

M.E Semester: 1 M.E Mechanical (Automobile Engineering)
Subject Name: Fundamental of Automotive System MEA101

A. Course Objective:

- To present a problem oriented in depth knowledge of automotive system.
- To address the underlying concepts and methods behind automotive system.

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	
MEA101	Fundamental of Automotive System	4	0	2	6	5	3	70	30	20	30	150

C. Detailed Syllabus

1. INTRODUCTION: Passenger, commercial vehicles, types and specifications, off highway vehicles.
2. VEHICLE PERFORMANCE: Resistance, power and torque curve, driving force against vehicle speed, acceleration and gradeability in different gears for a typical car or truck plotted from specifications. Calculation and plotting the curves of air, rolling and gradient resistances, driving force, engine power, speed, rear axle ratio. Torque and mechanical efficiency at different vehicle speeds.
3. ENGINE BASIC THEORY: Engine types and their operation, classification, Properties of I.C. engine fuels, actual cycle, air fuel cycle, combustion charts (equilibrium), two stroke engines, four stroke engine, characteristics of engines, air capacity of engine, valve timing diagram.
4. FLYWHEEL, CLUTCH AND GEAR BOX: Flywheel, clutch, gear box types, general function and design characteristics, decoupling of power, speed and torque characteristics of power transmission system.

5. PROPELLER SHAFT AND FINAL DRIVE: Functional and design characteristics of propeller shaft, selection criteria for material and cross section of propeller shaft, need for differential and final drive.
6. WHEELS AND TYRES: Use of different types of wheels and tyres, specification, materials.
7. STEERING AND SUSPENSION: Effort multiplication and geometry in steering, types of springs used in suspension system, need for damping.
8. BRAKES: Distribution of braking force on front and rear wheels, stopping distance and braking efficiency, introduction to ABS.
9. ELECTRICAL AND ELECTRONIC SYSTEMS: Application of electricity in automobiles, starting, charging, lighting and accessory systems. Application of basic electronic components in automobiles.
10. PROPULSION SYSTEMS: Introduction to electric, hybrid and fuel cell vehicles.

D. Lesson Planning

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

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.

List of experiments:

- To study about layout and components of automobile.
- Tutorials on vehicle performance.
- Demonstration and study of different clutches, its troubles and remedies.
- Demonstration and study of different types of gear boxes.
- Demonstration and study of propeller shaft and driving axle.
- Demonstration and study of suspension system.
- Demonstration and study of wheels and tyres.
- Demonstration and study of steering system.
- Demonstration and study of different types brakes.
- Seminar: Recent trends in automobile.
- Industrial visit –ST workshop Mehesana and ST workshop Ahmadabad

F. **Students Learning Outcomes**

- The student can identify different areas of automotive system.
- Can find the applications of all the areas in day to day life.

G. **Recommended Study Materials**

• **Text & Reference Books:**

1. WH & Anglin DL, "Automotive Mechanics", Tata McGraw Hill Publishing Company, 2004.
2. Robert Bosch "Automotive Hand book", 5th edition, 2004.
3. Ganesan V, "Internal Combustion Engines", Tata McGraw Hill, New Delhi, 2003.
4. Mathur L and Sharma R P, "Internal Combustion Engines", Dhanpat Rai Publications (P), Ltd, New Delhi, 2002
5. Heinz Heisler, "Advanced Engine Technology", SAE 1995.
6. Kirpal Singh, "Automobile Engineering", Standard publishers, Distributors, Delhi, 1999.
7. G.B.S.Narang, "Automobile Engineering", Khanna Publishers, Twelfth reprint New Delhi, 2005.
8. R.P.Sharma, "Automobile Engineering", Dhanpat Rai & Sons, New Delhi, 2000.
9. Dr. N. K. Giri, "Automobile Mechanics", Seventh reprint, Khanna Publishers, Delhi, 2005
10. Automobile engineering by K.M Gupta Vol I & II
11. Richard Stone, "Introduction to IC Engines", 2nd edition, Macmillan, 1992.
12. William Crouse, "Automobile Engineering "