



**Lok Jagruti Kendra University**  
University with a Difference

# **Diploma in Automobile Engineering**



**Course Code: 025010505**  
**Additive Manufacturing &  
Materials**

Programme / Branch Name			Diploma in Automobile Engineering			
Course Name	Additive Manufacturing & Materials				Course Code	025010505
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

**Legends:** HSSC: Humanities and Social Sciences Courses

ESC: Engineering Science Courses

OEC: Open Elective Courses

BSC: Basic Science Courses

PCC: Program Core Courses

PEC: Program Elective Courses

## 1. Teaching and Evaluation Scheme

Teaching Hours / Week					Evaluation Scheme				
L	T	P	Total Teaching Hours	Total Credit	CA	CCE	SEE (TH)	SEE (PR)	Total
3	2	0	5	5	10	40	50	-	100

**Legends:** L: Lectures T: Tutorial P: Practical

CA: Continuous Assessment (Attendance + Activity)

CCE: Continuous & Comprehensive Evaluation

SEE (Th): Semester End Evaluation (Theory)

SEE (Pr): Semester End Evaluation (Practical)

## 2. Prerequisites

- ✓ Manufacturing Technology

## 3. Rationale

The course aims to provide students with an in-depth understanding of Additive Manufacturing and the materials used in this process. It covers topics such as the different types of Additive Manufacturing processes, material properties and selection, design principles, and process planning and optimization. The course also focuses on the applications of Additive Manufacturing in the Automotive industry and the future trends in this field.

## 4. Objectives

- ✓ To introduce students to the basics of Additive Manufacturing and its applications in the Automotive industry.
- ✓ To familiarize students with the different types of materials used in Additive Manufacturing and their properties.
- ✓ To provide students with an understanding of the various Additive Manufacturing processes and their advantages and disadvantages.
- ✓ To enable students to select appropriate materials for Additive Manufacturing based on their properties and applications.
- ✓ To teach students the design principles and guidelines for Additive Manufacturing applications in the Automotive industry.
- ✓ To provide students with hands-on experience in Additive Manufacturing techniques and the use of software tools for process planning and optimization.
- ✓ To enable students to identify the benefits and limitations of Additive Manufacturing in the context of the Automotive industry.

## 5. Contents

Unit No.	Unit Name	Topics	Learning Outcome	% Weightage	Hours
1.	<b>Introduction to Additive Manufacturing in Automobiles</b>	1.1. Overview of Additive Manufacturing and its applications in Automobiles 1.2. Comparison with traditional manufacturing processes used in Automobiles 1.3. Types of Additive Manufacturing techniques used in Automobiles (e.g., Fused Deposition Modeling, Selective Laser Sintering) 1.4. Advantages and limitations of Additive Manufacturing in Automobiles	<ul style="list-style-type: none"> <li>Understand the basics of Additive Manufacturing and its applications</li> <li>Understand the different types of materials used in Additive Manufacturing and their properties</li> </ul>	14	6
2.	<b>Materials for Additive Manufacturing in Automobiles</b>	2.1. Properties of materials used in Additive Manufacturing for Automobiles (e.g., thermoplastics, metals, ceramics) 2.2. Factors affecting material selection for Additive Manufacturing in Automobiles 2.3. Material testing and evaluation for Additive Manufacturing in Automobiles 2.4. Post-processing of Additive Manufacturing parts for Automobiles (e.g., surface finishing, heat treatment)	<ul style="list-style-type: none"> <li>Understand the importance of material selection for Additive Manufacturing</li> <li>Learn about the properties of different materials used in Additive Manufacturing</li> </ul>	19	8
3.	<b>Additive Manufacturing Applications in Automobiles</b>	3.1. Overview of Additive Manufacturing applications in Automobiles (e.g., prototyping, tooling, spare parts production) 3.2. Case studies of successful Additive Manufacturing applications in Automobiles	<ul style="list-style-type: none"> <li>Learn about the various applications of Additive Manufacturing in the Automobile industry</li> <li>Understand the benefits and limitations of Additive Manufacturing in the</li> </ul>	24	10

		3.3.Benefits and limitations of Additive Manufacturing applications in Automobiles 3.4.Design principles and guidelines for Additive Manufacturing applications in Automobiles	context of Automobiles		
4.	<b>Additive Manufacturing Process Planning and Control in Automobiles</b>	4.1.Process planning for Additive Manufacturing in Automobiles (e.g., build orientation, support structures) 4.2.Process control and monitoring for Additive Manufacturing in Automobiles 4.3.Quality control and inspection for Additive Manufacturing in Automobiles 4.4.Safety considerations for Additive Manufacturing in Automobiles	<ul style="list-style-type: none"> <li>Learn about the process planning and optimization for Additive Manufacturing</li> <li>Understand the design for Additive Manufacturing (DfAM) principles and guidelines</li> </ul>	24	10
5.	<b>Future Trends and Advancements in Additive Manufacturing for Automobiles</b>	5.1.Process planning for Additive Manufacturing in Automobiles (e.g., build orientation, support structures) 5.2.Process control and monitoring for Additive Manufacturing in Automobiles 5.3.Quality control and inspection for Additive Manufacturing in Automobiles 5.4.Safety considerations for Additive Manufacturing in Automobiles	<ul style="list-style-type: none"> <li>Understand the emerging Additive Manufacturing techniques and materials for Automobiles</li> <li>Learn about the integration of Additive Manufacturing with other manufacturing processes in Automobiles</li> </ul>	19	8

**Total Hours 42**

## 6. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	Ap %	C %	E %	An %
1.	Introduction to Additive Manufacturing in Automobiles	60	25	15	0	0	0
2.	Materials for Additive Manufacturing in Automobiles	15	30	30	0	5	20
3.	Additive Manufacturing Applications in Automobiles	20	30	25	10	10	5
4.	Additive Manufacturing Process Planning and Control in Automobiles	15	25	25	15	5	15
5.	Future Trends and Advancements in Additive Manufacturing for Automobiles	15	35	25	15	0	10

**Legends:** R: Remembering U: Understanding  
 App: Applying C: Creating  
 E: Evaluating An: Analyzing

## 7. Reference Books

- 1) Additive Manufacturing Technologies: An Overview by Prashanth Konda Gokuldoss and R. Aravindan.
- 2) Additive Manufacturing: Principles, Applications and Research Directions by J. Paulo Davim.
- 3) Additive Manufacturing: A Comprehensive Guide for Industry 4.0 by Adithya Kumar and Ramanathan Pitchandi.
- 4) Additive Manufacturing: Emerging Applications, Processes, and Technologies by J. Paulo Davim and Rajul Sheth.
- 5) 3D Printing and Additive Manufacturing: Principles and Applications - Fifth Edition by Chee Kai Chua, Kah Fai Leong, and Chu Sing Lim

## 8. Open Sources (Website, Video, Movie)

- 1) Open Additive Manufacturing Education (OpenAME): This is a free, open-source platform that provides educational resources for Additive Manufacturing. It includes video tutorials, webinars, and instructional materials for various levels of learners. <https://www.opename.org/>
- 2) Materialise Academy: This platform offers a range of courses on Additive Manufacturing and 3D printing, including materials, design, and software tools. Many of these courses are available for free. <https://www.materialise.com/en/academy>
- 3) MIT OpenCourseWare: This website offers a free course on Additive Manufacturing and 3D printing, including materials, processes, and design considerations. The course includes lecture notes, assignments, and exams. <https://ocw.mit.edu/courses/mechanical-engineering/2-810j-additive-manufacturing-for-innovative-design-and-production-spring-2016/>
- 4) 3D Printing Industry: This website offers a range of free educational resources on Additive Manufacturing and 3D printing, including news, tutorials, and case studies. <https://3dprintingindustry.com/>
- 5) e-Manufacturing: This is a free, online textbook that covers the principles and practices of Additive Manufacturing. It includes information on materials, processes, design, and applications. <http://e-manufacturing.eu/>