



**KIET GROUP OF INSTITUTIONS**  
**(An Autonomous Institution, Affiliated to AKTU, Lucknow, UP)**

Approved by AICTE, New Delhi

Delhi-NCR, Ghaziabad-Meerut Road, Ghaziabad-201206

## **EVALUATION SCHEME & SYLLABUS**

FOR

**B. Tech (Minor Degree)**  
**in**  
**Automotive Mechatronics**

[Effective from the Session: 2025-26]

**DEPARTMENT OF MECHANICAL ENGINEERING**

### Minor Degree in Automotive Mechatronics

S No.	Semester	Course Category	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL			
1	3rd sem	Major (core)	ME	ME212B	Automotive Essentials	B	3	0	2	80	20	100	100	200	4
2	4th sem	Major (core)	ME	ME213B	Drivetrain Technology	B	3	0	2	80	20	100	100	200	4
3	5th sem	Major (core)	ME	ME302B	General Vehicle electrical system and BMS	B	3	0	2	80	20	100	100	200	4
4	6th sem	Major (core)	ME	ME303B	Vehicle Diagnosis and Networking	B	3	0	2	80	20	100	100	200	4
Total Hours : 20 hrs.							12	0	8					800	16

<b>Course Code</b> ME212B			<b>Course Name: Automotive Essentials</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Pre-requisite:</b> Student should have basic understanding of mechanical systems, safety protocols, and interest in automotive technology									<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Course Objectives:</b>												
1. To introduce students to the fundamentals and key domains of the automotive industry. 2. To develop awareness about workshop safety, tools, and standard automotive practices. 3. To provide exposure to industry-oriented systems like VIN, FIN, and Workshop Information Systems (WIS).												
<b>Course Outcome:</b> After completion of the course, the student will be able to												
1. Understand the landscape of the global and Indian automotive industry and its orientation. 2. Apply safety practices related to personal protection, tools, and workspace. 3. Identify and use various automotive tools, measuring instruments, jacks, and lifting devices. 4. Distinguish between different vehicle body types and chassis systems. 5. Decode vehicle identification systems like VIN and FIN. 6. Utilize the Workshop Information System (WIS) for accessing vehicle maintenance data												
<b>Co-PO Mapping (scale 1: low, 2: Medium, 3: High)</b>												
<b>CO-PO Mapping</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
CO1	2	2	-	-	-	-	-	-	-	1	-	2
CO2	3	2	-	2	1	-	1	1	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	1	-	2
CO4	2	2	-	1	-	-	-	-	-	1	-	2
CO5	2	2	-	-	-	-	-	-	-	1	-	2
CO6	3	3	2	2	1	-	-	-	-	2	-	3
<b>Unit 1</b>	<b>Orientation</b>											<b>10 hours</b>
Introduction to the automotive industry: global & Indian context, Key automotive manufacturers and suppliers, Vehicle categories and market segments, Career opportunities and industry expectations, Orientation Summary – Recap and discussion.												
<b>Unit 2</b>	<b>Safety</b>											<b>08 hours</b>
Personal Safety: PPE (gloves, goggles, shoes, etc.), safe behavior, Tool and Equipment Safety: Handling, maintenance, safety rules, Work Area Safety: Cleanliness, hazard identification, emergency protocols, Safety drills and incident reporting practice.												
<b>Unit 3</b>	<b>Tools and Measurement</b>											<b>12 hours</b>
Measuring systems: metric vs imperial, Hand Tools: Types, usage, maintenance, Measuring Instruments: Vernier calipers, micrometers, feeler gauges, Special Tools: Torque wrenches, dial indicators, Jacks and Lifts: Types (hydraulic, scissor, two-post), operating procedures, safety practices.												
<b>Unit 4</b>	<b>Body Style and Chassis and Modern Features</b>											<b>12 hours</b>
Vehicle Body Styles: Hatchback, sedan, SUV, coupe, etc. Chassis Layouts: Ladder frame, monocoque, space frame, Chassis Components: Suspension, axles, frame, sub-frame, Materials used in automotive body, chassis and features given in modern vehicles.												
<b>Unit 5</b>	<b>Vehicle Identification and Components of the vehicle</b>											<b>12 hours</b>
VIN (Vehicle Identification Number): Format, interpretation, location, Purpose and decoding, Importance in service, repair history, insurance and case study of VIN number of different vehicle.												
<b>Unit 6</b>	<b>Workshop Information System (WIS)</b>											<b>21 hours</b>
Introduction to WIS: Role and benefits in modern workshops, Usage of WIS: Accessing service data, part numbers, repair manuals, Practice: Hands-on demonstration of WIS (e.g., Mercedes-Benz WIS).												
											<b>Total Hours</b>	<b>75 hours</b>
<b>Textbook</b>												
1. Bosch Automotive Handbook, Robert Bosch GmbH 2. Fundamentals of Automotive Technology – CDX 3. Workshop Safety Manual – HSE Publications												
<b>Reference Books</b>												



1. Vehicle Body Layouts – SAE Papers
2. Mercedes-Benz WIS/ASRA (Demo Version for Practice)

**Mode of Evaluation:**

Evaluation Scheme					
MSE		CA			ESE
MSE 1	MSE 2	CA1	CA2	CA3(ATT)	Total Marks
40	40	8	8	4	100
80		20			200

<b>Course Code</b> ME213B				<b>Course Name: Drive Train Technology</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Pre-requisite:</b> Student should have basic knowledge of IC engines, mechanics of machines, and vehicle systems.								<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>	
<b>Course Objectives:</b>												
1. To impart knowledge of internal combustion engine fundamentals and power transmission systems.												
2. To train students on gasoline and diesel engine assembly/disassembly and working.												
3. To familiarize students with manual and automatic transmission mechanisms.												
4. To introduce emerging electric drivetrain systems and their components.												
<b>Course Outcome:</b> After completion of the course, the student will be able to												
1. Understand the basic engine parameters and principles of two-stroke and four-stroke engines.												
2. Demonstrate disassembly and assembly of gasoline engine and explain its sub-systems.												
3. Perform disassembly and assembly of diesel engine and explain key circuits.												
4. Understand the components and working of manual and automatic transmissions.												
5. Understand the layout and working of electric powertrain systems.												
<b>Co-PO Mapping (scale 1: low, 2: Medium, 3: High)</b>												
<b>CO-PO Mapping</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
CO1	3	3	-	-	-	-	-	-	-	1	-	1
CO2	2	3	2	2	-	-	-	-	2	1	-	2
CO3	2	3	2	2	-	-	-	-	2	1	-	2
CO4	3	3	3	2	-	-	-	-	-	1	-	1
CO5	2	2	2	2	2	-	-	-	-	1	-	1
<b>Unit 1</b>	<b>Engine Fundamentals</b>										<b>10 hours</b>	
Two-stroke and Four-stroke engine operation, Terminology: HP, BHP, IHP, IP, Torque, Engine Efficiency, Engine geometries: Bore, Stroke, Compression ratio, Displacement, Valve timing diagrams and performance parameters												
<b>Unit 2</b>	<b>Gasoline Engine (M274)</b>										<b>16 hours</b>	
Disassembly and assembly procedure of M274 engine, Engine components: Pistons, Crankshaft, Camshaft, Valves, Manifolds, Fuel supply circuit, Cooling circuit and coolant flow, Lubrication/oil circuit and flow path.												
<b>Unit 3</b>	<b>Diesel Engine (OM642)</b>										<b>14 hours</b>	
Disassembly and assembly procedure of OM642 engine, Engine components and comparison with gasoline engine, EGR (Exhaust Gas Recirculation) system, Diesel fuel supply circuit, Cooling and oil lubrication system, Turbocharging and air management system.												
<b>Unit 4</b>	<b>Manual and Automatic Transmission</b>										<b>25 hours</b>	
Necessity and types of transmission, Power flow path in gearboxes, Gear ratio and torque multiplication, Shifting mechanisms: synchronizers, selector forks, Clutch operation (single plate, diaphragm type). Sensors and actuators in AT, Electronic Control Unit (TCU/ECU) functions, Planetary gear sets: working and configuration, Multiplate clutches and brakes, Gear ratio control and hydraulic system												
<b>Unit 5</b>	<b>EQ Powertrain (Electric Drivetrain)</b>										<b>10 hours</b>	



Construction and working of Asynchronous (Induction) Motor, AC to DC conversion and Inverter technology, High voltage lithium-ion battery structure and safety, Battery Cooling system: liquid-cooled and air-cooled methods, Regenerative braking system (introductory).

**Total Hours** | **75 hours**

**Textbook**

1. Automobile Engineering by Kirpal Singh, Standard Publishers.
2. Internal Combustion Engines by M.L. Mathur and R.P. Sharma.
3. Electric and Hybrid Vehicles by Iqbal Husain.

1. Bosch Automotive Handbook – Robert Bosch GmbH.
2. Electric Vehicle Technology Explained by James Larminie.
3. Mercedes-Benz M274 and OM642 Technical Training Manuals.

**Mode of Evaluation:**

Evaluation Scheme					
MSE		CA			ESE
MSE 1	MSE 2	CA1	CA2	CA3(ATT)	Total Marks
40	40	8	8	4	100
80		20			200

