INSTITUTEOFAERONAUTICALENGINEERING

(Autonomous)

Dundigal, Hyderabad– 500043

Mechanical Engineering

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

S.No	Subject	COURSE	Sub Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	English for communication	C101	AHS001										2.80					
2	Linear algebra and ordinary differential equations	C102	AHS002	2.20	1.80													
3	Engineering chemistry	C103	AHS005	1.40	1.40					1.80								
4	Applied physics	C104	AHS007	1.80	1.40		2.50											0.80
5	Engineering drawing	C105	AME001	2.80		2.70							2.80		2.90	2.90		
6	Communication skills laboratory	C106	AME101									3.00	3.00					
7	Engineering chemistry laboratory	C107	AHS101	3.00	3.00					3.00								
8	Basic workshop	C108	AHS103	3.00	3.00			3.00							3.00			3.00
9	Engineering mechanics	C109	ACS113	2.70		2.70						2.70		2.70				2.70
10	Computational mathematics and integral calculus	C110	AME002	1.10	1.10	1.10	1.10		1.10									1.00

11	Modern physics	C111	AHS003	1.10	1.20													
12	Environmental studies	C112	AHS008	2.10	2.40		2.10											2.60
13	Computer programming	C113	AHS009	1.80			1.80			1.80								
14	Computational mathematics laboratory	C114	ACS001	1.00	0.90	1.00		1.00					1.00		1.00	0.80		
15	Engineering physics laboratory	C115	AME102	2.40	2.40		2.40									2.40		
16	Computer programming laboratory	C116	ACS101	2.70	2.70		2.70											2.70
17	Computer aided engineering drawing practice	C117	AHS105	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30		2.30		2.30	2.30		2.30
18	Probability and Statistics	C118	AHS102	2.40		2.40		2.40				2.40	2.40					2.40
19	Thermodynamics	C201	AHS010	1.60	1.50		2.10											
20	Mechanics of Solids	C202	AME003	1.70	2.00	1.90	1.60		1.10								1.60	
21	Metallurgy and Material Science	C203	AME004	1.20	1.20	1.00	1.20		1.50						1.20	1.20		1.00
22	Basic Electrical and Electronics Engineering	C204	AME005	1.40	0.80	0.60										1.60		0.50
23	Metallurgy and Mechanics of Solids Laboratory	C205	AEE018	1.60	2.00											1.60		
24	Machine drawing through cad laboratory	C206	AME104	2.40	2.40	2.40						2.40				2.40	2.40	
25	Basic Electrical and Electronics Engineering Laboratory	C207	AME105		3.00	3.00	3.00	3.00				3.00	3.00			3.00		

26	Mathematical transform techniques	C208	AEE103	2.30	2.30						2.30	2.30	2.30		2.30	2.30		
27	Production technology	C209	AHS011	1.30	1.00		1.00									1.00		
28	Applied thermodynamics	C210	AME006	2.90	2.80	2.80			2.90	2.90								2.80
29	Mechanics of Fluids and Hydraulic Machines	C211	AME007	2.10	2.00	2.10											2.20	
30	Kinematics of Machinery	C212	AME008	1.50	1.10		2.30											1.10
31	Computational mechanical engineering laboratory	C213	AME009	2.10	2.10	2.30	2.30	1.20		1.20	2.80		2.90	2.80	2.30	2.80		2.30
32	Production technology laboratory	C214	AME106	0.90	0.90	0.90		0.90					0.90			0.90	0.90	
33	Mechanics of Fluids and Hydraulic Machines Laboratory	C215	AME107	2.40	2.40	2.40			2.40	2.40		2.40			2.40			2.40
34	Machine Tools and Metrology	C216	AME108	2.70	2.70	2.70	2.70	2.70				2.70			2.70		2.70	
35	Dynamics of Machinery	C301	AME010	1.10	1.20	1.20		1.10	1.10	1.10					1.10	1.20		
36	Design of Machine Members	C302	AME011	1.20	1.20	1.20	1.20	1.20		1.20	1.20				1.20			1.20
37	Thermal engineering	C303	AME012	2.60	2.90	2.40	2.80		2.30						2.20			2.50
38	Business Economics and Financial Analysis	C304	AME013	2.20	2.10	1.00	2.10		1.00	2.20					2.10		2.50	
39	Thermal engineering laboratory	C305	AHS015	1.20	1.20						1.10	1.20		1.20				1.20

40	Machine Tools and Metrology laboratory	C306	AME507	3.00	3.00		3.00					3.00			3.00		3.00	
41	Research and content development	C307	AME516	2.70	2.70			2.70				2.70			2.70	2.70		
42	Unconventional machining processes	C308	AME509	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	2.30	2.30
43	Tool design	C309	AME519	2.80	2.80			2.80		2.80					2.80	2.80		
44	Aerospace Propulsion and Combustion	C310	AME109	1.00	1.00	1.20			0.70						0.70	1.00		1.20
45	Finite element modelling	C311	AME110	1.20	1.20	1.20	1.20						1.20				1.20	1.20
46	Instrumentation and Control Systems	C312	AHS106	1.30	1.30	1.20	1.30	1.20							1.30		1.10	1.20
47	Instrumentation and Control Systems Laboratory	C313	AME014	2.20	2.10	2.60			2.50						2.10		2.60	
48	Machine design	C314	AME015	2.40	2.40	2.40	2.40	2.40		2.40		2.40			2.40		2.40	2.40
49	Heat transfer	C315	AME016	1.60	1.50	2.30	1.20	1.20	1.20									
50	Solar energy systems	C316	AME525	1.10	1.30	1.30	1.20		1.20	1.10							1.30	
51	Nondestructive testing	C317	AME526	1.80	1.80	1.70				1.70		1.40			2.00		1.50	
52	Theory of machines lab	C318	AAE551	2.90	2.80			2.80		2.90					2.90		2.90	
53	Heat transfer lab	C319	ACE551	2.70	2.70		2.70	2.70				2.70						2.70
54	Fulid, thermal modeling and simulation lab	C320	AME111	2.00	2.00			2.00				2.00						2.00
55	Ideation and product development	C321	AME112	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

56	Refrigeration and air conditioning	C322	AME113	2.70	2.70	2.70	2.70		2.70	2.70	2.70	2.70	2.70		2.70	2.70		2.70
57	Computer aided design/computer aided manufacturing	C401	AME017	1.50	1.40		1.20	1.70	1.70	1.10	1.40						1.60	1.70
58	Robotics	C402	AME018	2.60	2.80	2.80		2.90		2.90				2.80	2.20	2.60		
59	Computer aided modeling and analysis laboratory	C403	AME019	2.20	2.30	0.80	1.30											2.50
60	Computer aided numerical control laboratory	*C404	AME533	2.70	2.70		2.70					2.70	2.70		2.70	2.70		
61	Fundamentals of database management systems	C405	AME510	2.70	2.70	2.70	2.70	2.70	2.70	2.70		2.70		2.70	2.70	2.70		
62	Energy from waste	C406	AEE551	1.00	1.00	1.00	0.70	0.70					1.00		0.70	1.20		1.00
63	Project work	C407	ACS553	1.50		1.30			1.50	1.60					1.70			1.70
Direct Attainment Value				**2**	**2**	**1.9**	**2.1**	**2.1**	**1.9**	**2.1**	**2.2**	**2.5**	**2.3**	**2.6**	**2.2**	**2.1**	**2.1**	**2**

Overall Attainment

S.No	Assessment Components (Direct + Indirect)	Program Outcomes (POs)													
		PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3
1	Direct Assessment (CIA + SEE + Course End Survey) (a)	2	2	1.9	2.1	2.1	1.9	2.1	2.2	2.5	2.3	2.6	2.2	2.1	2.1	2
2	Program Exit Survey (b)	2.4	2.5	2.0	2.0	2.5	2.6	2.5	2.6	2.5	2.5	2.5	2.4	2.5	2.4	2.5

3	Alumni Survey (c)	2.4	2.5	2.1	2.0	2.5	2.6	2.5	2.6	2.5	2.5	2.5	2.4	2.5	2.4	2.5
4	Employer 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
Final attainment = a*0.8 + b*0.1 + c*0.05 + d*0.05		**2.1**	**2.1**	**2**	**2.1**	**2.2**	**2**	**2.2**	**2.3**	**2.5**	**2.3**	**2.6**	**2.2**	**2.2**	**2.2**	**2.1**

Actions taken based on the results of evaluation of each of the POs &PSOs

Measures identified and implemented to improve POs & PSOs attainment levels.

POs Attainment Levels and Actions for improvement

Pos	Target Level	Attainment Level	Observation
PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	**2.0**	**2.1**	**Target level has been Achieved. However, following observations were made:** Students should give more attention to solve the subjects having critical thinking.
Action: 1. To emphasize students to involve in solving different types of engineering problems			
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
			Target level has been Achieved. However, following observations were made:

<table>
<tr><td>PO2</td><td>1.6</td><td>2.1</td><td>It is found that students find it difficult to correlate theory with practical and interpret the results</td></tr>
<tr><td colspan="4">Action :
1. Additional classes to be conducted to introduce Mechanical Engineering fundamental.
2. Practical approach of teaching to be adapted.</td></tr>
<tr><td colspan="4">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 the public health and safety, and the cultural, societal, and environmental considerations.</td></tr>
<tr><td>PO3</td><td>1.6</td><td>2.0</td><td>Target level has been Achieved.
Lack of knowledge of product development, materials and hands on practical experience.</td></tr>
<tr><td colspan="4">Action:
1. More design classes to be taught in tutorial classes
2. Conduction of Science Fest and motivating students to prepare/built prototype models.</td></tr>
<tr><td colspan="4">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.</td></tr>
<tr><td>PO4</td><td>1.7</td><td>2.1</td><td>Target level has been Achieved. However, following observations were made:

Subject involves both analysis and design.</td></tr>
<tr><td colspan="4">Action:
1. More emphasis on mathematical basic to be given in the previous course</td></tr>
<tr><td colspan="4">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.</td></tr>
<tr><td>PO5</td><td>1.8</td><td>2.2</td><td>Target level has been Achieved. However, following observations were made:
1. Use of CAD and analysis tools must be done by the students for project work.
2. Students were also need these techniques for the better placement and/or higher studies.</td></tr>
</table>

Action:
1. Conducted hands on training and certification programmes on modelling and simulation tools.

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	**1.5**	**2.0**	**Target level has been Achieved. However, following observations were made:** Investigation of problems faced by society were addressed

Action:
1. To understand the safety concerns and social aspects, students visited industry to expand their practical knowledge with the effect of improved practices in engineering

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	**1.6**	**2.2**	**Target level has been Achieved. However, following observations were made:** The concept of sustainability should reach the students.

Action:
1. Students are encouraged to do projects on composite materials, Solar energy operated vehicle , Solar Refrigeration system and alternate fuels (Bio fuel).

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

PO8	**1.6**	**2.3**	**Target level has been Achieved. However, following observations were made:** Ethical practice of engineering system is implemented.

Action :
1 . The students are taught to be ethical in their work.
2. More examples on the subject to be practiced by students in extra classes

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

PO9	**1.8**	**2.5**	**Target level has been Achieved. However, following observations were made:** Give importance to team work.
Actions Taken: **Action :** 1. Students are made to do their projects as a team work. 2. Students should be sent to Industries to do project.			
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	**1.6**	**2.3**	**Target level has been Achieved. However, following observations were made:** Imparting the knowledge of effective communication.
Action : 1.Report writing is taught to students 2. Soft skill training is given to students			
P11: 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	**1.6**	**2.6**	**Target level has been Achieved. However, following observations were made:** Complete details of project management
Action 1: : 1. Students are taught to work in multidisciplinary approach.			
P12: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	**1.5**	**2.2**	**Target level has been Achieved. However, following observations were made:** Adaptation of new technologies will improve the lifelong learning.

Action: 1. Latest design and analysis software's are taught to the students

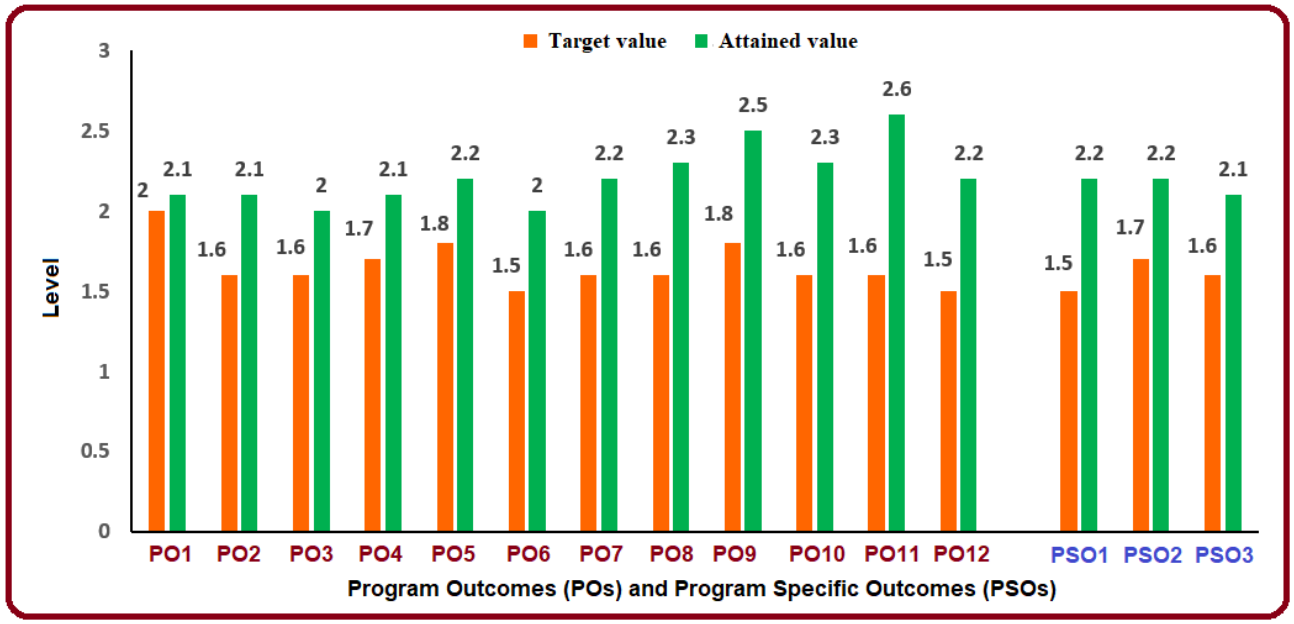
PSOs Attainment Levels and Actions for improvement

PSOs	Target Level	Attainment Level	Observation
PSO1: Focus on Ideation and Research towards Digital manufacturing in Product development using Additive manufacturing, Computer Numerical Control (CNC) simulation and high speed machining.			
PSO1	**1.5**	**2.2**	**Target level has been Achieved. However, following observations were made:** Different manufacturing methods and designs are used to develop/ implement, test, validate and maintain the Mechanical engineering foundation for industry. Publish/ exhibit/ innovate through conferences, journals etc.
Action: 1. students are motivated to attend curricular activities in other institutions. 2. Arrange Industrial visits.			
PSO2: Formulate and Evaluate concepts of Thermo-Fluid Systems to provide solutions for Inter Disciplinary Engineering Applications.			
PSO2	**1.7**	**2.2**	**Target level has been Achieved. However, following observations were made:** Concepts of Thermo-fluid systems provide various solutions through modelling and optimization methods.
Action : 1.Students are encouraged to learn the inter disciplinary engineering applications			
PSO3: Make use of Computational and Experimental tools for Building Career Paths towards Innovation Startups, Employability and Higher Studies.			
			Target level has been Achieved. However, following observations were made:

PSO3	**1.6**	**2.1**	Computational and Experimental knowledge / skills to be transferred to the Mechanical engineers.

Action:

1. Project works are encouraged that involve the usage of modern tools and techniques of Data Collection/ Analysis/ Implementing



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