

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**MECHANICAL ENGINEERING**  
**B. E. SEMESTER: VII**

Subject Name: **Automobile Engineering**  
Subject Code: **171902**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	<p><b>Introduction to Automobile &amp; Automobile Performance:</b></p> <p>Development of automobile, classification of automobiles, main parts of automobiles, vehicle assemblies, specifying an automobile, resistance to the motion of the vehicle, power required for propulsion of the vehicle, power required for acceleration, effect of different drives like front wheel/rear wheel/for wheel drive, stability of a vehicle on a slope, dynamics of a vehicle running on banked track, stability of a vehicle taking a turn.</p>	3
2.	<p><b>Chassis, Frame &amp; Body:</b></p> <p>Types of frames, engine location, Comparison of front and rear mounting of engine, arrangement of clutch assembly, gearbox, propeller shaft with universal joints. front and rear differentials, rear, front and four wheel drives, their relative merits, types of chassis, pre requirements of body, types of bodies &amp; their construction, aerodynamic considerations in body profiling, ergonomical considerations, defects in frames and body.</p>	3
3.	<p><b>Transmission System: Clutch:</b></p> <p>Necessity of a clutch, requirements of a good clutch, constructional features and working of different types of clutch (like single plate/multi plate/cone/semi-centrifugal/fully centrifugal/wet etc.) used in automobiles, calculation of surface area and number of driving and driven plates, nature of wear and tear each components, effect of misalignment and mis- adjustment of components, fluid coupling, trouble shooting in clutch systems.</p>	4
4.	<p><b>Gear Box:</b></p> <p>Functions of gearbox, need of gear box, gears &amp; gear ratios, principle of gearing, types of gear boxes, manual gearboxes, sliding mesh/ constant mesh</p>	3

	/ synchro mesh type gear box, transfer case of 4 wheel drive vehicle.	
<b>5.</b>	<b>Automatic Transmission:</b> Basic devices used in automatic transmission, principle of epicyclic gearing, torque converter, free wheel clutch, over speed drive and its working, semi/fully automatic transmission, continuously variable transmission(CVT).	2
<b>6.</b>	<b>Propeller Shaft:</b> Propeller shafts and their types, fluid drive and fluid flywheel, universal joints, hotchkiss drive, torque tube drive, whirling of propeller shaft.	2
<b>7.</b>	<b>Differential:</b> Principle of the differential, locking differential, limited slip differential	1
<b>8.</b>	<b>Final Drive and Rear Axle:</b> Final drives and its types, hypoid type final drive, rear axle, rear axle drives, rear axle shaft supporting, rear axle casing, axle breather, oil retention	2
<b>9.</b>	<b>Axle, Suspension and Steering System:</b> <b>Front Axle:</b> Types, construction, components and their functions	1
<b>10.</b>	<b>Suspension System:</b> Principle, type of suspension system, conventional and independent front and rear axle, spring, rubber and air suspensions, automatic/hydro suspension system, shock absorbers.	2
<b>11.</b>	<b>Steering System:</b> Steering layout, types of steering gears, steering linkages, steering mechanism, definitions and significance of camber, caster, king pin inclination, toe in and toe out on turn, measurement and adjustment of various steering system layouts, steering ratio, under steering and over steering, power assisted steering, steering geometry, checking wheel alignment and steering geometry, computerized wheel alignment equipment, steering trouble shooting	3
<b>12.</b>	<b>Brakes:</b> Principle, braking distance, braking efficiency ,weight transfer, wheel skidding, principle and working of various types of brakes (like drum/disc/mechanical/girling mechanical/hydraulic etc.), power assisted brakes, hand brake, anti-lock brake systems (ABS), diagnosis of faults , adjustment and maintenance of brakes.	4
<b>13.</b>	<b>Wheels &amp; Tyres :</b> Types of wheels, wheel dimensions, types of tyres (conventional tubed tyre/ tubeless tyre), comparison of radial and bias ply tyres, tyre materials, considerations in tread design, tyre section, tyre designations, tyre wear	3

	indicators, nitrogen in tyres, factors affecting tyre life, wheel and tyre trouble shooting.	
14.	<p><b>Battery, Lighting System , Accessories and Safety System :</b></p> <p><b>Battery:</b></p> <p>Construction, working, methods of rating, faults, charging methods, test, generator and cranking motor with drive purpose, construction, faults and diagnosis, voltage and current regulator, purpose, typical circuit, layout, working principle, voltage setting.</p> <p><b>Lighting system:</b></p> <p>wiring system, head lights, aiming of head lights, indicating lights.</p> <p><b>Accessories</b> like direction indicators, hazard flashes, horn, speedometer, tachometer, wind screen wiper, wind screen washer, central locking system, power windows, and vehicle tracking system.</p> <p><b>Safety provisions</b> like air bags/ safety belts.</p>	4
15.	<p><b>Automobile garage for maintenance and repair:</b></p> <p>Scope of a garage, types of garages, equipments /tools for garages / service station, services carried out in garages and service station. necessity and types of servicing, engine decoking overhauling of engine, battery services, introduction to use of engine scanner / engine analyzer /chassis dynamometer / vehicle test lane etc., repairing of automobile component / system, laboratory &amp; road testing of an automobile.</p>	3
16.	<p><b>Regulation and Standardization of Vehicles:</b></p> <p>Motor vehicle act, registration of motor vehicles, driving license, control of traffic, insurance against third party, claims for compensation, traffic signs, central motor vehicle rules, vehicle safety standards and regulations, classification and definition of vehicles, enforcement of emission norms, duties of surveyor.</p>	3
17.	<p><b>Modern Vehicles:</b></p> <p>Construction and operational features of four wheelers available in Indian market, introduction to electric vehicles &amp; hybrid vehicles.</p>	2

### **Term Work:**

The term work shall be based on the topics mentioned above.

### **Practical / Oral:**

The candidate shall be examined on the basis of term-work.

**Text Books:**

1. Automobile Engineering Vol- I & II by Dr. Kirpal Singh, Standard Pub.& Dist.
2. Automobile Engineering Vol- I & II by Dr. K.M.Gupta,Umesh Pub.
3. Automobile Engineering by R.B.Gupta , Satya Prakashan
4. Automobile Technology by Dr. N.K.Giri, Khanna Pub.

**Reference Books:**

1. Automotive Mechanics by W.Crouse , Tata Mc Graw Hill
2. Automobile Engineering by G.B.S.Narang, Khanna Pub