INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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

Course Code	Course	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
AHSB02	Linear Algebra And Calculus	2.90	2.90													
AHSB03	Engineering Chemistry	2.20	2.50					2.90								
AEEB01	Fundamental Of Electrical Engineering	2.20	1.80											2.00		
AHSB09	Engineering Chemistry Laboratory	3.00	3.00													
AEEB05	Fundamental Of Electrical Engineering Laboratory	3.00				3.00			3.00	3.00	3.00		3.00	3.00		
AMEB01	Workshop Manufacturing Practices Laboratory	3.00		3.00		3.00				3.00	3.00		3.00			3.00
AHSB01	English										2.70					
AHSB12	Probability And Statistics	2.60	2.70		2.50											
AHSB13	Semiconductor Physics	2.40	2.70		2.30											2.90
ACSB01	Programming For Problem Solving	2.20	2.20	2.20	2.20	2.20					2.20		2.20	2.00		2.20
AHSB08	English Language And Communication Skills Laboratory									3.00	3.00					
AHSB10	Engineering Physics Laboratory	3.00	3.00		3.00									3.00		
ACSB02	Programming For Problem Solving Laboratory	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30		2.30	2.30		2.30
ACSB03	Data Structures	2.50	2.60	2.40	2.70	2.60					2.40		2.70	2.40	2.60	2.40
ACSB04	Discrete Mathematical Structures	2.80	2.70	2.60										2.70		
AITB01	Object Oriented Programming Through Python	2.60	2.50		2.60	2.60					2.40		2.60	2.60		2.60
AHSB14	Business Economics And Financial Analysis	2.60	2.50						2.50	2.50		1.80				
ACSB06	C++ Standard Template Library	2.30	3.00		3.00	2.50	2.50	3.00	3.00			2.40		2.50		2.00
ACSB05	Data Structures Laboratory	2.30	2.30	2.30	2.30	2.30	2.30				2.30		2.30	2.30	2.30	2.30
AITB03	Theory Of Computation	2.10	2.10	1.80	2.30									2.30		2.30
AITB04	Operating Systems	2.80	2.80	2.80	2.80						2.80		2.80	2.80	2.80	2.80
AITB05	Design And Analysis Of Algorithms	1.80	1.90	1.20	1.00									2.00		

ACSB08	Database Management Systems	2.10	1.90	1.80	1.80	1.70					2.00		1.70	2.00	1.80	1.80
AITB06	Object Oriented Programming Through Java Laboratory															
AITB07	Design And Analysis Of Algorithms Laboratory		3.00	3.00	3.00	3.00	3.00		3.00		3.00		3.00	3.00	3.00	3.00
ACSB09	Database Management Systems Laboratory		3.00	3.00		3.00					3.00		3.00		3.00	
AITB26	Software Engineering	2.00	1.50	2.30	2.00	2.00					1.20		1.10	2.20	1.70	2.30
ACSB07	Computer Organization And Architecture	2.60	2.30	2.80	2.40						2.50		2.50	2.40		2.80
ACSB10	Object Oriented Analysis And Design	1.50	1.40	1.50		1.50					1.50		1.50		1.50	1.50
AITB09	Web Technologies	2.80	2.80	2.80		2.80					2.80		2.80	2.80	2.90	2.80
AITB10	Computer Networks	2.30	2.10	2.00	2.50						2.50		2.00	2.40		2.00
ACSB11	Compiler Design	1.60	1.40	1.20		1.70					1.20			2.00	1.70	1.20
AECB57	Image Processing	2.30	2.30	2.30	2.30						2.30		2.00	2.30		
ACSB12	Case Tools Laboratory		3.00	3.00		3.00					3.00		3.00	3.00		3.00
AITB11	Web Technologies 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
AITB22	Information Security	2.20	2.20	2.30	2.30		2.20		2.20		2.20		2.20	2.20	2.20	2.20
AITB12	Linux Programming	2.20	2.30	2.00		2.20								2.10	2.30	
ACSB14	Data Ware Housing And Data Mining	2.60	2.50	2.40	2.30	2.30					2.30		2.30	2.40	2.40	2.70
AITB20	Internet Of Things	2.40	2.60	2.60	2.70	2.80		2.80			2.70		2.70	2.60	2.80	2.80
AHSB18	Soft Skills And Interpersonal Communication								2.90	2.90	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
AITB13	Linux Programming 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	3.00
ACSB15	Data Ware Housing And Data Mining 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	3.00
ACSB30	Soft Computing	2.50	2.50	2.60							2.50		2.50	2.20	2.50	2.50
ACSB16	Big Data And Business Analytics	2.80	2.80	2.80		2.80					2.80		2.80	2.80	2.80	2.80
ACSB17	Cloud Application Development	2.80	2.80	2.80		2.80					2.80		2.80	2.80	2.80	2.80
ACSB18	Big Data And Business Analytics 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	3.00
ACSB19	Cloud Application Development 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	3.00
ACSB39	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
ACEB52	Energy From Waste	2.30		2.00			2.40	2.40					2.30		2.60	
ACSB40	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
Attainment Values		2.5	2.5	2.5	2.5	2.6	2.7	2.9	2.9	2.9	2.6	2.6	2.6	2.6	2.6	2.6

PO / PSO Attainment Overall

S.No	Assessment Components (Direct + Indirect)	Program Outcomes (POs)												Program Specific 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)	2.5	2.5	2.5	2.5	2.6	2.7	2.9	2.9	2.9	2.6	2.6	2.6	2.6	2.6	2.6
2	Program Exit Survey (b)	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2
3	Alumni Survey (c)															
4	Employer Survey (d)	2.4	2.4	2.6	2.4	2.4	2.5	2.4	2.4	2.5	2.3	2.4	2.5	2.4	2.4	2.6
Final attainment = a*0.8 + b*0.1 + c*0.05 + d*0.05		**2.3**	**2.3**	**2.4**	**2.3**	**2.4**	**2.5**	**2.7**	**2.7**	**2.7**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**

POs & PSOs Attainment Levels and Actions for Improvement:

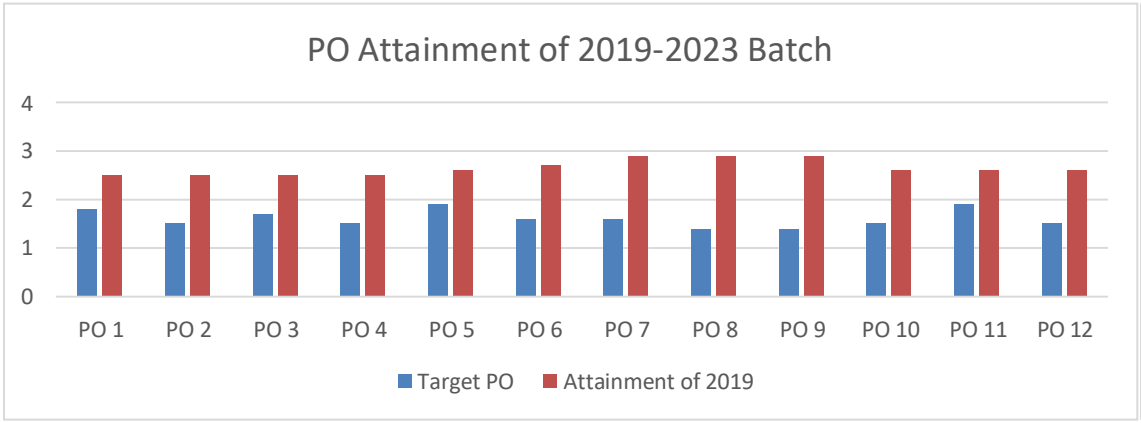
Sustained efforts are made to ensure continuous attainment by monitoring the resources and processes. The following actions were taken to enhance the target level. The attainment of POs / PSOs and action taken for improvements in attainments for 2019-2020 is illustrated in table

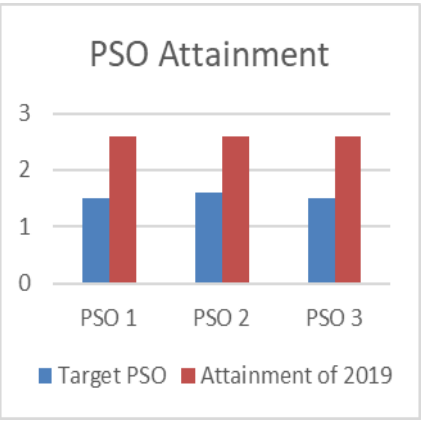
POs/ PSOs	Target Level	Attainment Level	Observations
PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	**1.8**	**2.2**	Overall attainment of PO1 Target is Achieved. The Computer Science and Engineering curriculum has a strong foundation of practical and theoretical knowledge of science, mathematics, and engineering principles. However, students need to know to correlate the theoretical concepts with practical applications in the subjects include object-oriented Analysis and design and Compiler Design.
Action 1: To improve the knowledge levels of the students by explaining the basic engineering concepts with relevant engineering applications, motivation hasbeen given to students through a mentoring/counseling process, in which the mentor will identify the problems of students and help them to overcome the problems in concerned subjects. (Object Oriented Analysis and Design, Compiler Design) **Action 2:** Critical thinking exercises are incorporated to understand complex engineering problems more easily. **Action 3:** Tutorial classes are conducted to improve the student's performance.			
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	**1.8**	**2.2**	Overall attainment of PO2 reached the target level. It is observed that Compiler Design and Object Oriented Analysis and Design courses are moderately attained target level. Need to improve my analytical skills given problem identification, model translation, and interpretation of results.
Action 1: New pedagogical initiatives such as open coding platforms are taken to improve the analytical skills of the students in problem-solving with relevant engineering applications. **Action 2:** Students are encouraged to take part in the implementation of real-time applications through hackathons, project-based learning, and case study.			
PO3: Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.			
PO3	**1.8**	**2.2**	Overall attainment of PO3 reached the target level in most of the core courses. It is observed that, a few of the courses; Design and Analysis of Algorithms, Object Oriented Analysis, and Design and Compiler Design are nearer to the target level. The focus on the design/development of solutions for complex engineering problems needs to be improved.
Action 1: Students are motivated to solve real-time case studies through designing approaches in related courses of the curriculum for further improvement.			

POs/ PSOs	Target Level	Attainment Level	Observations
Action 2: Students' knowledge has been improved in applying engineering concepts to design solutions by conducting extra laboratory sessions. **Action 3:** Design-related problems are incorporated in laboratory courses to improve the student's skills in the development of projects.			
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	**1.8**	**2.1**	Overall attainment of PO4 reached the target level in most of the core courses. It is observed that the Design and Analysis of Algorithm course attained nearer to the target. A focus on the usage of research-based methods in solutions forcomplex engineering problems with innovations is needed.
Action 1: Critical thinking problems/ query exercises are incorporated into all the core courses. **Action 2:** Students are encouraged to participate in coding challenges, Hackathons, and various online coding contests. **Action 3:** Students are motivated to participate actively in research-based learning, ideation, and product development courses to nurture their ideas alongwith complex problem-solving skills.			
PO5: Modern Tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.			
PO5	**1.8**	**2.2**	Overall attainment of PO5 reached the target level in all the courses. It is observed that, the courses; Computer Programming, laboratory courses, Data Base Management Systems, Object Oriented Analysis and Design and Compiler Designs are attained nearer to the target level. Students are encouraged to learn, practice, and make use of appropriate modern tools through training, workshops, and internships.
Action 1: Students are instructed to learn and use open-source and modern tools in the implementation of projects and participation in hackathons. **Action 2:** Faculty are encouraged to identify course-specific modern tools and are encouraged to use them in their regular course work.			
PO6: The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issuesand the consequent responsibilities relevant to the professional engineering practice.			
PO6	**1.8**	**2.3**	Overall attainment of PO6 reached the target level in all the relevant courses.
Action 1: Students are encouraged to develop applications in the corresponding laboratory courses and projects for the societal benefit. **Action 2**: Students are motivated to understand the safety concerns and social aspects to expand their practical knowledge.			
PO7: Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts,and demonstrate the knowledge of, and need for sustainable development.			
PO7	**1.8**	**2.2**	Overall attainment of PO7 achieved target level in relevant courses.
Action 1: Awareness camps are conducted on global and environmental issues among the students.			

POs/ PSOs	Target Level	Attainment Level	Observations
Action 2: Students are encouraged to develop projects, in which global and environmental issues are addressed.			
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
PO8	**1.8**	**2.3**	Overall attainment of PO8 reached to target level. The students are lagging in real-life situations due to a lack of awareness of ethical principles and norms of the engineering practice.
Action 1: Students are encouraged to participate in professional ethics and security-relevant courses and workshops. **Action 2:** Faculty inculcate ethical values, principles, and professional responsibilities among students, wherever possible in their Teaching and learning practices.			
PO9: Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
PO9	**1.8**	**2.3**	Overall attainment of PO9 reached the target level. Consistent efforts are needed to inculcate the habit of individual and team contributions toward the development of multi-disciplinary projects.
Action 1: Flipped classroom practice is made mandatory for programming courses to enhance learning as an individual and among a team. **Action 2:** Students are advised to form multidisciplinary groups in the participation of hackathons and project expos.			
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	**1.8**	**2.2**	Overall attainment of PO10 reached the target level. The communication, presentation, and report writing skills need to be more focused on respective theory and laboratory tasks.
Action 1: More assessment methods are incorporated to enhance oral communication in theory courses through Alternative Assessment Tools(AAT) such as seminars and concept videos. **Action 2**: Soft skills training is imparted to enhance various aspects of communication through group discussions, presentations, and new learning outcomes. **Action 3**: Demonstration of experiment and viva are incorporated in laboratory day-to-day assessment.			
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**	Overall attainment of PO11 reached the target level.
Action 1: Awareness is to be created among the students on applying learned engineering and management principles in their projects. **Action 2:** Students are encouraged to demonstrate their project work in Project Exhibitions and Hackathons. **Action 3:** Students are advised to develop solutions to address the societal needs.			

POs/ PSOs	Target Level	Attainment Level	Observations
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	**1.8**	**2.2**	Overall attainment of PO12 reached the target level.
Action 1: Students have recognized the importance of self-learning and completed certifications and MOOC courses (NPTEL, CISCO, Udemy etc.) on the latesttechnologies. **Action 2:** Faculties are utilizing the available digital learning facilities in the form of videos (NPTEL, ELRV, Coursera, etc.), and software tools, to be on parwith the recent trends. **Action 3:** Students are encouraged to take topics from magazines and journals for seminar and video topics, and research-oriented projects, refer to research literature,and present or publish their work.			
PSO1: Understand, design, and analyze computer programs in the areas related to Algorithms, System Software, Web design, Big data, Artificial Intelligence, Machine Learning, and Networking.			
PSO1	**1.8**	**2.1**	Overall attainment of PSO1 reached the target level.
Action 1: Guest lectures are organized by industry experts to bridge the gap between theoretical aspects and real-time applications.			
PSO2: Focus on improving software reliability, network security, or information retrieval systems.			
PSO2	**1.8**	**2.1**	Overall attainment of PSO2 reached the target level. It is observed that the Object Oriented Analysis and Design Course is attained nearer to the target.
Action 1: Students are encouraged to participate in workshops and certifications related to application development with security and informationretrieval. **Action 2:** More emphasis has been given on the usage of different data handling and information retrieval techniques to improve the performance of the system.			
PSO3: Make use of modern computer tools for creating innovative career paths, to be an entrepreneur, and to desire higher studies.			
PSO3	**1.8**	**2.1**	Overall attainment of PSO3 reached the target level. It is observed that the Compiler Design Course is attained nearer to the target.
Action 1: Guest lectures are organized by industry experts to increase awareness of diversified career paths.			


PO Attainment of 2019-2023 Batch
4
3
2
1
0
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 PO
Attainment of 2019


PSO Attainment
3
2
1
0
PSO 1
PSO 2
PSO 3
Target PSO
Attainment of 2019