		L	T	P	C
1152AU104	**ENGINE TESTING AND CERTIFICATION**	**3**	**0**	**0**	**3**

1. Preamble

This course Engine Testing & Certification imparts knowledge in the area of testing and validation of IC Engines. It enables the learners to expertise themselves in facility engineering, measurements & calibration of equipments used in test cell and analysis of data

2. Pre-Requisite

1151AU318 Engine performance and emission testing lab

1151AU216 Automotive fuels, lubricants and Coolants

3. Links to Other Courses

Automotive Emission and Control

4. Course Educational Objectives

Students undergoing this course are expected to

- Develop in depth knowledge of Engine Testing & Evaluation techniques
- Understand the standards & directives for various types of engine testing
- Develop knowledge on measurements and calibration techniques

5. Course Outcomes:

Upon the successful completion of the course, students will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Illustrate the requirements of Engine Test Cell Facilities	K2
CO2	Generalize the theory of dynamometers & Calibration procedure	K2
CO3	Explain the test standards, full & part throttle performance & maintenance	K2
CO4	Summarize the Engine Emission Measurement for various driving cycles	K2
CO5	Discuss the advanced engine monitoring devices such as combustion photography, swirl measurement and gas exchange process.	K2

6. Correlation of COs with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H	H	M	M	M		L	M		M	L	M	H
CO2	H	H	H	M	M	M		L	M		M	L	M	H
CO3	H	H	H	M	M	M		L	M		M	L	M	H
CO4	H	H	H	M	M	M		L	M		M	L	M	M
CO5	H	H	H	M	M	M		L	M		M	L	H	H

H- High; M-Medium; L-Low

7. Course Content

UNIT I ENGINE TEST FACILITIES **L-9**

Test Cell Requirements - Cell Console & Control Room, Ventilation, Air Conditioning & Exhaust, Cooling, Lubrication/Fuel Supply Systems, Noise & Vibration Control in Test Cells -Electrical Systems.

UNIT II ENGINE DYNAMOMETER & TESTS EQUIPMENTS **L-9**

Engine Dynamometers, Types of Dynamometers, Dynamometer Panels, Engine Controllers, Data Acquisition System, Fuel Consumption Meter, Air Fuel Ratio Measurement, Oil Consumption Measurement, Temperature & Pressure Measurement, Humidity Measurement, Calibration & Maintenance.

UNIT III ENGINE MEASUREMENTS **L-9**

Engine Test Standards, Full Throttle & Part Throttle Performance, Road Load Testing, Friction Measurement, Durability, Maintenance.

UNIT IV ENGINE EMISSION MEASUREMENTS IN VARIOUS MODES **L-9**

Emission Analyzers, Emission Cycles for Commercial Vehicles, Tractors & Gensets, Steady State and Transient Cycles, Dilution Tunnel, Particulate Emissions, Calibration and Maintenance.

UNIT V ADVANCED ENGINE TESTING **L-9**

Use of Special Equipments, Fuel Injection Pressure, Needle Lift, Combustion Photography, Swirl Measurement.

TOTAL: 45 periods

8. Text Books:

1. A.J.Martyr, M.A.Plint, Engine Testing Theory and Practice, SAE International, Third Edition, 2007.
2. Michael James Plint & Tony Martyr, “Engine Testing - Theory & Practice”, 3rd Edition, SAE International, 2007.

9. References:

1. HenizHeisler, “Advanced Engine Technology”, Vol.1, SAE International 2002
2. Richard D Atkins, “An Introduction to Engine Testing & Development”, ISBN 978-0-7680-2099-1, SAE International 2009.