M.E Semester: 2 M.E Mechanical (Automobile Engineering)
Subject Name: Instrumentations and vehicle testing MEA205

A. **Course Objective**

- To present a problem oriented in depth knowledge of instrumentations and vehicle testing
- To address the underlying concepts and methods behind instrumentations and vehicle testing

B. **Teaching / Examination Scheme**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
MEA205	Instrumentations and vehicle testing	4	0	2	6	5	3	70	30	20	30	150

C. **Detailed Syllabus**

1. Planning and Measurement; Instrumentation; Selection of measuring instrument; requirements of measurement such as precision, accuracy, errors, sensitivity, readability and reliability; Measurement of thermo-physical properties; Devices to measure temperature and pressure of the working fluid, coolant, air and fuel flow into the engine.
2. Indicating and recording instruments; Vibrometer; Accelerometer; vibration and pressure pickups; vibration test methods; Counters; stroboscopes; charge amplifiers; cathode ray oscillographs; FFT analyzer.
3. Warning and alarm instruments; Brake actuation warning system; traficators; flash system; oil pressure warning system; engine over heat warning system; air pressure warning system; speed warning system; door lock indicators; gear neutral indicator; horn design; permanent magnet horn; air & music horns; safety air bag and latest developments.
4. Data acquisition and processing: General data acquisition system examples, storage; processing, recording and display devices.

5. ISI codes for testing automotive engines; Laboratory dynamometer testing systems of power train and vehicle under simulated conditions; Instrumentation for testing vehicles; road test of automobile vehicles; wheel alignment; balancing; PUC test of vehicles; preparation of test reports, EURO standards, Bharat stages.

D. **Lesson Planning**

SR.NO	DATE/WEEK	UNIT NO	%WEITAGE	TOPIC NO
1	1^{ST} , 2^{ND} , 3^{RD}	1	20	1
2	4^{TH} ,5^{TH} , 6^{TH}	2	20	2
3	7^{TH} ,8^{TH} , 9^{TH}	3	20	3
4	10^{TH} ,11^{TH} , 12^{TH}	4	20	4
5	13^{TH} ,14^{TH} , 15^{TH}	5	20	5

E. **Instructional Method & Pedagogy**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.
  List of experiments:

    1. To study and perform temperature and pressure measurement on coolant circuit and lubrication oil circuit of automobile.
    2. To study and perform measurement of flow of flow of coolant and lubrication oil circuit.
    3. To study the velocity of smoke and fresh air and flow measurement.
    4. To analyze the smoke with gas analyzer with PUC setup.

5. To measure the rpm of propeller shaft and axle with stroboscope and tachometer.
6. To align and balance the wheels of automobile.
7. To check the brake effort with rope brake dynamometer.
8. To analyze the vibrations with the help of FFT analyzer and vibrometer.

F. **Students Learning Outcomes**

- The student can identify different areas of instrumentations and vehicle testing
- Can find the applications of all the areas in day to day life.

G. **Recommended Study Materials**

- **Text & Reference Books:**

1. Engineering Experimentation – Ernest O. Doeblin
2. Experimental Methods for Engineers – Holman J.P., McGraw Hill Book Co.
3. Measurement Systems, Applications & Design – Ernest O Doeblin, McGraw Hill Book Co.
4. Modern Electric Equipments for Automobiles – Judge A. W., Chapman Hall, London
5. Applied Instrumentation in Process Industries – Andrews W. G.