

GUJARAT UNIVERSITY
TEACHING & EXAMINATION SCHEME

B.E. SEM-VIII (Automobile)

v.e.f. Jan.- 2008

Engg.

Subject Code	Subject Name	Teaching Scheme (Hrs)			Examination Scheme (Marks)					
		Theory	Practical	Tutorials	Theory Hrs	Theory Marks	Practical Oral Marks	Term Work Marks	Sessional Marks	Total Marks
-801	Vehicle Dynamics	3	2	--	3	100	25	25	50	200
-802	Vehicle Maintenance	3	4	--	3	100	50	50	50	250
803	Automotive Emission Control	4	2	--	3	100	25	25	50	200
804	Transport Management	4	2	--	3	100	25	25	50	200
305/1	Special Purpose Vehicles (EP-II)	4	2	--	3	100	25	25	50	200
305/2	Automobile Air-Conditioning (EP-II)	4	2	--	3	100	25	25	50	200
306	Project	--	2	--	--	--	50	50	--	100
TAL		18	14	--	--	500	200	200	250	1150

B.E. SEM VIII (AUTOMOBILE ENGG.)

A-801

VEHICLE DYNAMICS

Teaching Scheme		Examination Scheme					
Theory Hrs.	Practical Hrs.	Theory Marks	Hrs.	Sessional Marks	Practical/ Oral Marks	TermWork Marks	Total Marks
3	2	100	3	50	25	25	200

1 Performance Characteristics of Road Vehicles :

A) Steady State Operation : Various external forces acting on vehicle, Nature of the forces and factors affecting the forces, Tractive effort & Power available from the engine. Equation of motion, Maximum tractive effort, Weight distribution, Stability of vehicle on slope, Road performance curves, Acceleration, Gradability & Drawbar Pull.

B) Transient Operation : Inertia effect, Equivalent mass, Equivalent moment of inertia, Equivalent ungeared system, Time to produce synchronizing during gear change, Effect of engine flywheel on acceleration, Dynamics of vehicles on Banked tracks, Gyroscopic Effects, Net driving power.

2 Braking Performance :

Braking of vehicle - Braking applied to rear wheel, Front wheels and all the four wheels, On straight & Curved path, Mass transfer & its effect, Braking efficiency & stopping distance, Reaction time & stopping time, Brake locking, Anti-lock drives, Calculation of mean lining pressure & heat generation during braking.

3 Handling Characteristics :

Pitching, bouncing, yawing & rolling, wheel wobbling, Steering geometry, Fundamental condition for true Rolling, Ackerman's & Davis Steering mechanism, Steady State Handling, Slip angle, cornering power, Neutral steer, Under steer and over steer, Steady state response, Yaw velocity, Lateral Acceleration, Curvature response & Directional stability.

4 Ride Characteristics :

Human response to vibrations, Single degree & Two degree freedom, Vehicle Ride Model, Two degree freedom model for sprung & unsprung mass, Two degree freedom model for pitch & bounce, Vibrations due to road roughness, Motion of vehicle on undulating road & Compensated suspension systems, roll centre & roll axis.

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.

Books:

- 1 Steed, "Mechanics of Road Vehicles", by TMH
- 2 S.R. Ellise, "Vehicle Dynamics", by East West Press
- 3 N. K. Giri, "Automotive Mechanics", by Khanna Publications
- 4 Khovak, "Motor Vehicle engines", by Mir Publishers.
- 5 J. Y. Wong, "Theory of Ground Vehicles", John Willey & Sons, NY
- 6 P. M. Heldt, "Automotive Chassis", Chilton Co. NK
- 7 Gillespie, ' Vehicle Dynamics ' SAE
- 8 J. G. Giles, "Steering, Suspension & Tyres", Hefi: Books Ltd., London
- 9 Jack Erjavec, "Automotive Technology - A Systems Approach's"
- 10 R.V. Dukkupati, Vehicle Dynamics by Narosa Publications

B.E. SEM VIII (AUTOMOBILE ENGG.)

VEHICLE MAINTENANCE

A-802

Teaching Scheme		Examination Scheme					
Theory Hrs.	Practical Hrs.	Theory Marks	Hrs.	Sessional Marks	Practical/ Oral Marks	Term Work Marks	Total Marks
3	4	100	3	50	50	50	250

1 **Maintenance Records and Schedule:**

Importance of maintenance, scheduled and unscheduled maintenance, preventive maintenance details, breakdown maintenance details vehicle log books, maintenance record forms, different service garages & its layout.

2 **Maintenance, Servicing of Auxiliaries:**

Cooling system service, radiator, water pump service aspect, anti corrosion additives, anti freezing solutions Petrol fuel and diesel fuel system maintenance, lubrication system service, engine oil change, engine oil topping up, oil filters maintenance, oil relief valve Chassis lubrication, lubrication charts, head light focusing and adjustment.

3 **Maintenance, Repair and Overhauling of Engine:**

Dismantling of engine, cleaning, inspection and checking of components visually and dimensionally, reconditioning methods of engine components, engine tune-ups, assembly of engine components, special tools used for maintenance, repair and overhauling of engine.

4 **Maintenance, Repair and Overhauling of Chassis Drive-line Components:**

Servicing, repair & maintenance of clutch, maintenance, repair and servicing of gear box, servicing of propeller shaft, servicing and maintenance aspects of differential unit, servicing of front axle and rear axle, suspension system of both rigid and independent types, servicing of brake systems, hydraulic, air systems, brake bleeding and brakes adjustments, maintenance and servicing of steering system, wheel balancing, wheel alignment, maintenance of tyres, tyre rotation.

5 **Maintenance and Repair of Vehicle Body:**

Special tools used for body repair, minor body panel beating, tinkering of body works, polishing and painting of new and old vehicle body, servicing of door locks, passenger seat maintenance

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.

Suggested list of experiment /term-work :

1. Demonstration of petrol / diesel engine tune up
2. Engine cylinder compression & vacuum testing
3. Engine decarburizing & top overhaul
4. Inspection & wear measurement of engine components
5. Spark plug cleaning & testing
6. Injector cleaning & testing
7. Setting of ignition timing of multi-cylinder engine
8. Routine servicing, testing, trouble shooting and overhauling of - a) Clutch b) Gear Box
9. Study of chassis dynamometer

Note : Some of the demonstrations are to be arranged by planning visits to automotive industries & garages.

Books:

1. W. Steed, "Mechanics of Road Vehicles", Ilfe Books Ltd. London
2. P. M. Heldt, "Automotive Chassis", Chilton Co. NK
3. Venk Ernest, Billiet Walter, "Automobile Engines, Maintenance & Repairs", D.B. Taraporevala & Co.
4. A.W. Judge, "Car Maintenance & Repair – Motor Manual".
5. Heisler Hein Z., "Vehicle and Engine Technology", Vol. I, English Language Book Co.
6. Heisler Hein Z., "Advance Vehicle Technology", A Member of the Hodder Head Line Group-
7. John B. Heyhood, "Internal Combustion Engines Fundamentals", McGraw Hill
8. A.Chhikara , Automobile Engineering Vol-III, Satya Prakashan
9. Crouse & Anglin, Automotive Mechanics , Tata Mc Craw Hill co.

B.E. SEM VIII (AUTOMOBILE ENGG.)

A-803 AUTOMOBILE EMISSION & CONTROL

Teaching Scheme		Examination Scheme					
Theory Hrs.	Practical Hrs.	Theory Marks	Hrs.	Sessional Marks	Practical/ Oral Marks	Term Work Marks	Total Marks
4	2	100	3	50	25	25	200

- Air Pollution due to Automobile Exhaust**
Exhaust gas constituents & analysis, Ingredients responsible for air pollution, Harmful effects of various ingredients on plant ecology & human life, .
 - Pollution Norms :**
European pollution norms, Indian pollution norms as per Central Motor Vehicle Rules (C.M.V.R.).
 - Sources of Emission :**
Air Pollution due to engine exhaust, Emission from petrol tank & carburetor, crankcase blow-by. Effect of valve timing, ignition timing, Combustion chamber design, Fuel injection, fuel composition, air fuel ratio, mechanical condition of engine components and driving mode.
 - Smoke :**
Smoke problems, types of smoke, factors affecting diesel smoke, odor, Smog formation.
 - Exhaust Emission Control:**
Basic method of emission control, catalytic converter, After burners, reactor manifold, air injection, crank case emission control, evaporative loss control, Exhaust gas recirculation, Fuel additives.
 - Alternative Fuels :**
Use of CNG, LPG, Bio-Diesel, Hydrogen, fuel cells to decrease pollution, Eco-friendly vehicles, Electric & Solar operated vehicle
 - Instrumentation for Exhaust Emission Measurement:**
Measurement procedure, Sampling Methods, Orsat Apparatus, Infrared Gas analyzer, Flame Ionization Detector (FID), Gas chromatograph, Smoke meters.
- 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.

Suggested list of practicals/ term work:

- Study of Emission Norms
- Measurement of emission by portable exhaust gas analyzer.
- Measurement of emission by Infra Red Gas Analyzer (IRGA)
- Measurement of smoke by Bosch smoke meter
- Measurement of smoke by Hartridge smoke meter
- Study of Exhaust Gas Recirculation (EGR)
- Study of Evaporative Loss Control Device (ELCD)
- Study of catalytic converter
- Analysis of exhaust gas using Orsat Apparatus
- Study of LPG / CNG Kit

Books:

- E.F. Oberts, "Internal Combustion Engine and Air Pollution", Harper & Row Publisher, NY.
- J.G. Giles, "Vehicle Operation & Testing" (Automotive Vehicle Technology Vol. 7)
- C.H. Fisher, "Carburetion", Vol. 4.
- H.H. Willard and Others, "Instrumental Method of Analysis", CBS Publishers & Distributors,
- G.B.S. Narang, "Automobile Engineering", Khanna Publishers, Delhi
- Gupta B. R., "Electronics & Instrumentation Handbook", Wheeler Publishing.
- A.W. Judge, "Carburetion and Fuel Injection System", Motor Manual, Vol. 2, The Caxton Pub.
- P.L. Ballaney, "I.C. Engines, Khanna Publishers
- R. Yadav, ' I.C. Engines ', Central Publishing House, Allahabad.
- V. Ganeshan, ' I.C. Engines ', Tata McGraw Hill Pub.
- Domkundwar-Domkundwar, " I.C. Engines ', Dhanpatrai & Co.

B.E. SEM VIII (AUTOMOBILE ENGG.)

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TRANSPORT MANAGEMENT

Teaching Scheme		Examination Scheme					
Theory Hrs.	Practical Hrs.	Theory Marks	Hrs.	Sessional Marks	Practical/ Oral Marks	TermWork Marks	Total Marks
4	2	100	3	50	25	25	200

1 **Motor Vehicle Act:**

Short titles & definitions, Laws governing to use of motor vehicle & vehicle transport, Licensing of drivers & conductors, Registration of vehicle, State & interstate permits, Traffic rules, Signals & controls, Accidents, Causes & analysis, Liabilities & preventive measures, Design of road complex, Responsibility of driver, Public & public authorities, Offences, penalties & procedures, Different types of forms. Government administration structure, Personnel, Authorities & duties, Rules & regulations, Rules regarding construction of motor vehicles

2 **Taxation :**

Objectives, Structure & methods of laving taxation, One time tax, Tax exemption & tax renewal

3 **Insurance :**

Insurance types & significance, Comprehensive, Third party insurance, Furnishing of particulars of vehicles involved in accident, Award of the claims tribunal, MACT (Motor Accident Claims Tribunal), Solatium Fund, Hit & Run case, Duty of driver in case of accident, Surveyor & Loss Assessor, Surveyor's report

4 **Passenger Transport Operation:**

Structure of passenger transport organizations, Typical depot layouts, requirements, Problems on fleet management, Fleet maintenance, Planning - Scheduling operation & control, personal & training-training for drivers & conductors, Public relations, Propaganda, publicity, passenger amenities, Advertisement work, Parcel traffic. Theory of fares, Basic principles of fare charging , Differential rates for different types of services, Depreciation & debt charges, operation cost, Revenues, Economics & records.

5 **Goods Transport Operation:**

Structure of goods transport organizations, scheduling of goods transport, Management Information System (MIS) in passenger / goods transport operation, storage & transportation of petroleum products

6 **Advance Techniques in Traffic Management –**

Traffic navigation, global positioning system

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.

Suggested list of practicals / Term Work

1. Organization & Management of Motor Vehicle Department
2. Collection & study of different types of RTO forms.
3. Central Motor Vehicle rules
4. Taxation, Insurance & Permits
5. Study of accidents claims & survey report including post accident procedure
6. Study of depot layouts (passenger & goods transport)
7. Case study of MIS in passenger / goods transport organization
8. Collection & study of goods transport records.
9. Study of vehicle navigation system
10. Advanced traffic control devices

Books

1. Motor Vehicle Act - Govt. of India Publications.
2. Santosh Sharma, "Productivity in Road Transport", 2nd Edition, Association of State Road Transport Undertakings, New Delhi.
3. P.G.Patankar, "Road Passenger Transport in India", CIRT, Pune.
4. S.K. Shrivastava, "Economics of Transport"
5. "Transport Development in India", S. Chand & Co. Pvt. Ltd., New Delhi.

B.E. SEM VIII (AUTOMOBILE ENGG.)

A-805/1 (ELECTIVE PAPER- II) SPECIAL PURPOSE VEHICLES

Teaching Scheme		Examination Scheme					
Theory Hrs.	Practical Hrs.	Theory Marks	Hrs.	Sessional Marks	Practical/ Oral Marks	TermWork Marks	Total Marks
4	2	100	3	50	25	25	200

- 1 Classification of Special Purpose Vehicles, wheel type & track type, applications.
- 2 Study of working principles & design considerations of different systems involved like power system, transmission, final drive, lubrication, electrical, braking, steering, pneumatic & hydraulic control circuits.
- 3 Constructional & working features of different types of earth moving machinery such as rippers, shovels, loaders, Excavators, Dumpers, Dozers, Fork Lift
- 4 Study of instrumentation applied to such machines
- 5 **Farm Tractor :**
Layout, Load distribution, Engine, Transmission & Drive line, Steering, Braking system, Wheels & Tyres, Hydraulic system, Auxiliary Systems, Draw bar, PTO Shaft.
- 6 **Mobile Cranes :**
Basic characteristics of truck cranes, stability & design features, control systems & safety devices.
- 7 Tracked Vehicles, Articulated Vehicles, Multi-axle Vehicles

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.

Suggested list of practicals/ Term Work

1. Study of tipping mechanism of a dumper
2. Study of forklift truck
3. Study of operation of a truck crane
4. Study of technical & operational features of a tractor
5. Study of technical & operational features of a hole drill
6. Study of technical & operational features of a power scraper
7. Study of technical & operational features of a power hoe and shovel
8. Study of an electric van

Reference Books

1. Y. Pokras and M. Tushnyakov, "Construction Equipment Operation & Maintenance", MIR, Moscow.
2. A. Astskhov, "Truck Cranes", MIR, Moscow.
3. E.G. Poninson, "Motor Graders", MIR, Moscow.
4. Hand book of Earth Moving Machinery - Central Water & Power Commission (Govt. of India)
5. N. Rudenko, "Material Handling Equipment", M.R. Publishers.
6. Sheldon, R.Shacket, "Electric Vehicles", Domus Books, New York

A-805/2 (ELECTIVE PAPER- II) AUTOMOBILE AIR CONDITIONING

Teaching Scheme		Examination Scheme					
Theory Hrs.	Practical Hrs.	Theory Marks	Hrs.	Sessional Marks	Practical/ Oral Marks	TermWork Marks	Total Marks
4	2	100	3	50	25	25	200

- 1 **Refrigeration :**
Introduction, methods of refrigeration, vapour compression refrigeration system, vapour absorption refrigeration system, applications of refrigeration & air conditioning, Automobile air conditioning, air conditioning for passengers, isolated vehicles, transport vehicles, applications related with very low temperatures
- 2 **Refrigerant :**
Classification, properties, selection criteria, commonly used refrigerants, alternative refrigerants, eco-friendly refrigerants, applications of refrigerants, refrigerants used in automobile air conditioning
- 3 **Psychrometry :**
Psychrometric properties, tables, charts, psychrometric processes, comfort charts, factor affecting comfort, effective temperature, ventilation requirements
- 4 **Air Conditioning Systems :**
Classification, layouts, central / unitary air conditioning systems, components like compressors, evaporators, condensers, expansion devices, fan blowers, heating systems etc.
- 5 **Load Analysis :**
Outside & inside design consideration, factors forming the load on refrigeration & air conditioning systems, cooling & heating load calculations, load calculations for automobiles, effect of air conditioning load on engine performance,
- 6 **Air Distribution Systems :**
Distribution duct system, sizing, supply / return ducts, type of grills, diffusers, ventilation, air noise level, layout of duct systems for automobiles and their impact on load calculations
- 7 **Air Routine & Temperature Control :**
Objectives - evaporator care & air flow, through the dashboard re-circulating unit, automatic temperature control, controlling flow, control of air handling systems.
- 8 **Air Conditioning Service :**
Air conditioner maintenance & service - servicing heater system, removing & replacing components, trouble shooting of air conditioning system, compressor service, methods of dehydration, charging & testing.
- 9 **Air Conditioning Control :**
Common control such as thermostats, humidistats, control dampers, pressure cutouts, relays.

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.

Suggested list of practical / Term Work

1. Study of refrigeration methods & controls
2. Study of air conditioning systems & controls
3. Study of different components with the help of cut section/models/charts- Compressor, condenser, Evaporators, expansion device, Blower, Fans, heating systems etc.
4. Trial on Refrigeration Tutor.
5. Study of window air conditioning system & packaged units.
6. Trail on air conditioning tutor
7. Study of layout of air conditioning system for Car & Bus
8. Study of different tools, equipments used for automobile air conditioning systems.
9. Study of joints, dehydration, charging, & testing system,
10. Study of Leak testing, leak detection methods
11. Automobile air conditioning system design- case studies.

Books

1. Chhikara A., "Automobile Engg. Vol-VI (Automotive Air Conditioning)", Satya Prakashan
2. Crouse & Anglin, 'Automotive Air-Conditioning', Mc Graw Hill Pub.
3. Paul Weiser 'Automotive Air-Conditioning', Reston Publishing Co.
4. Automatic Heating & Air Conditioning Systems – Mitchell Information Services
5. Paul Lang, "Air Conditioning", C.B.S. Publisher & Distributor, Delhi.
6. Harris, "Modern Air Conditioning".
7. ASHRAE Handbook – 1985 Fundamentals, American Society of Heating, Refrigeration & Air Conditioning

B.E. SEM VIII (AUTOMOBILE ENGG.)

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PROJECT

Teaching Scheme		Examination Scheme					
Theory Hrs.	Practical Hrs.	Theory Marks	Hrs.	Sessional Marks	Practical/ Oral Marks	Term Work Marks	Total Marks
--	2	--	--	--	50	50	100

Term Work

The project work submitted by the student shall be according to following guidelines –

Format of project report–

The project report shall be typed with double space on A4 size bond paper. The total number of pages shall not be more than 120 and not less than 60 including figures, graphs, annexure etc. as per requirement. The report shall be written in the following format.

1. Title sheet
2. Certificate
3. Acknowledgement
4. List of figures / photographs / graphs / tables
5. Abbreviations
6. Abstract / Synopsis
7. Literature survey
8. Contents
9. Text with usual scheme of chapters
10. Discussion of the results and Conclusion
11. Bibliography (The source of illustrative matter be acknowledged clearly at appropriate place)

The student has to present the project work in front of the faculty members of the department and his classmates. The faculty members, based on the quality of the work & preparation and understanding of the candidate, shall do an assessment of the project internally – jointly.