ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY, ASHTA

An Empowered Autonomous Institute

(Affiliated to Shivaji University, Kolhapur)

02 Revision Curriculum and Syllabus : IV Year and Semester VIII

Bachelor of Technology in Aeronautical Engineering

DOCUMENT NUMBER: ADCET/ACAD/5, Rev:00, 01/01/2020

Annasaheb Dange College of Engineering and Technology Ashta

Department of Aeronautical Engineering

Teaching and Evaluation Scheme

Final Year. B. Tech Semester VIII																						
Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE			Total	Min	ISE		MSE + ESE		Total	Min	
		L	T	P	Credits	Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
2AEPE4**	Professional Elective - VII	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2AEPR418	Internship /On Job Training	-	-	20	10	-	-	-	-	-	-	-	100	40	100	40	200	80	200
2*******	Minor Stream Project	-	-	-	3	-	-	-	-	-	-	-	50	20	50	20	100	40	100
		3	**0**	**20**	**16**														**400**
	Total Contact Hours/Week	**23**																	

Professional Elective - VII	
2AEPE414	Aerodynamic Design of Axial Flow Compressors & Fans
2AEPE415	Advanced Control System Design for Aerospace Vehicles
2AEPE416	Engineering Design Optimization
2AEPE417	Launch Vehicle Analysis and Design

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Course Details:

Class	B.Tech., Sem. - VIII
Course Code and Course Name	**2AEPE414 - Aerodynamic Design of Axial Flow Compressor and Fans**
Prerequisite	2AEPC203: Fluid Mechanics 2AEPC204: Thermodynamics 2AEPC213: Airbreathing propulsion
Teaching Scheme: Lecture/Tutorial/Practical	03/0/0
Credits	03
Evaluation Scheme : ISE/ESE	40/30/30

Course Objectives:

1. To develop a comprehensive understanding of the operating principles, velocity triangles, and performance characteristics of axial-flow compressors and fans.
2. To evaluate the impact of aerodynamic characteristics of blade geometry, cascade arrangements, flow losses, and compressibility effects on aerodynamic efficiencies of the compressor.
3. To utilize aerodynamic theories, computational tools, and design methodologies to design efficient single and multistage axial-flow compressors.
4. To remove major performance affecting factors like stall, surge, vibration, and noise while optimizing compressor performance under varying operational conditions.

Course Outcomes (COs): After successful completion of this course, the student will be able to,

2AEPE414_1	Infer the velocity triangles of single and multistage compressors, off-design conditions to understand the fundamentals characteristics of axial flow compressor and fans using aerodynamic principles and thermodynamic cycles.
2AEPE414_2	Analyze the flow through annulus, blockages, blade tip, and shroud at different angle of attack to mitigate the losses occurring inside the compressor under various Mach numbers.
2AEPE414_3	Examine the impact of vortex flow on the single and multiple stage compressors performance to improve the efficiency of the compressor.
2AEPE414_4	Discover the boundary layer growth on blade and wall and its impact on stall resulting in noise and vibration to increase the reliability of the compressor.
2AEPE414_5	Predict the aerodynamic load on blade profile due to different inlet conditions to enhance the performance of the compressor using advanced aerodynamic principles and computational tools.

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Course Contents:

Unit 1	Introduction to axial flow compressor and fans	06
Basic operation of fans and compressors; Velocity triangle for a stage; compressor and fan characteristics and applications; Factors affecting stage pressure ratio; blockage ratio in compressors; Degree of reaction; Design process; compressibility effects, and Off-design performance		
Unit 2	**Axial-Flow Compressor Blade Profiles**	**07**
Blade geometry-C-series aerofoils, Circular & Parabolic arc chamberline, cascade nomenclature, Double Circular arc profile; Blade loading; 2D blade-to-blade flow with supersonic and subsonic inlet; 2D blade-to-blade flow through cascade blades.		
Unit 3	**Flow and Performance Analysis**	**07**
Geometry Considerations; Cascade Performance Considerations-Cascade Geometry and Performance Parameters;Design of AOA, Deviation angle,Loss co-efficeient and Diffusion factors; Mach Number Effects Shock Wave Loss,Blade Tip Clearance Loss,Shroud Seal Leakage Loss; Meridional Coordinate System-Full Normal Equilibrium Solution,Simplified Forms of the Through-Flow Analysis and annulus sizing		
Unit 4	**Single Stage Compressor Aerodynamic Design**	**07**
Dimensionless Performance Parameters; Application to Stage Design; Blade Design;Selecting the Stage Performance Parameters and swirl vortex type; Free Vortex Flow; Constant Reaction Vortex Flow, Swirl and Exponential Vortex Flow, and Assigned Flow Angle Vortex Flows; Application to a Practical Stage Design; Repeating Stage Axial-Flow Compressor; A Computerized Stage Design System		
Unit 5	**Multistage Compressor Aerodynamic Design**	**06**
The Basic Compressor Design Approach; Aerodynamic Performance Specifications; Blade Design; Refining the Compressor Design; An Axial-Flow Compressor Design; The Distribution of Stage Performance Parameters; The Swirl Vortex Type; Risks and Benefits		
Unit 6	**Viscous Effects in Compressors**	**06**
Introduction to 3D viscous flow in compressors; Axial blade boundary layers-end wall boundary layer analysis; Stall and surge-Stall and Compressor Surge Considerations; Vibration and Noise; Stage matching and stall control.		

Text Books:

Sl.No	Title	Authors	Publisher	Edition	Year
1	Axial-Flow compressors : a strategy for aerodynamic design and analysis	Ronald H. Aungier NEW	ASME PRESS	First	2003
2	Axial Flow Fans and Compressors Aerodynamic Design and Performance	A.B.Mckenzie	Ashgate	First	1996

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Sl.No	Title	Authors	Publisher	Edition	Year
3	Compressor Aerodynamics	Cumpsty, Nicholas A.	Longman Scientific & Technical	First	1989
4	Gas Turbine Theory	Saravanamuttoo, Herbert IH, Gordon Frederick Crichton Rogers and Henry Cohen	Pearson education	Fifth	2001

Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes					Marks		Weightage
		1	2	3	4	5	Max	Min	
1	ISE : ABA	☑	☑	☑	☑	☑	40	16	40 %
2	MSE	☑	☑	☑	☐	☐	30	24	60 %
3	ESE	☐	☐	☑	☑	☑	30		

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Course Details:

Class	B.Tech., Sem. - VIII
Course Code and Course Name	**2AEPE415 - Advanced Control System Design for Aerospace Vehicles**
Prerequisite	
Teaching Scheme: Lecture/Tutorial/Practical	03/0/0
Credits	03
Evaluation Scheme : ISE/ESE	40/30/30

Course Objectives:

1. To develop a comprehensive understanding of modern control theory concepts, including state-space representation, stability analysis, controllability, and observability, as applied to linear time-invariant systems.
2. To equip students with the ability to design advanced linear controllers and observers, such as pole placement and Linear Quadratic Regulators (LQR), and to explore their practical applications in aerospace vehicle control.
3. To introduce fundamental concepts of nonlinear system analysis using Lyapunov theory and to provide an overview of nonlinear control synthesis techniques, including dynamic inversion and neuro-adaptive design, relevant to aerospace applications.

Course Outcomes (COs): After successful completion of this course, the student will be able to,

2AEPE415_1	Understand and apply fundamental nonlinear control synthesis techniques, such as dynamic inversion and neuro-adaptive design, in the context of flight control applications.
2AEPE415_2	Apply Lyapunov theory to assess the stability of nonlinear systems and construct Lyapunov functions for specific cases.
2AEPE415_3	Analyze and represent complex dynamical systems in the state-space framework, and determine their time response, stability, controllability, and observability characteristics.
2AEPE415_4	Construct and analyze observers for linear systems, including pole placement observer design and an overview of Kalman filter theory, to estimate unmeasurable states.
2AEPE415_5	Design and implement state-feedback controllers using pole placement techniques and optimal controllers using the Linear Quadratic Regulator (LQR) method for aerospace vehicle systems.

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Course Contents:

Unit 1	Foundations of Control Systems and Flight Dynamics	06
Introduction and Motivation for Advanced Control Design, Classical Control Overview, Basic Principles of Atmospheric Flight Mechanics, Overview of Flight Dynamics		
Unit 2	**Linear System Representation and Analysis**	**06**
Representation of Dynamical Systems, Review of Matrix Theory, Review of Numerical Methods. basic numerical integration, solution of differential equations		
Unit 3	**Time Response, Stability, Controllability, and Observability of Linear Systems**	**07**
First and Second Order Linear Differential Equations, Time Response of Linear Dynamical Systems, Stability of Linear Time-Invariant Systems, Controllability and Observability of Linear Time-Invariant Systems		
Unit 4	**Linear Control Design Techniques**	**06**
Pole Placement Control Design, Pole Placement Observer Design, Static Optimization: An Overview		
Unit 5	**Optimal Control and Applications in Flight Control**	**07**
Calculus of Variations: An Overview, Optimal Control Formulation using Calculus of Variations, Classical Numerical Methods for Optimal Control, Linear Quadratic Regulator (LQR) Design, Linear Control Design Techniques in Aircraft Control		
Unit 6	**Nonlinear System Analysis and Advanced Nonlinear Control**	**07**
Linearization of Nonlinear Systems, Lyapunov Theory, Construction of Lyapunov Functions, Dynamic Inversion, Neuro-Adaptive Design, Neuro-Adaptive Design for Flight Control, Integrator Backstepping; Linear Quadratic (LQ) Observer, An Overview of Kalman Filter Theory		

Text Books:

Sl.No	Title	Authors	Publisher	Edition	Year
1	Linear System Theory and Design	Chi-Tsong Chen	Oxford University Press	4th Edition	2013
2	Nonlinear Systems	Hassan K. Khalil	Pearson	3rd Edition	2014

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		1	2	3	4	5	Max	Min	
1	ISE : ABA	☑	☑	☑	☑	☑	40	16	40 %
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3	ESE	☐	☐	☑	☑	☑	30		

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Course Details:

Class	B.Tech., Sem - VIII
Course Code and Course Name	**2AEPE416 - Engineering Design Optimization**
Prerequisite	—
Teaching Scheme: Lecture/Tutorial/Practical	03/0/0
Credits	02
Evaluation Scheme : ISE/ESE	40/30/30

Course Objectives:

1. To introduce students to the fundamental principles of optimization, including problem formulation, classification, and solution approaches for single-variable and multivariable problems.
2. To equip students with the knowledge and skills required to solve linear and nonlinear optimization problems using classical methods, numerical techniques, and computational tools like MATLAB.
3. To familiarize students with modern optimization methods, including genetic algorithms, simulated annealing, and particle swarm optimization, for solving complex real-world problems.

Course Outcomes (COs): After successful completion of this course, the student will be able to,

2AEPE416_1	Given an engineering design scenario, formulate and classify optimization problems using appropriate modeling techniques and distinguish between analysis and optimization models, under defined assumptions and constraints.
2AEPE416_2	Solve linear programming problems using the simplex method and interpret results through duality and sensitivity analysis, by employing manual methods and MATLAB tools.
2AEPE416_3	Apply one-dimensional and unconstrained nonlinear optimization techniques such as exhaustive, Fibonacci, and gradient-based methods to determine optimal solutions, using structured problem sets and algorithms.
2AEPE416_4	Analyze and solve constrained nonlinear optimization problems using penalty and interior-point methods, for mathematical models with equality and inequality constraints.
2AEPE416_5	Implement modern optimization algorithms such as genetic algorithms, simulated annealing, and particle swarm optimization, using MATLAB or equivalent platforms in the context of engineering optimization problems.

Course Contents:

Unit 1	**Introduction**	**06**
Design Optimization Process, Formulation of an Optimization Problem, Optimization Problem Classification, Selecting an Optimization Approach, History of Optimization, Model Development for Analysis versus Optimization, Single-Variable, multivariable optimization , with no constraints and equality constraints, Modeling Process and Types of Errors, Numerical Models as Residual Equations.		

Unit 2	**Linear Programming: Simplex Method**	**06**
Standard form of Linear Programming problem, Solution of a system of linear simultaneous equations Identification of an optimal point using Simplex algorithm, Duality, Sensitivity analysis, solutions using MATLAB.		
Unit 3	**Nonlinear Programming- One Dimensional Minimization Methods:**	**07**
Unimodal Function, Unrestricted search, Exhaustive search, Dichotomous search, Internal halving method, fibonacci method, golden section method. Quadratic interpolation method, direct root methods,		
Unit 4	**Nonlinear Programming- Unconstrained optimization techniques:**	**06**
Classification of Minimization, Overall Approaches to Finding an Optimum,, Line Search, Search, EIgen and Conjugate Directions, Gradient Methods, Newton-Raphson Method.		
Unit 5	**Nonlinear Programming-Constrained Optimization:**	**07**
Characteristics, Understanding n-Dimensional Space, Equality Constraints, Optimality Criteria, Penalty Methods, Quadratic methods, Interior-penalty Methods.		
Unit 6	**Introduction to Modern methods of optimization:**	**07**
Genetic algorithm, Simulated annealing, Particle swarm optimization, Ant Colony optimization,Fuzzy systems, Neural-network-based optimization.		

Text Books:

Sl.No	Title	Authors	Publisher	Edition	Year
1	Engineering Optimization: Theory and Practice	Rao, Singiresu	John Wiley & Sons	Fifth Edition	2020
2	Engineering Design Optimization	Joaquim R. R. A. Martins and Andrew Ning	Cambridge University Press	First Edition	2021
3	Design Optimization using MATLAB and SOLIDWORKS	Krishnan Suresh	Cambridge University Press	First Edition	2021
4	Optimization Toolbox For Use with MATLAB	Thomas Coleman, Mary Ann Branch, Andrew, Grace	The MathWorks, Inc.		

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Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes					Marks		Weightage
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1	ISE : ABA	☑	☑	☑	☑	☑	40	16	40 %
2	MSE	☑	☑	☑	☐	☐	30	24	60 %
3	ESE	☐	☐	☑	☑	☑	30		

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Course Details:

Class	B.Tech., Sem - VIII
Course Code and Course Name	**2AEPE417 - Launch Vehicle Analysis and Design**
Prerequisite	Engineering Mathematics; Engineering Physics Space Dynamics
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme : ISE/MSE/ESE	40/30/30

Course Objectives: This course aims to

1. Introduce the fundamentals of launch vehicles, including propulsion systems, structural dynamics, and thermal protection.
2. Develop understanding of launch vehicle dynamics and guidance, navigation, and control (GNC) systems.
3. Provide insights into material science, design optimization, and systems engineering for launch vehicles.
4. Familiarize students with mission planning, payload integration, and real-world applications through case studies.

Course Outcomes (COs): Upon successful completion of this course, the student will be able to,

2AEPE417_1	Analyze the subsystems of launch vehicles and missiles, with a focus on propulsion systems, structural mechanics, guidance and control systems, and aerodynamic performance, to evaluate their roles in overall mission success and system reliability.
2AEPE417_2	Apply dynamic modeling, control strategies, and trajectory optimization techniques to the design of launch vehicles, considering vehicle dynamics, mission constraints, and real-time guidance and control for improved performance and reliability.
2AEPE417_3	Design and evaluate guidance, navigation, and control (GNC) systems for robust launch vehicle performance under varying environmental conditions, system uncertainties, and mission constraints.
2AEPE417_4	Conduct thermal and structural analysis for thermal protection systems (TPS) and select suitable materials for launch vehicle applications, considering extreme aerodynamic heating, mechanical loads, and mission-specific environmental conditions.
2AEPE417_7	Implement systems engineering methods for integrating and optimizing launch vehicle subsystems, considering interface constraints, performance trade-offs, and varying mission and environmental conditions.

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Course Contents:

Unit 1	**Introduction to Launch Vehicles, missiles and their subsystems**	**06**
Launch Vehicles and Missiles and their subsystems, Fundamentals and Types of Propulsion system: Solid/ Liquid / cryogenic / Semi-Cryogenic / Mono-propellant, Bi-Propellant and Electric propulsion systems (including green propulsion). Fundamentals of Structures and Mechanics: Structural Dynamics / Vibration modes for Dynamics modeling. Fundamentals of thermal protection systems (TPS) and material science aspects		
Unit 2	**Launch Vehicle Dynamics**	**06**
Gravity model, Point mass dynamics, Aerodynamics: Multi-Strap-on Missiles, its aerosurfaces, Fundamentals of Trajectories (Mission Design): Equations of Motion: Short period / Long period Model development, Slosh Dynamic analysis, Coupling aerodynamic forces with structural dynamics Basics principles of inertial measurement units: Gyros, Fiber optic / Laser Gyros and others, Accelerometers, Actuators: Electrohydraulic, Electromechanical, Reaction Control Systems. optimization techniques,		
Unit 3	**Fundamentals of GNC loop, design problem and algorithms**	**07**
Basic guidance: open loop / Closed Loop: Implicit / Explicit Guidance schemes, Basics of Navigation: Nav algorithm, compensation schemes, multiple sensor fusion, Basics of Control (Autopilot): Linear / Non-Linear Design Techniques, Fault-tolerant GNC systems.		
Unit 4	**Thermal Protection Systems and Materials in Launch Vehicles**	**06**
TPS; Classifications, Material properties, Heat transfer mechanisms, Thermal-structural interaction analysis, Thermal analysis and Challenges – Classifications TPS and TPS Design Considerations. Vibration and Acoustic Considerations- Active vibration control systems, Materials for Launch Vehicles: Advanced materials, High-temperature materials for propulsion systems and re-entry, Fracture mechanics and fatigue analysis of structural components,		
Unit 5	**Launch Vehicle Systems Engineering and Design Optimization**	**07**
Systems Engineering Principles: Requirement capture and analysis, Subsystem integration and trade-off studies. Failure Mode and Effects Analysis (FMEA), Reliability Engineering. Design Optimization: Multi-disciplinary optimization for weight, cost, and performance. Cost and Risk Analysis: Life-cycle cost analysis, Risk mitigation strategies in design and operation, Impact of reusability (e.g., Falcon 9, Starship) on design economics.		
Unit 6	**Mission Planning, and Real-world Applications**	**07**
Mission Planning: Design considerations for specific missions: LEO, GEO, interplanetary missions. Payload considerations and integration with the vehicle. Case Studies and Applications: Detailed case studies of successful missions (e.g., Saturn V, Falcon 9, PSLV, Ariane). Emerging trends: Space tourism, small satellite launches, reusable rockets.		

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Text Books:

Sl.No	Title	Authors	Publisher	Edition	Year
1	Design of Rockets and Space Launch Vehicles	Edberg, D. and Costa, W	AIAA	-	2020
2	Practical Design of Flight Control System for launch Vehicles and Missiles	Kadam, N. V.	Allied Publishers	-	2009
3	Thermal Design and Control of Spacecraft and Entry Vehicles	Jerry C. South, Michael G. Skidmore	-	-	-
4	Space Mission Engineering: The New SMAD	James R. Wertz, David F. Everett, and Jeffrey J. Puschell.	-	-	-

References:

Si. No	Title	Authors	Publisher	Edition	Year
1	Mechanics and Thermodynamics of Propulsion	Hill, P., & Peterson, C.	Pearson.	2nd	1992
2	Introduction to Space Flight.	Hale, F. J.	Prentice Hall	-	1994
3	A Rocket Propulsion Element	George P. Sutton and Oscar Biblarz	Sutton, G. P., & Biblarz, O.	Wiley	9th

Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes					Marks		Weightage
		1	2	3	4	5	Max	Min	
1	ISE : ABA	☑	☑	☑	☑	☑	40	16	40 %
2	MSE	☑	☑	☑	☐	☐	30	24	60 %
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Course Details:

Class	B.Tech., Sem - VIII
Course Code and Course Name	**2AEPE418 - Internship/On Job Training**
Prerequisite	-
Teaching Scheme: Lecture/Tutorial/Practical	00/0020
Credits	10
Evaluation Scheme : ISE/MSE+ESE	50/50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to,

2AEPE418_1	Utilize engineering concepts to engage in real-world projects within a professional environment
2AEPE418_2	Operate industry-specific tools, software, and equipment efficiently.
2AEPE418_3	Exhibit strong teamwork skills by working alongside industry professionals, peers, and mentors to successfully meet project goals, ensuring compliance with industry regulations and standards
2AEPE418_4	Analyse challenges encountered in industrial processes, proposing innovative and effective solutions.
2AEPE418_5	Create comprehensive reports, including case studies, and deliver impactful presentations that effectively convey insights and outcomes from projects and learning experiences.

Internship Requirements:

- All students are required to complete an internship at a research organization, university, or industry to gain practical exposure through meaningful projects that align with their academic learning. This internship must be approved by the Head of the Institution and has duration of a **minimum of 12 weeks and a maximum of 24weeks**, as specified in the curriculum.

- The tables below represent the outline of the internship guidelines and student responsibilities: For detailed guidelines and procedures, refer to the Institute Internship Policy Document.

Internship Guidelines:

1. Request Letter	Obtain a request letter from the institute, signed by the Institute Director, addressed to the HR manager or relevant authority.
2. Confirmation Letter	Submit the confirmation letter from the industry or organization to the Internship Coordinator and Department Office.

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3. Mentorship	• A faculty member will act as a mentor for a group of students to monitor, evaluate, and guide their internship activities. • The mentor will visit the internship location at least once or twice during the internship period and provide feedback to the Internship Coordinator.
4. Progress Reports	Submit progress reports every two weeks to the mentor, along with a final report to the Internship Coordinator.
5. Evaluation	The mentor and an assessment panel will evaluate student performance post-internship, submitting an evaluation report to the Department Office.
6. Internship Certificate	Obtain and submit an Internship Certificate from the organization to the Internship Coordinator.
7.Presentation and Term Work	Deliver a presentation on internship work as part of term assessments; submit an internship diary and report for evaluation.

Student Responsibilities

Category	Responsibilities
Professionalism	Adherence to workplace rules, ethical conduct, and professional communication
Engineering Skills	Apply engineering fundamentals, use tools and software, conduct experiments, and solve problems
Industry Knowledge	Learn industry standards, observe practices, and understand project management
Professional Development	Improve communication, teamwork, problem-solving, time management, build a network, enhance employability
Learning & Growth	Seek learning opportunities, apply classroom knowledge, maintain a journal, and gain insights into career paths

Internship Evaluation Process

The Internship of students will be assessed in three key stages:

1. **Evaluation by Industry**

- ☐ Punctuality
- ☐ Willingness to learn
- ☐ Daily diary maintenance
- ☐ Skill test performance
- ☐ Supervisor's remarks

2. **Evaluation by Faculty Mentor on Student performance and Internship Report**

- ☐ Faculty Mentor will evaluate students based on their attendance, participation, and engagement during the internship.
- ☐ The quality and completeness of the internship report will also be assessed.

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3. Seminar Presentation/Viva-Voce at the Institute

- Students will present a seminar based on their internship report before an expert committee formed by the relevant department, in accordance with institute's norms.
- The evaluation criteria for the seminar presentation will include:
  - Quality of content presented
  - Planning and organization of the presentation
  - Effectiveness of delivery
  - Depth of knowledge and skills demonstrated
  - Attendance records, daily diary entries, and departmental reports will also be reviewed alongside the internship report.

This seminar presentation serves as an opportunity for students to share their knowledge and experiences with peers and faculty, enhancing their communication skills and building confidence.

Final Evaluation During the final evaluation, the student shall prepare and submit a report and give a presentation & Viva voce before his/her Department Committee at the college.

In-Semester Evaluation			
Criteria	**Evaluated By**	**Weightage (%)**	**Description**
Student Performance	Industry Supervisor	20%	Evaluated based on a rubric and feedback form, focusing on punctuality, eagerness to learn, skill tests, and professionalism
Submission of Internship Report with Certificate	Institute	20%	Assesses the quality, structure, and content of the report submitted by the student, reviewed by the mentor, along with the internship certificate.
Internship Diary, Attendance Record, and Industry-Faculty Interaction	Institute (During and End of Internship)	10%	Evaluates consistency and detail in maintaining the diary, adherence to attendance, and meaningful engagement during interactions with mentors.
Presentation, Demonstration, or Case Studies	Institute	20%	Assesses the student's ability to effectively communicate insights, demonstrate practical learning outcomes, or analyze and present case studies..
Viva-Voce	Institute	30%	Tests the student's depth of understanding, analytical skills, and ability to articulate their internship experience during an oral evaluation.

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