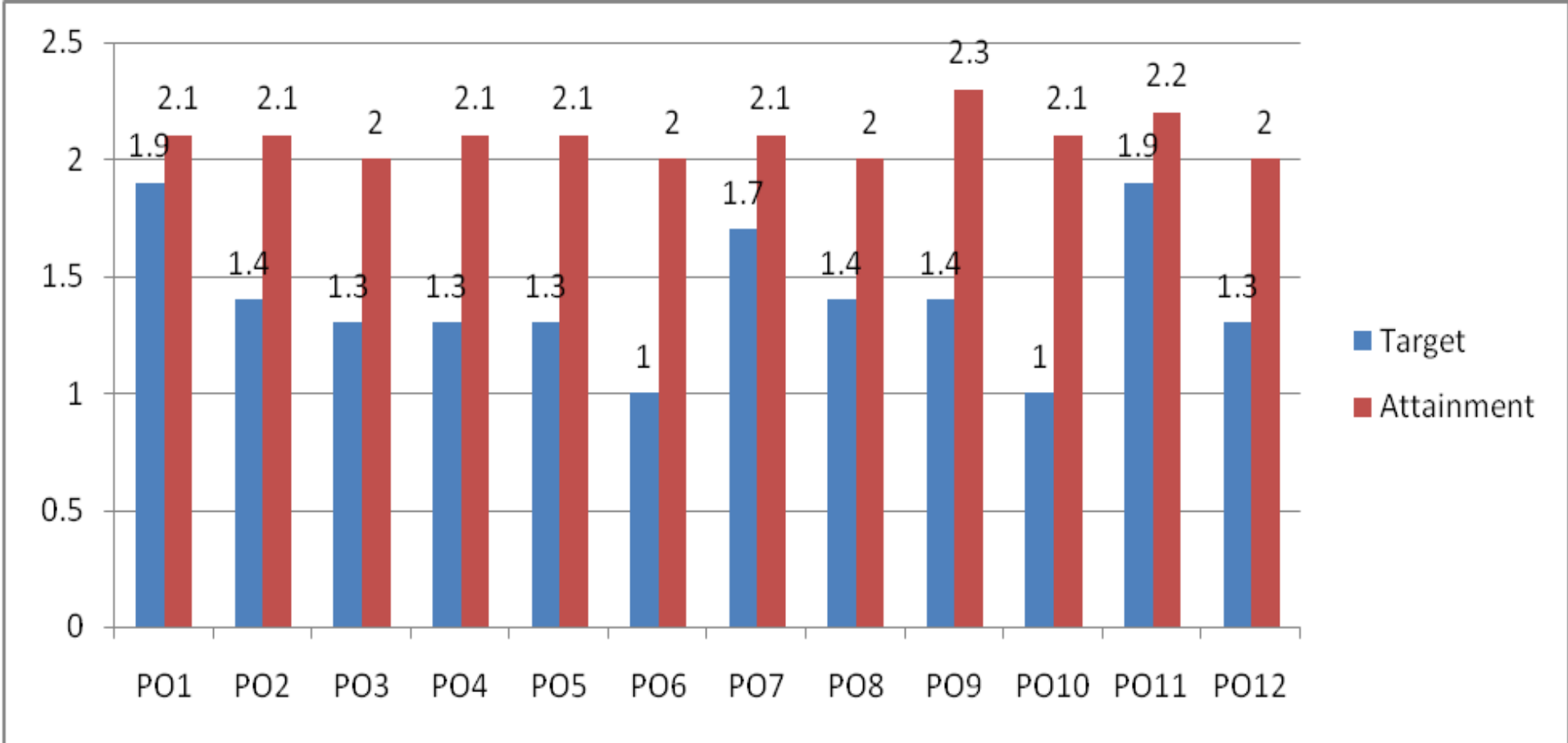
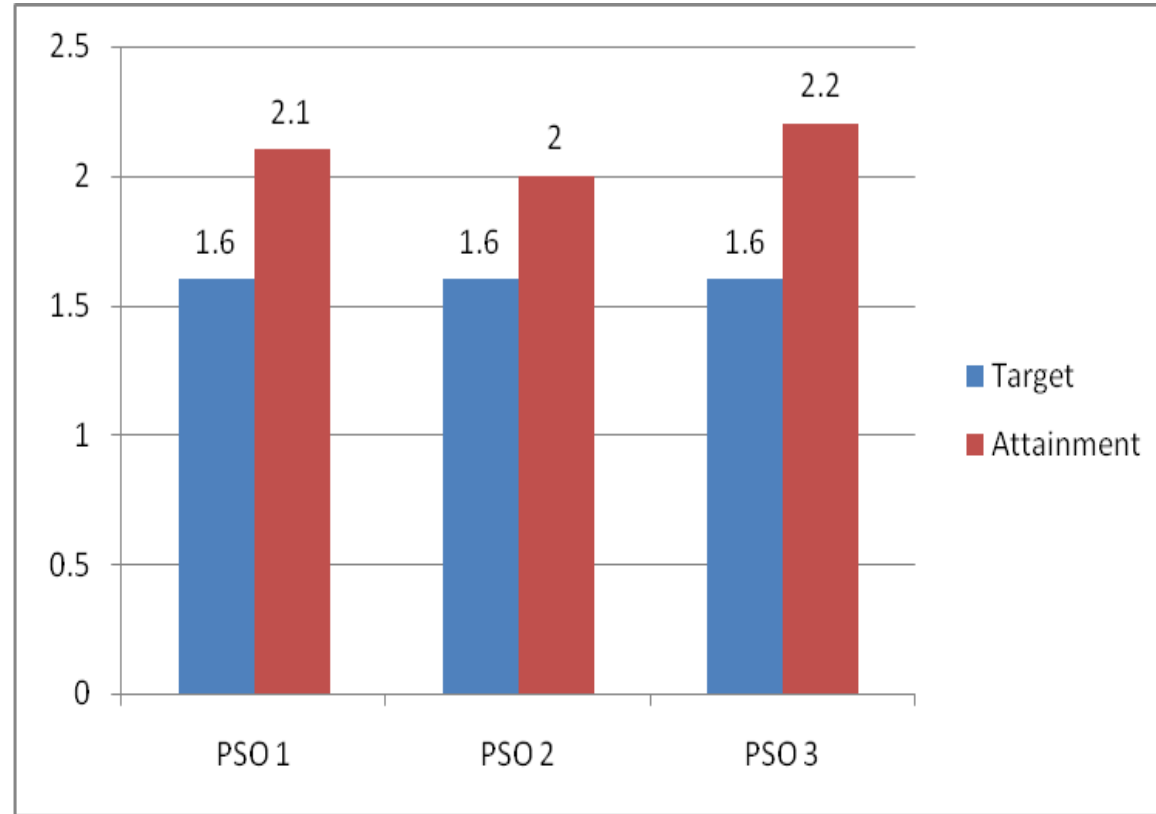| PSO2	1.6	2	Target is achieved. The following actions were taken to enhance the target level.

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	1.6	2.1	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.

HOD, ECE