B. Tech. (Third Semester) Automobile Engg.

HUM-201E: Basics of Economics and Management

Sessional :50 marks

Theory :100 marks

Total : 150 marks

Duration : 3 hours

Unit-I

Meaning of Industrial Economic, production function, its types, least cost combination, law of variable proportion, law of returns; increasing, constant & Diminishing.

Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC. U-shaped short run AC curve.

Price & output determination under monopoly in short run & long run, price discrimination, price determination under discriminating Monopoly, comparison between Monopoly & perfect competition.

Unit- II

Meaning of management, characteristics of management, management Vs administration, management – Art, Science & Profession, Fayol's principles of management. Human relations approach. Functions of management.

Unit-III

Planning & Organizing

Planning, steps in planning. Planning premises, difference between planning policy & strategy. Authority & responsibility, centralization & decentralization.

Unit-IV

Staffing, directing & controlling – Manpower planning, Recruitment & section styles of leadership, communication process and barriers, control process and steps in controlling.

Note: - Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all taking at least one from each unit.

SCHEME OF STUDIES & EXAMINATION

B.TECH. 3rd year Automobile Engg. Semester-V

S. No	Course No.	Course Title	Teaching Schedule				Marks for class work	Marks for exam		Total Marks
			L	T	P	Total		Theory	Practical	
1	AE-301 E	Design of automobile components-I	3	1	-	4	50	100	-	150
2	AE-303 E	Auto electrical Systems	3	1	-	4	50	100	-	150
3	ME-305 E	Heat Transfer	3	1	-	4	50	100	-	150
4	ME-307 E	Industrial Engineering	3	1	-	4	50	100	-	150
5	AE-309 E	Automotive Transmission-I	3	1	-	4	50	100	-	150

6	AE-311 E	Applied Numerical Techniques & Computing	3	1	-	4	50	100	-	150
7	AE-313 E	Automotive Transmission Lab	-	-	2	2	25	-	25	50
8	AE-315 E	Auto electrical Systems Lab	-	-	3	3	25	-	25	50
9	ME-317 E	Heat Transfer Lab	-	-	2	2	25	-	25	50
10	ME-319E	Industrial Engineering Lab	-		2	2	25		25	50
11	AE-321 E	Applied Numerical Techniques & Computing Lab	-		-	-	25		25	50
		TOTAL	18	6	9	33	425	600	125	1150

Note-Students will be allowed to use Non-Programmable scientific calculator. However, sharing of calculator will not be allowed

SCHEME OF STUDIES & EXAMINATION

B.TECH. 3rd year Automobile Engg. Semester-VI

S. No	Course No.	Course Title	Teaching Schedule	Marks for class work	Marks for exam	Total Marks

			L	**T**	**P**	**Total**		**Theory**	**Practical**	
1	AE-302 E	Two & Three wheeler Vehicles	3	1	-	4	50	100	-	150
2	AE-304 E	Engineering Materials	4	-	-	4	50	100		150
3	AE-306 E	Design of automobile components-II	3	1	-	4	50	100	-	150
4	AE-308 E	Auto Pollution & Control	3	1	-	4	50	100	-	150
5	AE-310 E	Tribology & Preventive Maintenance	3	1	-	4	50	100	-	150
6	AE-312 E	Microprocessor and interfacing	4	-	-	4	50	100	-	150
7	AE-314 E	Microprocessor and interfacing lab	3	1	-	4	25	-	25	50
8	AE-316 E	Automobile Engg. Lab	-	-	2	2	25	-	25	50
9	AE-318 E	Auto pollution & Control Lab	-	-	2	2	25	-	25	50
10	AE-320 E	Graphics Lab	-	-	3	3	25	-	25	50

11	AE-322 E	Tribology Lab	-		2	2	25		25	50
		TOTAL	19	5	9	33	425	600	125	1150

Note-Students will be allowed to use Non-Programmable scientific calculator. However, sharing of calculator will not be allowed

Scheme of Studies & Examination

B.Tech. 4th Year Automobile Engg. Semester – VII

Sr. No.	Course No.	Course Title	Teaching				Sessional	Marks for Exam		Total Marks
			L	T	P	Total		Theory	Practical	
1	AE-401 E	Mechanical vibrations	3	2	-	5	50	100	-	150
2	ME-403 E	Measurement and Control	3	1	-	4	50	100	-	150
3	AE-402 E	Vehicle Body Engineering	3	-	-	3	50	100	-	150
4	AE	Elective-I	3	1	-	4	50	100	-	150
5	AE	Elective-II	3	1	-	4	50	100	-	150
6	AE-407 E	M&C & Mechnical Vibration Lab	-	-	2	2	25	-	25	50
7	AE-409 E	Vehicle Maintencance Lab	-	-	2	2	25	-	25	50
8	AE-411 E	Project-I	-	-	7	7	100	-	100	200
9	AE-413 E	Pravcticle Training	-		2	2	125	-	-	125
		Total	15	5	13	33	525	500	150	1175

Note: Students will be allowqed to use Non-Programmabkle sciectific calcuator. However, sharing calculator wil not be allowed.

Scheme of Studies & Examination

B.Tech. 4th Year Automobile Engg. Semester – VIII

Sr. No.	Course No.	Course Title	Teaching				Sessional	Marks for Exam		Total Marks
			L	T	P	Total		Theory	Practical	
1	AE-402 E	Trasport Management	3	1	-	4	50	100	-	150
2	ME=404 E	Computer Added vehicle design	3	1	-	4	50	100	-	150
3	AE-406 E	Motor Vehilce & environment protection	3	-	-	3	50	100	-	150
4	AE	Elective-III	4	-	-	4	50	100	-	150
5	AE	Elective-IV	3	1	-	3	50	100	1	150
6	AE-408 E	Computer added vehicle design Lab	-	-	3	3	50	-	25	75
7	AE-410 E	Project-II	-	-	9	9	100	-	100	200
8	AE-412 E	Seminar	2	-	-	2	25	-	-	25
9	AE-414 E	Comprehensive Viva	-	-	-	-	-	-	50	50
10	AE-416 E	General fitness for profession	-		-	-	-		75	75
		Total	18	2	12	32	425	500	250	1175

Note: Students will be allowqed to use Non-Programmabkle sciectific calcuator. However, sharing calculator wil not be allowed.

B-Tech 3rd year (5th semester) (Automobile Engineering)

AE-301E DESIGN OF AUTOMOBILE COMPONENTS-1

L	T	P		
			Sessional	**: 50 Marks**
3	**1**	**-**	**Theory**	**: 100 Marks**
			Total	**: 150 Marks**

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT- I

Introduction:- Problem identification - problem statement, specifications, constraints, Feasibility study-technical feasibility, economic & financial feasibility, societal & environmental feasibility, Generation of solution field (solution variants), Design Procedure, System Design Cycle, Life cycle costs, selection of fits and tolerances and analysis of dimensional chains, Human factors engineering. Concept of tearing, bearing, shearing, crushing, bending etc, Stress concentration, factor of safety under different loading conditions.

Selection of Materials:-Mechanical properties of the commonly used Engg materials, hardness, and Strength parameters with reference to stress-strain diagram. Introduction to various theories of failure; selection of Engg Materials.

UNIT- II

MechanicalJoints:-Bolted joints in tension, eccentrically loaded bolted joints in shear and under combined stresses, Design of Power Screw; Coupling design; Design of various types of welding joints under different static load conditions, eccentrically loaded riveted joints; design of cotter and knuckle joint

Brakes :-Self energizing condition of brakes, design of shoe brakes - internal & external expanding, band brakes, and disc brakes, Braking lever design, Thermal considerations in brake designing

UNIT- III

Clutch :-Design of single plate clutch, multi plate clutch, design of centrifugal clutch, cone clutch, energy dissipated, torque capacity of clutch, design of clutch components, design details of roller and sprag type of clutches

Vehicle Frame :-Study of loads, moments, and stresses on frame members. Design considerations for frame of passenger and commercial vehicles, materials for automobile structure.

UNIT- IV

Front Axle and Steering Systems :-Analysis of loads, moments and stresses at different sections of front axle, determination of loads at kingpin bearings and wheel spindle bearings, determination of optimum dimensions and proportions for steering linkages ensuring minimum error in steering.

Final Drive and Rear Axle :-Detailed design of shafts for static and dynamic loading, Rigidity and deflection consideration, design of propeller shaft, design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings.

Books

1.Automobile Mechanics by Giri. N.K, Khanna Publisher, New Delhi –2002

2. Fundamental of Machine component design by Juvenal R.C, John Wiley, 3rd Edition

3. PSG Design Data book by PSG College of Technology, Combative, 2000

4. Selection & use of engineering materials – J.A. Charles – Butterworth – Heinemann 3 ed– 06

5. Design of Machine Elements – V.B. Bhandari- McGraw Hill

6. Automotive Chassis by Heldt. P.M., Chilton Co., New York – 1992

7. Steering, Suspension and tyres by Giles. K.G, Illiffe Books Ltd., London – 1998

8. Motor Vehicle by Newton Steeds & Garret, Illiffe Books Ltd., London- 2000

9. Automobile Chassis Design by Dean Averns, Illiffe Books Ltd. – 1992

10.MechanicalEngg. Design by Joseph Edward Shigley, MGH

11.Machine Design – An integrated Approach by R.L. Norton, Addison Wesley

B-Tech 3rd year (5th semester) (Automobile Engineering)

AE-303E AUTO ELECTRICAL SYSTEMS

L	T	P		
			Sessional	**: 50 Marks**
3	**1**	**-**	**Theory**	**: 100 Marks**
			Total	**: 150 Marks**

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT- I

Introduction :-Earth returns and insulated return systems, 6, 12, and 24-volt systems. Positive & negative earth systems.Fusing of circuits, relays, switches, low and high voltage automotive cables, wiring diagram for typical automotive wiring systems, maintenance and servicing.

Batteries:- Principles of lead acid cells and their characteristics - construction and working of lead acid battery, types of batteries, testing of batteries, effect of temperature on: capacity and voltage, battery capacity, voltage, efficiency, charging of batteries, sulphation and desulphation, maintenance and servicing, Battery failures & checking, Maintenance free Batteries, High energy and power density batteries for electric vehicles**.**

UNIT- II

Charging system:-Principle of generation of direct current. Shunt generator characteristics. Armature reaction. Third brush regulation. Cut-out. Voltage & current regulators, compensated voltage regulator. Alternators - principle, constructional and working aspects, bridge rectifiers. Principle of Magneto, Flywheel Magneto, Maintenance and servicing.Trouble shooting in charging systems.

UNIT- III

Starting system:-Condition at Starting – starting torque and power requirements, behavior of starter during starting.Series motor and its characteristics. Principle & construction of starter motor. Working of different starter drive units, care & maintenance of starter motor. Starter switches. Safety mechanism.Maintenance, servicing and trouble shooting.

Ignition system:- Types, construction & working of battery & coil and magneto ignition systems. Relative merits, Ballast Resistor, Ignition coil, Distributor, Contact breaker Point, centrifugal and vacuum advance mechanisms, Limitations of conventional ignition systems,

Transistorized Ignition systems, Spark plugs - construction, different types, plug fouling, maintenance, servicing and fault diagnosis, Electronic Ignition system. Programmed ignition, distributor less ignition.

UNIT-IV

Lighting system ;- Principle of automobile illumination, headlamp construction and wiring, reflectors – types, signaling devices- flashers, stop lights, fog lamps, auxiliary lighting-engine, passenger, reading lamp. Regn-plate lamps.Automatic illumination system. Head light levelling devices. Study of a modern headlight system with improved night vision.

Electrical Equipment and Accessories :-Oil pressure gauge, fuel level gauge, engine temperature gauge, electrical fuel pump, speedometer, odometer, trip meter, engine rpm meter, Headlamp & Windshield washer and wiper, heaters and defrosters, horns, stereo/radio, power antennae. Central locking, power window winding. Sun/Moon Roof. Motorized rear view mirrors, reverse warning, Bumper collision warning. Other accessories in modern vehicles.

Books

1. "Automotive Electrical Equipment ", P.L. Kohli, Tata McGraw-Hill Co. Ltd. New Delhi, 1975.

2. “Principles of Electricity and electronics for the Automotive Technician”, Chapman, Thomson Asia,

2000.

3. "Modern Electrical Equipment of Automobiles", A.W. Judge. Chapman & Hall, London.

4. "Automobile Electrical and Electronic Equipments ", A.P. Young. & L. Griffiths, English Languages Book

Society & New Press, 1990.

5. "Storage Batteries ", G.W. Vinal. John Wiley & Sons Inc., New York, 1985.

6. "Automobile Electrical Equipment ", W.H. Crouse. McGraw Hill Book Co. Inc., New York,

7. "Electrical Ignition Equipment ", F.G. Spreadbury, Constable & Co Ltd., London, 1962.

8. “Basic Automotive Electrical Systems”, C.P.Nakra, Dhanpat

B-Tech3rdYear (5th Semester) (Automobile Engineering)

ME-305E Heat Transfer

L	T	P		
			Sessional	: 50 Marks
3	1	-	Theory	100 Marks
			Total	:150Marks

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Heat Exchanger Function, Classification, types and applications of heat Exchangers, heat rejection ratio elements of heatexchanger, Working fluid: Liquid and Gas, Dalton's law of partial pressures; Effect of leakage of air. Methods tocheck and prevent air infiltration, selection of heat exchangers, heat exchanger design methodology. Single Phase Heat Exchangers: LMTD and NTU methods for evaporator and condenser tubes, and parallel andcounter flow heat exchangers, calculation of number and length of tubes in a heat exchanger. Rating and sizingmethods, design criteria, geometry, process parameters, pressure drops and applicationsCondensation Mechanism, types of condensers and design procedures, Evaporators, Design procedures,augmented surface heat exchangers, Heat transfer coefficients, pressure drops, compact heat exchangers and air coolers, plate heat exchangers and plate fine heat exchangers Heat Pipe Heat Exchangers: Types and design procedure and applications Installation, Operation and Maintenance: Fouling factors, type of fouling, and cleaning methods

UNIT-II

Air Conditioning Basic Concept Natural and Mechanical refrigeration; Application of Refrigeration; Units of refrigeration and Coefficient of performance; Refrigeration effect, cooling capacity and COP of a refrigerator; Reversed Carnot cycle and its limitations, Meaning of air conditioning,

Refrigerants Classification, properties, selection criteria, commonly used refrigerants, alternative refrigerants, eco-friendly refrigerants, and applications of refrigerants. Refrigerants used in automobile air conditioning, Basic vapourcompression system.

UNIT-III

Air Conditioning Concept and Applications; Psychometric properties of air; Dry bulb, wet bulb and dew point temperatures; Relative and specific humidity; degree of saturation adiabatic saturation temperature, enthalpy of air and water vapours; psychometric chart.Human requirement of comforts; effectivetemperature and comfort charts; Industrial and comfort air conditioning**.**

Psychometric Processes Sensible heating and cooling, cooling with dehumidification; Heating with dehumidification; by-pass factor; chemical dehumidification; adiabatic mixing, air washer.

UNIT-IV

Calculations for Air –conditioning Load and for Rate and state of Supply Air Sources of heat load; sensible and latent heat load; sensible heat factor; apparatus dew point temperature; Rate and state of air supply for air- conditioning of vehicles**.**

Air Conditioning Equipment Brief description of compressors, condensers, evaporators and expansion devices; Cooling towers; Ducts; dampers; grills; air filters; fans; room air conditioners; split units; automotive air conditioning systems-HVAC model

Text Books:

1. Fundamentals of Heat and Mass transfer by DS Kumar, SK Kataria and Sons, Delhi

2. A Course in Heat and Mass Transfer by S Domkundwar; DhanpatRai and

Sons, Delhi

3. Refrigeration and Conditioning by CP Arora, Tata McGraw Hill

4. Refrigeration and Conditioning by Manohar Prasad, Wiley Eastern Limited

Reference Books:

1. Heat Transfer by AJ Chapman; Macmillan Publishing Company, New York

2. Heat transfer by JP Holmans, McGraw Hill, London

3. Refrigeration and Conditioning by Jordan and Priester, Prentice Hall of India

4. Refrigeration and Conditioning by WF Stoecker, McGraw

5. Automotive Air conditioning by Paul Lung, CBS Publisher & Distributor, New Delhi.

B-Tech3rdYear (5th Semester) (Automobile Engineering)

ME-307E INDUSTRIAL ENGINEERING

L	T	P		
			Sessional	: 50 Marks
3	1	-	Theory	100 Marks
			Total	:150 Marks

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT- I

Introduction to work study; Method study; Basic procedure; Recording techniques (charts and diagrams); Elemental breakdown; Micro-motion studies; Therbligs; SIMO-chart; Principles of motion –economy.

Introduction; Objectives; technique; (time) information recording; methods of timings; Time study allowances; Work sampling technique; Performance rating and its determination PMTS; M. T. M.; Work factor.

UNIT- II

Principles of organization, Importance and characteristics of organization, Organization theories; Classical Organization theory; Neo-Classical organization theory, Modern organization theory; Types of organization, Military or line organization, Functional organization, Line and staff organization, Committees.

Objectives of PPC; Functions of PPC; Preplanning and planning; Routing; Estimating; scheduling-master schedule; Daily schedule; Gantt chart; Dispatching –centralized vs. decentralized; Control; Follow up and progress reporting.

Introduction; Product development; Product characteristics; Role of product development; 3Ss – Standardization; Simplification and Specialization.

UNIT- III

Introduction, Objectives and importance of sales forecasting, Types of forecasting, Methods of sales forecasting-Collective opinion method, Delphi technique, economic indicator method; Regression analysis, Moving average method, Time series analysis.

Introduction, Functions of inventory; Types of inventory; Control importance and functions, Inventory costs, Factors affecting inventory control, Various inventory control models. A. B. C. analysis, Lead-time calculations.

UNIT- IV

Introduction; Objectives; Concept and life cycle of a product and V.E.; Steps in VE., Methodology and techniques, Fast diagram, Matrix method.

Various concepts in industrial engineering

a) WAGES AND INCENTIVES; -Concept; Types; Plans; Desirable characteristics.

b) ERGONOMICS; - its importance; Man-machine work place system; Human factors considerations in system design.

c) SUPPLY CHAIN MANAGEMENT; - its definition, Concept, Objectives, Applications, benefits, Some successful cases in Indian Industries.

d) JIT; - Its definition, Concept, Importance, Misconception, Relevance, Applications, Elements of JIT (brief description).

e) MRP;-Introduction, Objectives, factors, Guide lines, Techniques Elements of MRP
f) TIME MANAGEMENT;-Introduction, Steps of time management, Ways for saving time, Key for time saves.

Reference and Text books:

- Production planning and control by S.Elion
- Modren production Management by S.S Buffa
- Industrial engg. and management manufacturing system by Surender kumar, Satya prakashan
- Essence of Supply Chain Management by R.P mohanty and S.G Deshmukh
- Industrial engg. and management by S Sharma and Savita Sharma

AE-309E AUTOMOTIVE TRANSMISSON-I

L	T	P		
			Sessional	**: 50 Marks**
3	**1**	**-**	**Theory**	**: 100 Marks**
			Total	**: 150 Marks**

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Introduction:-Need for Transmission system. Tractive Effort and Resistances to Motion of a vehicle.Requirements of transmission system.Classification of Transmission systems.Single, Two or Four Wheel drive systems. Multi axle drives. Chain, Shaft and Electric drives. Location of transmission system. Different transmissions in scooter, car, MUVs and transport vehicles of Indian make.

Clutch:-Automatic Clutch. Dry and Wet type of clutch. Friction lining materials.Over-running clutch.Modes of operating a clutch –mechanical, hydraulic and electric.Principle of operation, Constructional details, torque capacity and design aspects. Different types of clutches. Operation of single plate: helical spring and diaphragm type, and multiplate clutch. Centrifugal clutch

UNIT- II

Gear box:-Determination of gear ratios for vehicles. Performance characteristics in different speeds.Different types of gear boxes – sliding, constant and synchromesh type. Need for double declutching and working of synchronizing unit. Power and economy modes in gearbox. Transfer box. Transaxles.Overdrives. Gear shifting mechanisms – mechanical link andwiretypes

UNIT-III

Hydrodynamic drive :-Fluid coupling- principle of operation, constructional details. Torque capacity. Performance characteristics, Reduction of drag torque. Torque converter-Principle of operation, constructional details, performance characteristics, converter coupling, multistage torque converters and Polyphase torque converters.

Hydrostatic drive:-Hydrostatic driveVarious types of hydrostatic systems - Principles of hydrostatic drive system, Advantage and limitations, Comparison of hydrostatic drive with hydrodynamic drive - Construction and working of typical Jannyhydrostatic drive**.**

UNIT-IV

Electric drive :-Electric drive Principle of early and modified Ward Leonard Control system. Advantage & limitations.Performance characteristics.Study of drive system in an electric and hybrid vehicle.Automatic transmission applications Chevrolet "Turboglide" Transmission, Powerglide Transmission Toyota "ECT-i" Automatic Transmission with Intelligent Electronic controls system, Hydraulic Actuation system.

References:

1. Heldt.P.M., " Torque converters ", Chilton Book Co.

2. Newton and Steeds, " Motor vehicles ", llliffe Publishers.

3. Judge.A.W., " Modern Transmission systems ", Chapman and Hall Ltd.

4. SAE Transactions 900550 & 930910.

5." Hydrostatic transmissions for vehicle applications", I Mech E Conference,1981-88.

6. Crouse. W.H., Anglin., D.L., " Automotive Transmission and Power Trains construction ", McGraw-Hill.

B-Tech 3rd year (5th semester) (Automobile Engineering)

AE-311E Applied numerical technique & computing

L	T	P		
			Sessional	**: 50 Marks**
3	**1**	**-**	**Theory**	**: 100 Marks**
			Total	**: 150 Marks**

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT- I

Solution of equations and eigen value problems: Iterative method, Newton-Raphson method for single variable and for simultaneous equations with two variables. Solutions of linear system by Gaussian, Gauss-Jordan, Jacobi and Gauss-Seidel methods.Inverse of a matrix by Gauss-Jordan method, Eigen value of a matrix by power and Jacobi methods.

UNIT- II

Interpolation: Newton's divided difference formula, Lagrange and Hermit's polynomials. Newton forward and backward difference formulae, Stirling's and Bessel's central difference formulae.

Numerical Differentiation and Integration: Numerical differentiation with interpolation polynomials,

UNIT-III

Numerical integration by Trapezoidal and Simpson's rules.Two and three point Gaussian quardratureformula.Double integrals using Trapezoidal and Simpson's rules. Initial value problems for ordinary differential equations: Single Step Methods-Taylor Series, Euler and Modified Euler, Runge-Kutta method of order four for first and second order differential equations.

UNIT- IV

Boundary value problems for ordinary and partial differential equations: Finite difference solution for the second order ordinary differential equations. Finite difference solution for one-dimensional heat equation one-dimensional wave equation and two-dimensional Laplace and Poisson equations.

BOOKS:

1. Sastry, S.S Introductory Methods of Numerical Analysis (Third Edition), Prentice Hall of India, New Delhi, 1998.

2. Kandasamy, P., Thilakavathy, K, and Gumnavathy, K, Numerical Methods, S.Chand & Co., New Delhi, 1999.

3. Grewal, B.S and GrewalJ.S.Numerical Methods in Engineering and Science, Hanna Publishers, New Delhi, 1999.

4. Jain, M.K., Iyengar, S.R.K and Jain, R.K.Numerical Methods for Engineering and Scientific Computation (Third Edition), New Age International (P) Ltd., New Delhi, 1995.

5. Gerald, C.F. and Wheatley, P.O.Applied Numerical Analysis (Fifth Edition), Addison-Wesley, Singapore, 1998.

6.Narayanan, S., ManickavachakamPillai, K.andRamanaiah, G.Advanced Mathematics for Engineering Students Volume-III,S Viswanathan Pvt.Ltd.1993.

B-Tech 3rd year (5th semester) (Automobile Engineering)

AE-313E AUTOMOTIVE TRANSMISSION LAB

L	T	P	Class Work	:25Marks
-	-	2	Exam	:25Marks
			Total	: 50 Mark

List of experiments

1. Study of a layout of transmission system for a front wheel drive, rear wheel drive and a four wheel drive arrangement

2. Trouble shooting in different types of friction clutches

3. Study of layout of gears and shafts in a manual type gearbox and a transaxle.

4. Trouble shooting in manual type of gearbox and a transaxle

5. Study of layout in a manual & automatic gearbox for a two wheeler

6. Trouble shooting in gearbox of two wheeler of previous experiment

7. Study of layout of an automatic gearbox.

8. Study of gear shifting controls in an automatic gearbox

9. Trouble shooting in an automatic gearbox

10. Study of performance of an automatic gearbox.

11. Study of a manual and electric Transfer Case.

12. Trouble shooting in Transfer Case of previous experiment.

13. Study of an electric drive in an Electric vehicle

Note: Any 8 experiments from the above list and other 2 from others (developed by

institute) are required to be performed by students in the laboratory.

B-Tech (5th semester) (Automobile Engineering)

AE-315E AUTO ELECTRICAL SYSTEMS LAB

L	T	P	Class Work	:25Marks
-	-	3	Exam	:25Marks
			Total	: 50 Mark

List of Experiments

1. To understand the layout of complete wiring system of an automobile.

2. Perform the various tests for checking the battery condition.

3. To understand and test the charging circuit and charging motor.

4. To conduct performance test on a dynamo, alternator & starter motor.

5. To understand & test the starting circuit and trouble shooting in it.

6. Understand and test the conventional ignition system, setting of contact breaker points and spark plug gap.

7. Understand the working and testing of an Electronic Ignition system

8. Understand and test the lighting circuit of a car.

9. Conduct headlamp focusing as per the procedure.

10. Study the working of different accessories of a modern car

11. To study the layout / working of a Fuel Cell powered electric car.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech3rdyear (5th Semester) (Automobile Engineering)

ME-317E HEAT TRANSFER LAB

L	T	P	Class Work	:25Marks
-	-	2	Exam	:25Marks
			Total	: 50 Mark

List of Experiments

1. Determination of thermal conductivity of:

   - a solid insulating material by slab method
   - powder materials by concentric spheres method / or by some transient heat transfer technique
   - liquids by employing thin layer
   - a metal by comparison with another metal by employing two bars when kept in series and / or in parallel under different boundary conditions

2. Determination of coefficient of heat transfer for free/forced convection from the surface of a cylinder / plate when kept

   - along the direction of flow
   - perpendicular to the direction of flow
   - inclined at an angle to the direction of flow

3. Determination heat transfer coefficient by radiation and hence find the Stefan Boltzman's constant using two plates/two cylinders of same size by making one of the plates/cylinders as a black body

4. To plot the temperature profile and to determine fin effectiveness and fin efficiency for

- A rod fin when its tip surface is superimposed by different boundary condition

• Straight transfer fins of various sizes and optimization of fin proportions
• Circumferential fins of rectangular/triangular section

5. Study of various elements of an air conditioner system through cut sections models / actual apparatus
6. Study of design of an AC condenser / evaporator as an heat exchanger.
7. Calculation/ Estimation of cooling load for a vehicle
8. Study and performance of car air conditioner (HVAC model)

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech3rdyear (5th Semester) (Automobile Engineering)

ME-319E INDUSTRIAL ENGINEERING LAB

L	T	P		
			Class Work	**:25Marks**
-	-	**2**	**Exam**	**:25Marks**
			Total	**: 50 Mark**

List of Experiments

1. To study various Rating Factor systems and find standard time for making small sand mould.
2. To study various plat layouts and suggest improvements in existing Machines Shop layout.
3. To study and draw organizational structure of a near by industry and suggest changes.
4. To draw X and R charts for a given sample of products to check their acceptance.
5. To draw p chart for a given product lot and verify its acceptance
6. Draw a flow process chart with time estimates for a simple welding process.
7. Draw a two handed process chart for a simple process of a job preparation on a lathe.
8. To study various purchase procedures and draw organizational structure of college purchase department.
9. A case study on ABC/VED analysis.

10. A case study on Quality Improvement Techniques (e.g. Hostel Mess/ Workshop / Canteen etc.)
11. A market survey and analysis.
12. A "preliminary project report" preparation for any small-scale unit.

Note: Any 8 experiments from the above list and other 2 from others (developed by
1. institute) are required to be performed by students in the laboratory.

B-Tech (VTH semester) (Automobile Engineering)

AE-321E Applied Numerical Techniques& Computing Lab

L	T	P	Class Work	:25Marks
-	-	2	Exam	:25Marks
			Total	: 50 Mark

List of Experiments

1. To develop computer program to determine roots of a given equation using method of Newton -Raphson method,

2. To develop computer programs for solution of system of simultaneous linear equations using Gauss Elimination Technique

3. Numerical Integration with Simpson's rule and Gaussian Integration

4. Solution of ordinary differential equations by (i) Euler Method (ii) Runge-Kutta Method (iii) Taylor Series Methods

5. Develop a computer program to generate random numbers.

6. Develop a computer program to carry out a numerical integration using Monte Carlo Method.

7. Develop a computer program to find the value of pi using Monte Carlo method with different total number of computations.

8. Develop a computer program to simulate the car wash station problem.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech 3rd year (6th semester) (Automobile Engineering)

AE-302E TWO AND THREE WHEELER VEHICLES

L	T	P		
			Sessional	**: 50 Marks**
3	**1**	**-**	**Theory**	**: 100 Marks**
			Total	**: 150 Marks**

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT- I

Power Unit: Two stroke and four stroke SI engine, merits and demerits. Symmetrical and unsymmetrical port timing diagrams. Types of scavenging processes merits and demerits, scavenging efficiency. Scavenging pumps.Rotary valve engine.

UNIT- II

Fuel system.Lubrication system. Magneto coil and battery coil spark ignition system. electronic Ignition system. Starting system. Kick starter system.

UNIT- III

Chassis and Sub-Systems: barMainframe, its types. Chassis and shaft drive. Single, multiple plates and centrifugal clutches. Gear box and gear controls. Front and rear suspension- systems. Shock absorbers.Panel meters and controls on handle.

UNIT- IV

Brake and Wheels: Drum brakes, Disc brakes, front and rear brake links layouts. Spoked wheel, Cast

wheel. Disc wheel.Disctypes.Tyres&tubes.Two wheeler dynamics: Stability of two wheelers on straight and curved path.

B-Tech3rd year (6th semester) (Automobile Engineering)

AE-304E ENGINEERING MATERIALS

L	T	P		
			Sessional	**: 50 Marks**
4	**-**	**-**	**Theory**	**: 100 Marks**
			Total	**: 150 Marks**

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Atomic structure of metals & crystal system:- crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

UNIT-II

. **General principles of phase transformation in alloys**:-, phase rule and equilibrium diagrams, Equilibrium diagrams of (i) Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. (ii) systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature(iii) alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (iv) system whose components are subject to allotropic change. Iron carbon equilibrium diagram and their Phase transformation

UNIT-III

Engineering materials and their properties:- classification. Classification of ferrous and non-ferrous materials.Classification of cast iron-properties and their applications.Effects of alloying elements on properties of steel, carbon steel, low alloy steels, stainless steel, tool steels and die steels.Alloys of Ni, Al, Cu, Mg; properties and their applications.Classification of composite materials and their properties and applications.

UNIT-IV

4. Heat treatment and surface treatment: Heat treatment of steel – Annealing, Normalising, Hardening and tempering with their types and application to automotive components, surface hardening techniques, Induction, flame and chemical hardening, coating of wear and corrosion resistance, Electroplating. Phosphating, Anodizing, hot dipping, thermal spraying, hard facing and thin film coatings.

Selection of materials: Cryogenic wear, corrosion, fatigue, creep and oxidation resistance application. criteria of selecting materials for automotive components viz cylinder block, Cylinder head, piston, piston ring, Gudgeon pin, connecting rod, crank shaft, crank case, cam,cam shaft, engine valve, gear wheel, clutch plate, axle, bearings, chassis, spring, body panel - radiator, brake lining etc. Application of non-metallic materials such as composite, ceramic and polymers in automobile.

References:

1. Khanna.O.P., " Material Science and Metallurgy ", DhanapalRai& Sons,

2. Kapoor, " Material Science and Processes ", New India Publishing House,

3. Raghavan.V., Physical Metallurgy, Principle and Practice, Prentice Hall,

4. Bawa.H.S., Materials Metallurgy, McGraw-Hill,.

5. Avner S.H". Introduction to Physical Metallurgy" McGraw-Hill, New York,

6. Dieter, G.E., Mechanical Metallurgy, McGraw-Hill, New York, 1996.

7. Heat treatment of metals B. Zakharv

B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-306E DESIGN OF AUTOMOBILE COMPONENTS-II

L	T	P	Sessional	: 50 Marks
3	1	-	Theory	100 Marks
			Total	:150 Marks

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Belts and Chains systems

Design for the selection of V-belt, toothed belt and chains. Design of pulley for belt, and sprocket for chain.

UNIT-II

Suspension Systems

Type of springs and their uses, Design for helical springs, under tension, compression and fluctuating loads,

design of leaf springs, Belleville springs, Air (Pneumatic) springs, Surging phenomenon in springs.

UNIT-III

Transmissions

Basics of gears and gear trains, nomenclature, design of spur, helical, straight bevel gears, worm and worm wheel.

UNIT-IV

Bearing

Basics of bearings, their types, nomenclature. Selection criteria, Design of sliding and rolling type of bearings, Details of design of bearing housings Design of Lubrication systems for different assemblies in vehicles

UNIT-IV

Engine Components

Details of cylinder and piston assembly and their failures.Choice of material for piston and cylinder.Details, failures, and design of connecting rod, crankshaft, and camshaft.Material for crankshaft, connecting rod, and camshaft.Basics of Valves and their design. Design aspects of intake and exhaust manifolds, valves springs, tappets, valve trains. Materials for the same.

Text Books

1. Design Data Book by PSG College of Technology, Coimbatore, 2000.

2. Automobile Mechanics by Giri. N.K., Khanna Publisher, New Delhi – 2002.

3. Fundamental of Machine Component Design by Juvenal R.C, John Wiley.

4. Vehicular Engine Design, " by Kevin L Hoag, SAE Publication

5. An Introduction to Modern Vehicle Design, Julian Happiah Smith, SAE Publication

6. High Speed Combustion Engines by P.M.Heldt, Oxford-IBH Publishing Co.

7. Mechanical Engg. Design by Joseph Edward Shigley, MGH

8. Machine Design – An integrated Approach by R.L. Norton, Addison Wesley

9. Automobile Chassis Design by Dean Averns, Illiffe Books Ltd.

B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-308 AUTO PULLUTION AND CONTROL

L	T	P		
			Sessional	: 50 Marks
3	1	-	Theory	100 Marks
			Total	:150 Marks

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Introduction: General Scenario on automotive Pollution, Pollutants-sources-formation-effects-transient operational effects on pollution.

Engine Combustion and Pollutant Formation: HC, CO, NOx, Particulate Matters, Aldehyde emissions, Effect of operating variables on emission formation.

Emission Control Efforts: Supply of fuel – establishment of national test centers, construction of road networks.

UNIT-II

Alternate Fuels : Estimation of petroleum reserve – need for alternate fuels – Merits & Demerits and uses of CNG, LPG, Alcohols, Hydrogen, Bio-fuels, Electric Energy, Solar Energy.

Emission Standards : Evaluation of Emission Standards – Mandatory Tests for Emission measurement – Type Approval & Production Conformity Tests – Driving Cycles, Bharat Stages & Euro emission standards.

UNIT-III

Control Techniques for SI and CI: Design changes, optimization of operating factors, Control of

Crankcase emission, Evaporative emission, Exhaust emission - exhaust gas recirculation, air injector PCV system, thermal reactors, catalytic converters.

UNIT-IV

Test Procedure & Instrumentation for Emission Measurement: Test procedures- Measurements of invisible emissions -ORSAT apparatus, NDIR analyzer, Flame ionization detectors, Chemiluminescent analyzer, Gas analyzer, Measurements of visible emissions – Comparison methods & Obscure methods - Smoke meters, Emission standards.

Reference:

1. B.P. Pundir, “Engine Emissions”, Narosa Publishing House, 2007.
2. V. Ganesan, Internal Combustion Engines, Tata McGraw Hill Co., 2004.
3. K.K. Ramalingam, “Automobile Engineering”, Scitech Publications Pvt. Ltd., 2005
4. Amitosh De, “Automobile Engineering”, Galgotia Publications Pvt. Ltd., 2004
5. Dr. N.K. Giri, “Automobile Mechanic”, Khanna Publishers, 2006
6. Heywood. J.B., Internal Combustion Engine Fundamentals, McGraw Hill Book Co., 1995.
7. Automobiles and Pollution SAE Transaction, 1995.

B-TECH 3rd YEAR (6th SEMESTER) (AUTOMOBILE ENGINEERING)

AE-310E TRIBOLOGY & PREVENTIVE MAINTENANCE

L	T	P		
			Sessional	: 50 Marks
3	1	-	Theory	100 Marks
			Total	:150 Marks

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT- I

INTRODUCTION :-Introduction to Tribology, general tribological considerations in design of gears, cams, reciprocating components, Engine tribology basics – importance , tribological aspects of engine components such as bearing, piston assembly, valve train, transmission drive line-transmission, traction drive, universal and constant velocity joints, wheel bearings, drive chains, lubrication regims in the engine.

UNIT -II

FRICTION AND WEAR:-Nature of metal surface, surface properties, surface parameters and measurements, types, sliding friction, rolling friction, theories of friction, modified adhesive theory, engine friction, losses and engine design parameters. Introduction to wear, types of wear, theories of wear, mechanism of wear, wear testing and methods of wear measurements, factors affecting wear.

UNIT-III

BEARINGS, LUBRICATION AND AUTOMOTIVE LUBRICANTS:- Theory of hydrodynamics, lubrication, generalizedReynold's equation & physical significance of terms, pressure distribution and load carrying capacity equations for hydrodynamic journal bearing-infinitely long and short bearing approximations, thrust bearings, Raleigh bearing sintered bearings. Automotive Lubricants- introduction, properties, standard test methods for automotive lubricants, testing, classification, engine oil performance designations, tests, transmission fluids, gear lubricants, axle lubricants, solid lubricants, automotive engine oils, EP lubricants, Lubricant monitoring, SOAP, ferrography and other rapid testing methods of lubricant contamination

HYDROSTATIC AND ELASTOHYDRODYNAMIC LUBRICATION:- Hydrostatic bearings, basic concepts, bearing characteristic number and performance coefficients, flat, conical & spherical pad thrust bearing, air & gas lubricated bearing, squeeze film lubrication Elastohydrodynamic Lubrication, introduction, rolling of two cylinders, lubrication of ball & roller bearings, cams and gears, selection and life estimation, fatigue and diagnosis. .

UNIT-IV

INTRODUCTION TO PREVENTIVE MAINTANENCE:-Definition of preventive maintenance, difference between regular maintenance and preventive maintenance, preventive maintenance schedule for passenger vehicles and commercial vehicles, Noise, wear and corrosive maintenance.

PERIODIC MAINTANENECE:-Maintenance of batteries, Lead acid battery, Factor affecting battery life, testing and battery troubles Maintenance of auxiliaries Lubrication system, greasing of vehicle , lubricationcharts , Cooling system Maintenance, Maintenance of Electrical system, testing of starters ,alternators, ignition coils, wiring harness, horns, wipers, maintenance of drive line system

Reference Books

1. Fuller D. D., “Theory and Practice of Lubrication for Engineers “. John Wiley and Sons.

2. Halling J., “Principles of Tribology “, McMillan Press Ltd.

3 Cameron A. “Basic Lubrication Theory “, Wiley Eastern Ltd.

4 Neale M. J. “Tribology Hand Book “, Butterworths.

5 O. P. Orlov, “Fundamentals of Machine Design “, Vol.IV, MIR.

6 Hamrok B.J. “Fundamentals of Fluid film lubrication”, McGraw Hill, New York,NY

7 Automotive Chassis – P. M. Heldt, Chilton Co. NK

8 Young, Griffiths , “Automobile Electrical & Electronic Equipments’ Butterworths, London

9 G.B.S. Narang, “Automobile Engineering”

10 NakraB.C.,”Theory& Practice of mechanical Vibrations”, McGraw Hill

11 Nakra B.C. &Chowdhari K.K., “Instrumentation, measurements and

analysis”, McGraw Hill.

B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-312E MICROPROCESSORS & INTERFACING

L	T	P		
			Sessional	: 50 Marks
4	-	-	Theory	100 Marks
			Total	:150 Marks

NOTE: In the semester examination, the paper setter will set 8 questions in all, at least two questions from each unit, and students will be required to attempt only 5 questions, selecting at least one from each unit.

UNIT-I

Basic Electronics :Introduction: Electronic devices and circuits, Amplifiers, Converters, Digital Electronics. Microprocessors Block diagram of microcomputer, Architecture of Intel 8085, Importance of Data, Address and Control buses, Instruction formats, Addressing modes and types of instructions in Intel 8085, Instruction set of 8085. Memory Devices, RAM, ROM Types, Microprocessor interfacing with memory chips. LAN and CAN Network basics

Microcontroller:Comparison of microprocessor & microcontrollers, survey of 4,8,16 & 32 bit microcontrollers. Architecture of 8051:Block Diagram, oscillator & clock, Program Counter, registers, Flags, Internal memory, stack & stack pointer, special function register, Input/Output Pins, Ports and Circuits, External memory, Counters & Timers, Serial Data input/output interrupts. DC Motor and Stepper motor controls.

UNIT-II

Electronic fuel control system:Introduction, components, Open loop and closed loop control systems, intake manifold pressures, mass air flow rate sensor, Throttle body injection and multi port or point fuel injection, Fuel injection system, Injector operations, Injection system controls.

:Motivation for electronic engine control, concept, parameters, Digital engine control variables, Engine mapping, control strategy, Electronic engine management components, layout. Engine cranking and warm up control, Acceleration enrichment, Deceleration leaning and idle speed control. EGR control, Variable valve timing control, Electronic Ignition control, Electronic spark timing control. Exhaust emission control engineering, Integrated engine control system.

UNIT-III

Transmission control systems: Electronic transmission management: components, layout. Electronic control of automatic transmissions, valve actuating control system, two-wheel drive control, four-wheel drive control, all wheel drive auto control system.

Electric vehicle drive controls Electronic control of hybrid and electric vehicles. Digital controllers for drive-motor, motor-generator, battery and fuel cell.

UNIT-IV

Chassis Control system Electronic management of chassis system, Cruise control systems. Electronic suspension system, antilock braking controls system, traction control system, and vehicle stability control system.Electronic Steering control. Body controls and Security

Body control systems: Remote central locking, Key less entry, Automatic Air conditioning systems.

Security systems: immobilizer, and warning systems. Telematics, GPS Systems, Electronic control system diagnostics.

Text Books:

1. William B.Riddens, " Understanding Automotive Electronics ", 5th Edition,

Butterworth, Heinemann Woburn, 1998.

2. William L Husselbee, " Automotive Computers and Control System: Fundamentals and Service ". Hartcourt

Brace Professional Publications.

3. Thomas H Denton, "Automobile Electrical and Electronic Systems", SAE Publication.

4. Bosch Automotive Handbook, Latest Edition, SAE Publication

5. Bechtold., " Understanding Automotive Electronic ", SAE Publication

6. Ronald K Jurgen, “Automotive Microcontrollers” SAE Publications

7. Ronald K Jurgen, “ Passenger Safety and Convenience Systems” SAE Publication

B-Tech 3rd year(6th Semester) (Automobile Engineering)

AE-314E Microprocessor & Interfacing Lab

L	T	P		
3	1	-	Class Work	:50Marks
			Exam	:100Marks
			Total	: 150 Mark

1. Study of 8085 Microprocessor Kit.

2. Write a program to add and subtract two 8-bit number using 8085

3. Study of 8051/8031 Micro controller kits.

4. Write a program for multiplication of two numbers using 8051

5. Write a program to interface the ADC.

6. Write a program to control a stepper motor in direction, speed and number of steps.

7. Write a program to control the speed of DC motor

8. Write a program to control the traffic light system using 8085/8086 microprocessors and 8255 PPI

9. Programming of a PLC based system to control speed of DC motor

10. Programming of a PLC based system to control stepper motor

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-316E AUTOMOBILE ENGG.LAB.

L	T	P	Class Work	:25Marks
-	-	2	Exam	:25Marks
			Total	: 50 Mark

List of experiments

1.To study and prepare report on the constructional details, working principles and operation of

the following Automotive Steering Systems.

(a) Manual Steering Systems, e.g. Pitman –arm steering, Rack & Pinion steering.

(b) Power steering Systems, e.g. Rack and Pinion Power Steering System.

(c) Steering Wheels and Columns e.g. Tilt & Telescopic steering Wheels, Collapsible

Steering Columns.

2. To study and prepare report on the constructional details, working principles and operation of the following Automotive Tyres& wheels.

(a) Various Types of Bias & Radial Tyres.

(b) Various Types of wheels.

3. To study and prepare report on the constructional details, working principles and operation of the Automotive Brake systems.

(a) Hydraulic & Pneumatic Brake systems.

(b) Drum Brake System.

(c) Disk Brake System.

(d) Antilock Brake System.

(e) System Packing & Other Brakes.

4. To study and prepare report on the constructional details, working principles and operation of Automotive Emission / Pollution control systems.

5. Modeling of any two automotive systems on 3D CAD using educational softwares (eg. 3D modeling package/Pro Engineering/I-Deas/ Solid edge etc.)

6. Crash worthiness of the designed frame using Hypermesh and LS-Dyna solver or other software.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-318E AUTO POLLUTION & CONTROL LAB

L	T	P	Class Work	:25Marks
-	-	2	Exam	:25Marks
			Total	: 50 Marks

List of Experiments :

1. To Study of Pressure pickups, charge amplifier, storage oscilloscope and signal analysers used for IC engine testing.

2. Performance study of petrol and diesel engines both at full load and part load conditions.

3. Determination of compression ratio, volumetric efficiency and optimum cooling water flow rate in engines..

4. Testing of 2 and 4 wheelers using chassis dynamometers.

5. Study of NDIR Gas Analyzer and FID

6. Study of Chemiluminescent NOx analyzer

7. Measurement of HC, CO, CO2, O2 using exhaust gas analyzer

8. Diesel smoke measurement.

9. Study of Exhaust gas re circulation system in diesel engine.

References:1. Giles. J.G., Vehicle Operation and performance, IIliffe Books Ltd., London, 1989.

2. Crouse. W.H. and Anglin. D.L., Motor Vehicle Inspection, McGraw Hill Book Co., 1978.

3. Ganesan. V., Internal Combustion engines, Tata McGraw Hill Co., 1994.

4. BIS code Books, IS-10000 series, 1988.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-320E GRAPHICS LAB

L	T	P		
-	-	3	Class Work	:25Marks
			Exam	:25Marks
			Total	: 50 Mar

1. AutoCAD or similar drafting software
2. Computer Aided Drafting – introduction
3. Learning standard tools of Computer Aided Drafting with exercise
4. Creating 2D drawings of simple automotive component like gaskets, brackets, valves etc.
5. Applying dimension and tolerance on entities.
6. Creating 2D detail drawing, cross sections & partial views of automotive components like flywheel, piston etc.
7. Concept of multi layer system with exercise.
8. Applying geometrical tolerance on drawing.

References:

1. Shrock Cheryl R., Exercise Workbook for Beginning AutoCAD, New Age International, 2006.

2. George Omura, Mastering AutoCAD, BPB Publication, 2005.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.

B-Tech 3rd year (6th Semester) (Automobile Engineering)

AE-322E TRIBOLOGY LAB.

L	T	P	Class Work	:25Marks
-	-	2	Exam	:25Marks
			Total	: 50 Marks

1. To study the pressure distribution of a journal bearing using journal bearing apparatus.
2. To determine abrasion index of a material with the help of dry abrasion tester.
3. To determine the rate of wear of metal and plot displacement v/s time curves by friction & wear monitor apparatus.
4. To evaluate the load wear index & weld point with the help of four ball stream pressure tester.
5. Analysis of various properties of lubricant of using lubricant oil analyzer.
6. Compare and analyzer the wear characteristics of different materials.
7. To study different types of bearing used in industries.
8. To study the effect of axial and circumferential grooves in cases of oil bearing.

Note: Any 8 experiments from the above list and other 2 from others (developed by institute) are required to be performed by students in the laboratory.