ANNA UNIVERSITY CHENNAI:: CHENNAI - 600 025

CURRICULUM 2004

B.E. AUTOMOBILE ENGINEERING

SEMESTER – III

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MA1201	Mathematics – III	3	1	0	100
ME1206	Applied Engineering Mechanics	3	1	0	100
AT1201	Applied Thermodynamics	3	1	0	100
ME1202	Fluid Mechanics and Machinery	3	1	0	100
AT1202	Automotive Petrol Engines	3	0	0	100
AT1203	Fuels and Lubricants	3	0	0	100
PRACTICAL					
ME1204	Fluid Mechanics and Machinery Lab	0	0	3	100
AT1204	Fuels and Lubricants Lab	0	0	3	100
AT1205	Two and Three Wheeler Lab	0	0	3	100
GE1202	Technical Seminar	0	0	3	0

SEMESTER – IV

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MA1253	Probability and Statistics	3	1	0	100
AT1251	Automotive Diesel Engines	3	0	0	100
CE1262	Strength of Materials	3	1	0	100
AT1252	Mechanics of Machines	3	1	0	100
MH1151	Engineering Materials and Metallurgy	3	0	0	100
EC1264	Electronics and Microprocessors	3	0	0	100
PRACTICAL					
EC1265	Electronics and Microprocessors Lab	0	0	3	100
AT1253	Engine Testing Lab	0	0	3	100
AT1254	Computer Aided Machine Drawing	0	0	3	100
GE1251	Technical Seminar	0	0	3	0

SEMESTER V

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
CY1201	Environmental Science and Engineering	3	0	0	100
AT1301	Automotive Electrical and Electronics	3	0	0	100
AT1302	Automotive Engines Components Design	3	1	0	100
AT1303	Automotive Chassis	3	0	0	100
ME1304	Engineering Metrology and Measurements	3	0	0	100
AT1304	Vehicle Dynamics	3	0	0	100
PRACTICAL					
AT1305	Auto Electrical and Electronics Lab	0	0	3	100
AT1306	Automotive Chassis Components Lab	0	0	3	100
AT1307	Computer Aided Engine Design Lab	0	0	3	100
GE1352	Communication Skills Laboratory *	0	0	4	100

*** All branches of B.E. & B.Tech. programme offered in V semester except B.E.(CSE), B.E. (ECE) & B.E. (Mech.)**

SEMESTER – VI

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MG1351	Principles of Management	3	0	0	100
AT1351	Automotive Chassis Design	3	1	0	100
AT1352	Computer Aided Vehicle Design Characteristics	3	1	0	100
AT1353	Automotive Pollution and Control	3	0	0	100
AT1354	Automotive Transmission	3	0	0	100
E1****	Elective - I	3	0	0	100
PRACTICAL					
AT1355	Reconditioning Lab	0	0	3	100
AT1356	Automotive Engine Components Lab	0	0	3	100
AT1357	Computer Aided Chassis Design Lab	0	0	3	100
GE1302	Technical Seminar **	0	0	3	0

**** All branches of B.E. & B.Tech. programme offered in VI semester except B.E.(CSE), B.E. (ECE) & B.E. (Mech.)**

SEMESTER – VII

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MG1401	Total Quality Management	3	0	0	100
MH1003	Finite Element Analysis	3	1	0	100
AT1401	Vehicle Maintenance	3	0	0	100
AT1402	Vehicle Body Engineering	3	1	0	100
E2****	Elective - II	3	0	0	100
E3****	Elective - III	3	0	0	100
PRACTICAL					
AT1403	Vehicle Maintenance Lab	0	0	3	100
AT1404	Computer Aided Manufacturing Lab	0	0	3	100
AT1405	Identification of Project Work of next Semester	0	0	2	0

SEMESTER – VIII

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
MG1452	Engineering Economics and Cost Analysis	3	0	0	100
E4****	Elective - IV	3	0	0	100
E5****	Elective - V	3	0	0	100
PRACTICAL					
AT1452	Comprehension	0	0	3	0
AT1453	Project Work	0	0	6	200

MA1201 MATHEMATICS III 3 1 0 100

(Common to all branches)

OBJECTIVES

The course objective is to develop the skills of the students in the areas of boundary value problems and transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

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1. PARTIAL DIFFERENTIAL EQUATIONS 9

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

2. FOURIER SERIES 9

Drichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

3. BOUNDARY VALUE PROBLEMS 9

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

4. FOURIER TRANSFORM 9

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

5. Z -TRANSFORM AND DIFFERENCE EQUATIONS 9

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TUTORIALS 15

TOTAL : 60 PERIODS

TEXT BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics Volume III", S. Chand & Company Ltd., New Delhi, 1996.
3. Wylie C. Ray and Barrett Louis, C., "Advanced Engineering Mathematics", Sixth Edition, McGraw-Hill, Inc., New York, 1995.

REFERENCES

1. Andrews, L.A., and Shivamoggi B.K., "Integral Transforms for Engineers and Applied Mathematicians," Macmillen, New York, 1988.
2. Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., "Advanced Mathematics for Engineering Students", Volumes II and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd. Chennai, 2002.
3. Churchill, R.V. and Brown, J.W., "Fourier Series and Boundary Value Problems", Fourth Edition, McGraw Hill Book Co., Singapore, 1987.

ME1206 APPLIED ENGINEERING MECHANICS 3 1 0 100

OBJECTIVE :

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

1. BASICS & STATICS OF PARTICLES 12

Introduction - Units and Dimensions - Laws of Mechanics – Parallelogram and triangular Law of forces – Vectorial representation of forces and moments – Vector operations of forces moments and Couples – Moment of a force about a point and aboutan axis – Vectorial representation of moments and couples – Scalar components of a moments – Varignon's theorem - Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space - Equilibrium of a particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force

2. EQUILIBRIUM OF RIGID BODIES 12

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples

3. PROPERTIES OF SURFACES AND SOLIDS 12

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle areas from integration – T section, I section, Angle section, Hollow section from primary simpler sections – second moments of plane area – Rectangle, triangle, circle from integration - T section, I section, Angle section, Hollow sections – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia - Mass moment of inertia – Derivation of mass moment of inertia for, prism, cylinder and sphere from first principle – Relation to area moments of inertia.

4. FRICTION AND DYNAMICS OF PARTICLES 12

Surface Friction – Law of dry friction – Sliding friction – Static and Kinetic friction – Rolling resistance – Belt friction – Rectilinear motion of particles - Relative motion – Curvilinear motion – Newton's law – Energy and momentum Equation of particles – Impulse – Impact of elastic bodies – Motion of connected particles.

5. ELEMENTS OF RIGID BODY DYNAMICS 12

Translation and Rotation of Rigid Bodies – Velocity and acceleration – Plane motion of rigid bodies – Forces and acceleration.

L: 45, T: 15, TOTAL: 60

TEXT BOOK

1. Beer,F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, 1997.

REFERENCES

1. Hibbeller, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000
2. Ashok Gupta, Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM), Pearson Education Asia Pvt., Ltd., 2002
3. Palanichamy, M.S., Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill, 2001.
4. Irving H. Shames, Engineering Mechanics - Statics and Dynamics, IV Edition - Pearson Education Asia Pvt. Ltd., 2003
5. Rajasekaran, S, Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt. Ltd., 2000

CY1201 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 100

AIM

The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make him/her sensitive to the environment problems in every professional endeavor that he/she participates.

OBJECTIVE

At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought,

conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT II ECOSYSTEMS AND BIODIVERSITY 14

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT III ENVIRONMENTAL POLLUTION 8

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.
Field Study of local polluted site – Urban / Rural / Industrial / Agricultural

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – Population explosion – Family Welfare Programme – Environment and human health – Human Rights – Value Education – HIV / AIDS – Women and Child Welfare – Role of Information Technology in Environment and human health – Case studies.

TOTAL : 45

TEXT BOOKS

1. Gilbert M.Masters, “Introduction to Environmental Engineering and Science”, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. Jr., “Environmental Science”, Wadsworth Publishing Co.

3. Townsend C., Harper J and Michael Begon, "Essentials of Ecology", Blackwell Science.
4. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", Techno-Science Publications.

REFERENCES

1. Bharucha Erach, "The Biodiversity of India", Mapin Publishing Pvt. Ltd., Ahmedabad India, Email: **mapin@icenet.net**
2. Trivedi R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., "Environmental Management", W.B. Saunders Co., Philadelphia, USA, 1998.

AT1201 APPLIED THERMODYNAMICS 3 1 0 100

OBJECTIVES

To make the students understand thermodynamic principles, compressible flow and fundamentals of heat transfer with its concepts in the operation of automotive engines.

1. FIRST LAW OF THERMODYNAMICS 9+3

System, thermodynamic equilibrium, state, property, process, cycle, zeroth law of thermodynamics, energy, work, heat, first law of thermodynamics, PMM I, ideal gases, application of first law of thermodynamics to closed and open systems, pressure – volume diagrams, steady flow process, application of steady flow energy equation.

2. SECOND LAW OF THERMODYNAMICS 9+3

Limitations of first law, statements of second law of thermodynamics, PMM II, Clausius inequality, heat engine, heat pump, refrigerator, carnot cycle, carnot theorem, entropy, temperature – entropy diagram, entropy changes for a closed system.

3. GAS POWER CYCLES, FLUID FLOW AND VAPOUR POWER CYCLE 9+3

Air standard Brayton cycle with intercooling, reheating and regeneration properties of steam, one dimensional steady flow of gases and steam through nozzles and diffusers, Rankine cycle.

4. RECIPROCATING AIR COMPRESSORS, REFRIGERATION CYCLES 9+3

Single acting and double acting air compressors, work required, effect of clearance volume, volumetric efficiency, isothermal efficiency, free air delivery, multistage compression, condition for minimum work. Fundamentals of refrigeration, C.O.P., reversed carnot cycle, simple vapour compression refrigeration system, T-S, P-H diagrams, simple vapour absorption refrigeration system, desirable properties of an ideal refrigerant.

5. FUNDAMENTALS OF HEAT TRANSFER 9+3

Modes of heat transfer, Fourier's law of conduction, one dimensional steady state conduction through plane and composite walls, cylinders and spheres. Free and forced convection, dimensionless numbers, thermal boundary layer, heat transfer co-efficient, simple problems in fins, heat transfer between fluids separated by plane and cylindrical walls, overall heat transfer coefficient, heat exchangers, LMTD, concept of radiation-Planck's law, Wien's displacement law, Stefan Boltzman law, Black body and Grey body radiation.

TOTAL : 60

TEXTBOOKS

1. R.K.Rajput – "A Textbook of Engineering thermodynamics"- Laxmi Publications (P) Ltd, New Delhi-2001.
2. Biray K. Dutta – "Heat Transfer Principles and Applications"- Printice hall of India, New Delhi-2003

3. R.Rudramoorthy- "Thermal Engineering" - Tata McGraw Publishing Co. Ltd, New Delhi- 2003

REFERENCES

1. R.S.Khurmi, J.K.Gupta – "A textbook of Thermal Engineering"- S.Chand & company Ltd- 2003.
2. E.Ratha Krishnan "Fundamentals of Engineering thermodynamics", Eastern Economy Edition- Prentice Hall of India Private Limited, New Delhi–110 001, 2000.
3. Yunus A. Cengel, Michael A.Boles – "Thermodynamics An Engineering approach"- Third Edition- 2002.
4. Y.V.C.Rao – Heat transfer – University press, Hyderabad – 2001.

ME1202 FLUID MECHANICS AND MACHINERY 3 1 0 100

(Common To Mechanical, Production, Mechatronics, Automobile And Aeronautical)

OBJECTIVE

- To understand the structure and the properties of the fluid.
- To understand and appreciate the complexities involved in solving the fluid flow problems.
- To understand the mathematical techniques already in vogue and apply them to the solutions of practical flow problems.
- To understand the energy exchange process in fluid mechanics handling incompressible fluids.

1. BASIC CONCEPTS AND PROPERTIES 6

Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers and pressure gauges.

2. FLIUD KINEMATICS AND FLUID DYNAMICS 12

Fluid Kinematics - Flow visualization - lines of flow - types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- Equation of streamline - stream function - velocity potential function - circulation - flow net – fluid dynamics - equations of motion - Euler's equation along a streamline - Bernoulli's equation – applications - Venturi meter, Orifice meter, Pitot tube - dimensional analysis - Buckingham's π theorem- applications - similarity laws and models.

3. INCOMPRESSIBLE FLUID FLOW 12

Viscous flow - Navier - Stoke's equation (Statement only) - Shear stress, pressure gradient relationship - laminar flow between parallel plates - Laminar flow through circular tubes (Hagen poiseulle's)- Hydraulic and energy gradient - flow through pipes - Darcy - weisback's equation - pipe roughness -friction factor - Moody's diagram-minor losses - flow through pipes in series and in parallel - power transmission - Boundary layer flows, boundary layer thickness, boundary layer separation - drag and lift coefficients.

4. HYDRAULIC TURBINES 8

Fluid machines: definition and classification - exchange of energy - Euler's equation for turbo machines - Construction of velocity vector diagram's - head and specific work - components of energy transfer - degree of reaction.

Hydro turbines: definition and classifications - Pelton turbine - Francis turbine - propeller turbine - Kaplan turbine - working principles - velocity triangles - work done - specific speed - efficiencies -performance curve for turbines.

5. HYDRAULIC PUMPS 7

Pumps: definition and classifications - Centrifugal pump: classifications, working principles, velocity triangles, specific speed, efficiency and performance curves - Reciprocating pump: classification, working principles, indicator diagram, work saved by air vessels and performance curves - cavitations in pumps - rotary pumps: working principles of gear and vane pumps

TUTORIALS 15

TOTAL : 60

TEXT BOOKS

1. Streeter, V.L., and Wylie, E.B., “Fluid Mechanics”, McGraw-Hill, 1983.
2. Kumar, K.L., “Engineering Fluid Mechanics”, Eurasia Publishing House (P) Ltd., New Delhi (7^{th} edition), 1995.
3. Vasandani, V.P., “Hydraulic Machines - Theory and Design”, Khanna Publishers, 1992.

REFERENCES

1. Bansal, R.K., “Fluid Mechanics and Hydraulics Machines”, (5^{th} edition), Laxmi publications (P) Ltd., New Delhi, 1995.
2. White, F.M., “Fluid Mechanics”, Tata McGraw-Hill, 5^{th} Edition, New Delhi, 2003.
3. Ramamirtham, S., “Fluid Mechanics and Hydraulics and Fluid Machines”, Dhanpat Rai and Sons, Delhi, 1998.
4. Som, S.K., and Biswas, G., “Introduction to fluid mechanics and fluid machines”, Tata McGraw-Hill, 2^{nd} edition, 2004.

AT1202 AUTOMOTIVE PETROL ENGINES 3 0 0 100

OBJECTIVE

To learn the fundamental principles, construction and auxiliary systems of automotive petrol engines.

1. ENGINE CONSTRUCTION AND OPERATION 9

Constructional details of four stroke petrol engine, working principle, air standard Otto cycle, actual indicator diagram, two stroke engine construction and operation, comparison of four stroke and two stroke engine operation, firing order and its significance. Port Timing, Valve Timing of petrol engines.

2. SI ENGINE FUEL SYSTEM 9

Carburettor working principle, requirements of an automotive carburettor, starting, idling, acceleration and normal circuits of carburettors. Compensation, maximum power devices, constant choke and constant vacuum carburettors, fuel feed systems; mechanical and electrical fuel feed pumps. Petrol injection, MPFI.

3. IGNITION SYSTEM 9

Types and working of battery coil and magneto ignition systems, relative merits and demerits, centrifugal and vacuum advance mechanisms. Types and construction of spark plugs, electronic ignition systems.

4. COOLING AND LUBRICATION SYSTEM 9

Need for cooling system, Types of cooling system: air cooling system, liquid cooling system, forced circulation system, pressure cooling system. Lubrication system; mist, wet sump lubrication system, properties of lubricants.

5. COMBUSTION AND COMBUSTION CHAMBERS 9

Combustion in SI engine; stages of combustion, flame propagation, rate of pressure rise, abnormal combustion, detonation, effect of engine variables on knock, knock rating. Combustion chambers; different types, factors controlling combustion chamber design.

TOTAL : 45

TEXT BOOKS

1. Ganesan.V., “Internal Combustion Engines”, Tata McGraw-Hill Publishing Co., New Delhi, 2003.
2. M.L.Mathur and R.P.Sharma, “A course in Internal combustion engines”, Dhanpat Rai & Sons Publications, New Delhi, 2001.
3. K.K.Ramalingam, “Internal Combustion Engines”, Scitech Publications, Chennai, 2000.

REFERENCES

1. Heldt P.M., “High Speed Combustion Engines”, Oxford IBH Publishing Co., Calcutta, 1975.
2. Obert E.F., “Internal Combustion Engines Analysis and Practice”, International Text Books Co., Scrantron, Pennsylvania - 1988.
3. William H.Crouse, “Automotive Engines”, McGraw-Hill Publishers, 1985.
4. Ellinger H.E., “Automotive Engines”, Prentice Hall Publishers, 1992.
5. John B.Heywood, “Internal Combustion Engine Fundamental”, McGraw-Hill, 1988.
6. Pulkrabek “Engineering Fundamentals of the Internal Combustion Engines”, Practice Hall of India, 2003.

AT1203 FUELS AND LUBRICANTS 3 0 0 100

OBJECTIVES

To understand the properties of fuels and lubricants for the design and operation of the I.C engines.

1. MANUFACTURE OF FUELS AND LUBRICANTS 9

Structure of petroleum, refining process, fuels, thermal cracking, catalytic cracking, polymerization, alkylation, isomerisation, blending, products of refining process. Manufacture of lubricating oil base stocks, manufacture of finished automotive lubricants.

2. THEORY OF LUBRICATION 9

Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elasto hydrodynamic lubrication, boundary lubrication, bearing lubrication, functions of the lubrication system, introduction to design of a lubricating system.

3. LUBRICANTS 9

Specific requirements for automotive lubricants, oxidation deterioration and degradation of lubricants, additives and additive mechanism, synthetic lubricants, classification of lubricating oils, properties of lubricating oils, tests on lubricants. Grease, classification, properties, test used in grease.

4. PROPERTIES AND TESTING OF FUELS 9

Thermo-chemistry of fuels, properties and testing of fuels, relative density, calorific value, distillation, vapour pressure, flash point, spontaneous ignition temperature, viscosity, pour point, flammability, ignitability, diesel index, API gravity, aniline point etc.

5. COMBUSTION & FUEL RATING 9

SI Engines – flame propagation and mechanism of combustion, normal combustion, knocking, octane rating, fuel requirements. CI Engine, mechanism of combustion, diesel knock, cetane rating, fuel requirements. Additive - mechanism, requirements of an additive, petrol fuel additives and diesel fuel additives – specifications of fuels.

TOTAL : 45

TEXT BOOKS

1. Ganesan.V., “Internal Combustion Engineering”, Tata McGraw-Hill Publishing Co., New Delhi, 2003.
2. M.L. Mathur, R.P.Sharma “A course in internal combustion engines”, Dhanpatrai publication, 2003.
3. Obert.E.F “Internal Combustion Engineering and Air Pollution”, International book Co., 1988.

REFERENCES

1. Brame, J.S.S. and King, J.G. – Fuels – Solids, Liquids, Gaseous.
2. Francis, W – Fuels and Fuel Technology, Vol. I & II
3. Hobson, G.D. & Pohl.W- Modern Petroleum Technology
4. A.R.Lansdown – Lubrication – A practical guide to lubricant selection – Pergamon press – 1982.
5. Raymond.C.Gunther – Lubrication – Chilton Book Co., - 1971.

ME1204 FLUID MECHANICS AND MACHINERY LAB 0 0 3 100

(Common To Mechanical, Mechatronics, and Automobile)

LIST OF EXPERIMENTS

1. Determination of the Coefficient of discharge of given Orifice meter.
2. Determination of the Coefficient of discharge of given Venturi meter.
3. Calculation of the rate of flow using Roto meter.
4. Determination of friction factor of given set of pipes.
5. Conducting experiments and drawing the characteristic curves of centrifugal pump/ submergible pump
6. Conducting experiments and drawing the characteristic curves of reciprocating pump.
7. Conducting experiments and drawing the characteristic curves of Gear pump.
8. Conducting experiments and drawing the characteristic curves of Pelton wheel.
9. Conducting experiments and drawing the characteristics curves of Francis turbine.
10. Conducting experiments and drawing the characteristic curves of Kaplan turbine.

TOTAL : 45

LIST OF EQUIPMENT

(for the batch of 30 students)

1. Orifice meter setup
2. Venturi meter setup
3. Rotameter setup
4. Pipe Flow analysis setup
5. Centrifugal pump/submergible pump setup
6. Reciprocating pump setup
7. Gear pump setup
8. Pelton wheel setup
9. Francis turbine setup Kaplan turbine setup

AT1204 FUELS AND LUBRICANTS LAB 0 0 3 100

1. Temperature dependence of viscosity of lubrication oil by Redwood Viscometer.
2. Viscosity Index of lubricating oil by Saybolt Viscometer
3. Flash and Fire points of fuels.
4. Flash and Fire points of lubricants.
5. ASME distillation test of gasoline
6. Drop point of grease and mechanical penetration in grease.
7. Aniline distillation test of gasoline
8. Calorific value of liquid fuel.
9. Calorific value of gaseous fuel.
10. Reid vapour pressure test.

TOTAL : 45

LIST OF EQUIPMENTS

(for a batch of 30 students)

1.	Redwood Viscometer	- 1 No.
2.	Saybolt Viscometer	- 1 No.
3.	Flash and Fire point apparatus	- 1 No.
4.	ASME distillation test apparatus	- 1 No.
5.	Drop point and penetration apparatus for grease	- 1 No.
6.	Aniline distillation test apparatus	- 1 No.
7.	Bomb Calorimeter	- 1 No.
8.	Reid vapor pressure test apparatus	- 1 No.
9.	Gas Calorimeter	- 1 No.

AT1205 TWO AND THREE WHEELER LAB 0 0 3 100

1. Road performance test of a two wheeler using chassis dynamometer.
2. Performance test of a shock absorber.
3. Performance test on coil spring.
4. Two wheeler chain tension test.
5. Brake and Clutch adjustment as per specification.
6. Dismantling and assembling of two wheeler gear box and finding gear ratio.
7. Dismantling and assembling of three wheeler gear box and finding gear ratios.
8. Three wheeler brake and clutch play adjustment
9. Dismantling and assembling of three wheeler steering system.
10. Study of three wheeler chassis frame and power transmission system.

TOTAL : 45 PERIODS

LIST OF EQUIPMENTS

(for a batch of 30 students)

1.	Two wheeler chassis dynamometer	- 1 No.
2.	Shock absorber test rig	- 1 No.
3.	Two-wheeler gearbox	- 2 Nos.
4.	Two-wheeler clutch	- 2 Nos.
5.	Three-wheeler brake assembly	- 2 Nos.
6.	Three-wheeler steering assembly	- 2 Nos.
7.	Three-wheeler gear box	- 2 Nos.

GE1202 TECHNICAL SEMINAR 0 0 3 0

(Common to all Branches)

OBJECTIVE

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

MA1253 PROBABILITY AND STATISTICS 3 1 0 100

(Common to Mechanical, Production and Automobile)

OBJECTIVES

At the end of the course, the students would

1. Acquire skills in handling situations involving more than one random variable and functions of random variables.
2. Be introduced to the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems.
3. Be exposed to statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.

1. PROBABILITY AND RANDOM VARIABLE 9

Axioms of probability - Conditional probability - Total probability - Bayes theorem - Random variable - Probability mass function - Probability density functions - Properties- Moments - Moment generating functions and their properties.

2. STANDARD DISTRIBUTIONS 9

Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.

3. TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

4. TESTING OF HYPOTHESIS 9

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

5. DESIGN OF EXPERIMENTS 9

Analysis of variance – One way classification – CRD - Two – way classification – RBD - Latin square.

TUTORIALS 15

Note : Use of approved statistical table permitted in the examination.

TOTAL : 60

TEXT BOOKS

1. Ross. S., "A first Course in Probability", Fifth Edition, Pearson Education, Delhi 2002. (Chapters 2 to 8)
2. Johnson. R. A., "Miller & Freund's Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000. (Chapters 7, 8, 9, 12)

REFERENCES

1. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, "Probability and Statistics for Engineers and Scientists", Seventh Edition, Pearsons Education, Delhi, 2002.
2. Lipschutz. S and Schiller. J, "Schaum's outlines - Introduction to Probability and Statistics", McGraw-Hill, New Delhi, 1998.
3. Gupta, S.C, and Kapur, J.N., "Fundamentals of Mathematical Statistics", Sultan Chand, Ninth Edition, New Delhi, 1996.

AT1251 AUTOMOTIVE DIESEL ENGINES 3 0 0 100

OBJECTIVES

To study and understand the principles involved in design, construction of diesel engines and its components.

UNIT – I BASIC THEORY 9

Diesel engine construction and operation, two stroke and four stroke diesel dual cycle engines, diesel cycle, fuel-air and actual cycle analysis, diesel fuel, ignition quality, cetane number, laboratory tests for diesel fuels, standards and specifications.

UNIT – II FUEL INJECTION SYSTEM 9

Requirements, air and solid injection, functions of components, jerk and distributor type pumps common rail system, PTFI system pressure waves, injection lag, unit injector, mechanical and pneumatic governors, fuel injector, types of injection nozzle, nozzle tests, spray characteristics, injection timing, pump calibration.

UNIT – III AIR MOTION, COMBUSTION AND COMBUSTION CHAMBERS 9

Importance of air motion, swirl, squish and turbulence, swirl ratio, fuel air mixing, stages of combustion, delay period, factors affecting delay period, knock in CI engines. Combustion chamber: design requirements, direct and indirect injection combustion chambers, M type combustion chamber.

UNIT – IV SUPERCHARGING AND TURBOCHARGING 9

Necessity and limitations, types of supercharging and turbocharging, relative merits, matching of turbocharger, exhaust gas recirculation, charge cooling.

UNIT – V DIESEL ENGINE TESTING AND PERFORMANCE 9

Automotive and stationary diesel engine testing and related emission standards. Engine performance and emission characteristics, variables affecting engine performance and emission, methods to improve engine performance, heat balance, performance maps.

TOTAL : 45

TEXT BOOKS

1. Ganesan.V "Internal Combustion Engines", Tata McGraw-Hill Publishing Co., New Delhi, 2003.
2. M.L.Mathur and R. P.Sharma "A course in Internal Combustion Engines", Dhanpat Rai and Sons, 2002.

REFERENCES

1. Dr.K.K.Ramalingam "Internal Combustion Engines Theory and Practice", Scitech Publications (India) Pvt. Ltd., Chennai 600 017, 2002.
2. Heywood.J.B "Internal Combustion Engine Fundamentals", McGraw-Hill Book Co., 1988.
3. Heinz Heister "Advanced Engine Technology", SAE, 1995.
4. Pulkrabek "Engineering Fundamentals of the Internal Combustion Engines", Practice Hall of India 2003.

CE1262 STRENGTH OF MATERIALS 3 1 0 100

(Common to Mechanical, Production, Mechatronics, Automobile and Metallurgy)

OBJECTIVES

To gain knowledge of simple stresses, strains and deformation in components due to external loads.
To assess stresses and deformations through mathematical models of beams, twisting bars or combinations of both.
Effect of component dimensions and shape on stresses and deformations are to be understood.
The study would provide knowledge for use in the design courses

1. STRESS STRAIN AND DEFORMATION OF SOLIDS 9

Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial loads.

2. BEAMS - LOADS AND STRESSES **9**

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow

3. TORSION **9**

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads

4. BEAM DEFLECTION **9**

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope: Double integration method, Macaulay Method, and Moment-area Method –Columns – End conditions – Equivalent length of a column – Euler equation – Slenderness ratio – Rankine formula for columns

5. ANALYSIS OF STRESSES IN TWO DIMENSIONS **9**

Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr's circle for biaxial stresses – Maximum shear stress - Strain energy in bending and torsion.

TUTORIALS **15**

TOTAL : 60

TEXT BOOKS

1. Popov E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi, 1997
2. Beer F. P. and Johnston R," Mechanics of Materials", McGraw-Hill Book Co, Third Edition, 2002.

REFERENCES

1. Nash W.A, "Theory and problems in Strength of Materials", Schaum Outline Series, McGraw-Hill Book Co, New York, 1995
2. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 1981.
3. Ryder G.H, "Strength of Materials, Macmillan India Ltd"., Third Edition, 2002
4 Ray Hulse, Keith Sherwin & Jack Cain, "Solid Mechanics", Palgrave ANE Books, 2004.
5. Singh D.K "Mechanics of Solids" Pearson Education 2002.
6. Timoshenko S.P, "Elements of Strength of Materials", Tata McGraw-Hill, New Delhi, 1997.

AT1252 MECHANICS OF MACHINES **3 1 0 100**

(Common to Production and Automobile-IV Semester)

OBJECTIVE

To expose the students the different mechanisms, their method of working, Forces involved and consequent vibration during working

UNIT I MECHANISMS 9+3

Machine Structure – Kinematic link, pair and chain – Grueblers criteria – Constrained motion – Degrees of freedom - Slider crank and crank rocker mechanisms – Inversions – Applications – Kinematic analysis of simple mechanisms – Determination of velocity and acceleration.

UNIT II FRICTION 9+3

Frictuion in screw and nut – Pivot and collar – Thrust bearing – Plate and disc clutches – Belt (flat and V) and rope drives. Ratio of tensions – Effect of centrifugal and initial tension – Condition for maximum power transmission – Open and crossed belt drive.

UNIT III GEARING AND CAMS 9+3

Gear profile and geometry – Nomenclature of spur and helical gears – Gear trains: Simple, compound gear trains and epicylic gear trains - Determination of speed and torque- Cams – Types of cams – Design of profiles – Knife edged, flat faced and roller ended followers with and without offsets for various types of follower motions

UNIT IV BALANCING 9+3

Static and dynamic balancing – Single and several masses in different planes –Balancing of reciprocating masses- primary balancing and concepts of secondary balancing – Single and multi cylinder engines (Inline) – Balancing of radial V engine – direct and reverse crank method.

UNIT V VIBRATION 9+3

Free, forced and damped vibrations of single degree of freedom systems – Force transmitted to supports – Vibration isolation – Vibration absorption – Torsional vibration of shaft – Single and multi rotor systems – Geared shafts – Critical speed of shaft.

TOTAL : 60

TEXT BOOKS

1. Rattan.S.S, "Theory of Machines", Tata McGraw–Hill Publishing Co., New Delhi, 2004.
2. Ballaney.P.L, "Theory of Machines", Khanna Publishers, New Delhi, 2002.

REFERENCES

1. Rao,J.S and Dukkipati, R.V, "Mechanism and Machine Theory", Second Edition, Wiley Eastern Ltd., 1992.
2. Malhotra, D.R and Gupta, H.C., "The Theory of Machines", Satya Prakasam, Tech. India Publications, 1989.
3. Gosh, A. and Mallick, A.K., "Theory of Machines and Mechanisms", Affiliated East West Press, 1989.
4. Shigley, J.E. and Uicker, J.J., "Theory of Machines and Mechanisms", McGraw-Hill, 1980.
5. Burton Paul, "Kinematics and Dynamic of Planer Machinery", Prentice Hall, 1979.

MH1151 ENGINEERING MATERIALS AND METALLURGY 3 0 0 100

(Common to Mechanical, Production, Mechatronics-II Semester and Automobile)

OBJECTIVE

To Impart knowledge on the structure, properties, treatment, testing and applications of metals and on non-metallic materials so as to identity and select suitable materials for various engineering applications.

Review (Not for Exam):

Crystal structure – BCC, FCC and HCP structure – unit cell – crystallographic planes and directions, miller indices – crystal imperfections, point, line, planar and volume defects – Grain size, ASTM grain size number.

1. CONSITITUION OF ALLOYS AND PHASE DIAGRAMS 10

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, peritectic, eutectoid and peritectroid reactions, Iron – Iron carbide equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

2. HEAT TREATMENT 11

Definition – Full annealing, stress relief, recrystallisation and spheroidizing – normalising, hardening and Tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR - Hardenability, Jominy end quench test – Austempering, martempering – case hardening, carburising, nitriding, cyaniding, carbonitriding – Flame and Induction hardening.

3. FERROUS AND NON FERROUS METALS 9

Effect of alloying additions on steel (Mn, Si, Cr, Mo, V Ti & W) - stainless and tool steels – HSLA - maraging steels – Gray, White malleable, spheroidal -Graphite - alloy castirons.

Copper and Copper alloys – Brass, Bronze and Cupronickel – Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys.

4. NON-METALLIC MATERIALS 9

Polymers – types of polymer, commodity and engineering polymers – Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE Polymers – Urea and Phenol formal deliydes – Engineering Ceramics – Properties and applications of Al_2O_3, SiC, SiC, Si_3, N_4, PSZ and Sialon – Fibre and particulate reinforced composites.

5. MECHANICAL PROPERTIES AND TESTING 6

Mechanism of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell) Impact test Izod and charpy, fatigue and creeptest.

TOTAL : 45

TEXT BOOKS

1. Kenneth G.Budinski and Michael K.Budinski “Engineering Materials” Prentice-Hall of India Private Limited, 4th Indian Reprint 2002.

REFERENCES

1. William D Callsber “Material Science and Engineering”, John Wiley and Sons 1997.
2. Raghavan.V.Materials Science and Engineering, Prentice Hall of India Pvt. Ltd., 1999.
3. Sydney H.Avner “Introduction to Physical Metallurgy” McGraw-Hill Book Company, 1994.

EC1264 ELECTRONICS AND MICROPROCESSORS 3 0 0 100

(Common to Mechanical, Production, and Automobile)

OBJECTIVE

To enable the students to understand the fundamental concepts of Semi Conductors Transistors, Rectifiers, Digital Electronics and 8085 Microprocessors

1. SEMICONDUCTORS AND RECTIFIERS 9

Classification of solids based on energy band theory-Intrinsic semiconductors-Extrinsic semiconductors-P type and N type-PN junction-Zenor effect-Zenor diode characteristics-Half wave and full wave rectifiers -Voltage regulation.

2. TRANSISTORS AND AMPLIFIERS 12

Bipolar junction transistor- CB, CE, CC configuration and characteristics-Biasing circuits-Class A, B and C amplifiers- Field effect transistor-Configuration and characteristic of FET amplifier-SCR, Diac, Triac, UJT-Characteristics and simple applications-Switching transistors-Concept of feedback-Negative feedback-Application in temperature and motor speed control.

3. DIGITAL ELECTRONICS 9

Binary number system - AND, OR, NOT, NAND, NOR circuits-Boolean algebra- Exclusive OR gate - Flip flops-Half and full adders-Registers-Counters-A/D and D/A conversion.

4. 8085 MICROPROCESSOR 9

Block diagram of microcomputer-Architecture of 8085-Pin configuration-Instruction set-Addressing modes-Simple programs using arithmetic and logical operations.

5. INTERFACING AND APPLICATIONS OF MICROPROCESSOR 6

Basic interfacing concepts - Interfacing of Input and Output devices-Applications of microprocessor Temperature control, Stepper motor control, traffic light control.

TOTAL : 45

TEXT BOOKS

1. Milman and Halkias, Integrated Electronics, Tata McGraw-Hill publishers, 1995
2. Ramesh Goankar, Microprocessor Architecture, Programming and Applications with 8085, Wiley Eastern, 1998.

REFERENCES

1. Malvino and Leach, Digital Principles and Applications, Tata McGraw-Hill, 1996
2. Mehta V.K, Principles of Electronics, S. Chand and Company Ltd, 1994
3. Dougles V.Hall, Microprocessor and Interfacing, Programming and Hardware, Tata McGraw-Hill, 1999.
4. Salivahanan S, Suresh Kumar N, Vallavaraj A, “Electronic Devices and Circuits” First Edition, Tata McGraw-Hill, 1999.

EC1265 ELECTRONICS AND MICROPROCESSORS LAB 0 0 3 100

(Common to Mechanical, Production and Automobile)

LIST OF EXPERIMENTS

ELECTRONICS 30

1. VI Characteristics of PN Junction Diode
2. VI Characteristics of Zener Diode
3. Characteristics of CE Transistor
4. Characteristics of JFET
5. Characteristics of Uni Junction Transistor
6. RC or Wein Bridge Oscillator
7. Study of Logic Gates (Basic Gates)
8. Half Adder and Full Adder
9. Shift Registers and Counters

10. Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non - Inverting

MICROPROCESSOR **15**

1. Block Transfer
2. 8 bit Addition, Subtraction
3. Multiplication and Division
4. Maximum and Minimum of block of data
5. Sorting
6. Stepper Motor Interfacing

TOTAL : 45 PERIODS

LIST OF EQUIPMENT
(for a batch of 30 students)

1.	Voltmeters	5 No.
2.	Ammeters	5 No.
3.	PN Diode, BJT, JFET, Logic Gates, Shift Registers and Counters	1 set.
4.	Digital Logic Trainer Kits	1 No.
5.	Breadboards	1 No.
6.	Microprocessor Kits – 8085	5 No.
7.	D/A Converter Interface	1 No.
8.	Stepper Motor Interface	1 No.
9.	CRO	1 No.
10.	Wavefarm Generator	1 No.
11.	Multimeter	1 No.

AT1253 ENGINE TESTING LAB **0 0 3 100**

1. Study of hydraulic, electrical and eddy current dynamometers
2. Valve timing and port timing diagram
3. Performance test on two wheeler SI engine
4. Performance test on automotive multi-cylinder SI engine
5. Performance test on automotive multi-cylinder CI engine
6. Retardation test on I.C. Engines.
7. Heat balance test on automotive multi-cylinder SI engine
8. Heat balance test on automotive multi-cylinder CI engine
9. Morse test on multi-cylinder SI engine
10. Study of P-θ and P-V diagrams for IC engine with piezo-electric pick up, charge amplifier, angle encoder.

LIST OF EQUIPMENTS
(for a batch of 30 students)

1.	Hydraulic dynamometer	- 1 No.
2.	Eddy current dynamometer	- 1 No.
3.	Electrical dynamometer	- 1 No.
4.	Single cylinder two stroke cut section engine	- 1 No.
5.	Single cylinder four stroke cut section engine	- 1 No.
6.	Two-wheeler engine test rig.	- 1 No.
7.	Automotive multicylinder SI engine test rig with heat balance arrangement	- 1 No.
8.	Automotive multicylinder CI engine test rig with heat balance arrangement	- 1 No.

TOTAL : 45

AT1254 COMPUTER AIDED MACHINE DRAWING LAB 0 0 3 100

1. Drawing of automobile components such as piston, connecting rod, valves, manifold and crank shaft.
2. Assembly drawing of screw jack, piston – connecting rod assembly, valve assembly, clutch assembly and gear box assembly.

TOTAL : 45

LIST OF EQUIPMENTS

(for a batch of 30 students)

1.	Computer nodes	- 30 Nos.
2.	Software like AutoCAD or Pro-E	- 15 licenses

GE1251 TECHNICAL SEMINAR 0 0 3 0

(Common to all Branches)

OBJECTIVE

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

AT1301 AUTOMOTIVE ELECTRICAL AND ELECTRONICS 3 0 0 100

OBJECTIVES

In Automobiles the electrical systems are important. It has number of subsystems like starting system, Charging system etc. Also most of the control systems are being converted from mechanical to electronics. In this course the function and construction of various electrical components and electronic components and system are described.

UNIT – I BATTERIES AND ACCESSORIES 9

Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries, maintenance and charging. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator.

UNIT – II STARTING SYSTEM 9

Condition at starting, behavior of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, care and maintenances of starter motor, starter switches.

UNIT – III CHARGING SYSTEM 9

Generation of direct current, shunt generator characteristics, armature reaction, third brush regulation, cutout. Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments.

UNIT – IV FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS 9

Current trends in automotive electronic engine management system, electro magnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system.

UNIT – V SENSORS AND ACTIVATORS 9

Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors, relay.

TOTAL : 45

TEXT BOOKS

1. Young A.P. & Griffiths. L. "Automotive Electrical Equipment", ELBS & New Press- 1999.
2. William B.Riddens "Understanding Automotive Electronics", 5th edition - Butter worth Heinemann Woburn, 1998.

REFERENCES

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Crouse, W.H "Automobile Electrical Equipment", McGraw-Hill Book Co., Inc., New York, 3rd edition, 1986.
3. Judge A.W "Modern Electrical Equipment of Automobiles", Chapman & Hall, London, 1992.
4. Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi, 1975.
5. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
6. Ganesan.V. "Internal Combustion Engines", Tata McGraw-Hill Publishing Co., New Delhi, 2003.

AT1302 AUTOMOTIVE ENGINES COMPONENTS DESIGN 3 1 0 100

OBJECTIVE

To make the students understand the design concept and principles of various engine components. These concepts and principles are familiarized for design of components.

UNIT –I INTRODUCTION 9+3

Engineering materials and their physical properties applied to design, selection of materials, factor of safety, endurance limit, notch sensitivity, principles of design optimization, future trends, computer aided drafting.

UNIT–II LIMITS, FITS, TOLERANCES, SURFACE FINISH, SHAFTS AND SPRINGS 9+3

Definitions, types of tolerances and fits, design considerations for interference fits, surface finish, surface roughness, design of power transmission shafts, design of helical springs.

UNIT – III DESIGN OF CYLINDER AND PISTON 9+3

Choice of material for cylinder and piston, piston friction, piston slap, design of cylinder, piston, piston pin, piston rings, piston failures, lubrication of piston assembly.

UNIT – IV DESIGN OF CONNECTING ROD, CRANKSHAFT 9+3

Material for connecting rod, determining minimum length of connecting rod, small end and big end design, shank design, design of big end cap bolts, connecting rod failures, balancing of I.C. Engines, significance

of firing order, material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations.

UNIT – V DESIGN OF VALVES AND FLYWHEEL 9+3

Design aspects of intake and exhaust manifolds, inlet and Exhaust valves, valve springs, tappets, valve train. Materials and design of flywheel.

TOTAL : 60

TEXT BOOKS

1. R.K. Jain, "Machine Design", Khanna Publishers, New Delhi, 1997.
2. "Design Data Book", PSG College of Technology, Coimbatore, 2000.

REFERENCES

1. P.M.Heldt "High Speed Combustion Engines", Oxford-IBH Publishing Co., Calcutta, 1965.
2. A.Kolchin and V.Demidov, "Design of Automotive Engines", MIR Publishers, Moscow, 1984.
3. Sundararaja Murthy T.V "Machine Design", Khanna Publishers, New Delhi, 1991.

AT1303 AUTOMOTIVE CHASSIS 3 0 0 100

OBJECTIVE

All automobiles have important driveline and structural components. This subject deals with the functions and constructional details of all the chassis components.

UNIT – I INTRODUCTION 8

Types of chassis layout with reference to power plant locations and drives, vehicle frames, various types of frames, constructional details, materials, testing of vehicle frames, unitized frame body construction.

UNIT – II FRONT AXLE AND STEERING SYSTEM 10

Types of front axles, construction details, materials, front wheel geometry: castor, camber, king pin inclination, toe-in. conditions for true rolling motion of wheels during steering, steering geometry, Ackermann and Davis steering system, constructional details of steering linkages, different types of steering gear boxes, steering linkages and layouts, turning radius, wheel wobble, power assisted steering, steering of crawler tractors.

UNIT – III DRIVE LINE 10

Effect of driving thrust and torque reactions, Hotchkiss drive, torque tube drive and radius rods, propeller shaft, universal joints, front wheel drive, different types of final drive, double reduction and twin speed final drives, differential principle, construction details of differential unit, non-slip differential, differential locks, differential housings, construction of rear axles, types of loads acting on rear axles, fully floating, three quarter floating and semi floating rear axles, rear axle housing, construction of different types of axle housings, multi axle vehicles.

UNIT – IV SUSPENSION SYSTEM 8

Need of suspension system, types of suspension, suspension springs, constructional details and characteristics of leaf, coil and torsion bar springs, independent suspension, rubber suspension, pneumatic suspension, shock absorbers.

UNIT – V BRAKING SYSTEM 9

Classification of brakes, drum brakes and disc brakes, constructional details, theory of braking, concept of dual brake system, parking brake, material, hydraulic system, vacuum assisted system, air brake system, antilock braking, retarded engine brakes, eddy retarders.

TOTAL : 45

TEXT BOOKS

1. Heldt.P.M.- "Automotive Chassis"- Chilton Co., New York- 1990
2. K.K.Ramalingam - "Automobile Engineering" – Scitech Publication, Chennai - 2001.

REFERENCES

1. Steed W - "Mechanics of Road Vehicles"- Illiffe Books Ltd., London- 1960
2. Newton Steeds and Garrot- "Motor Vehicles"- Butterworths, London- 2000.
3. Judge A.W- "Mechanism of the Car"- Chapman and Halls Ltd., London- 1986
4. Giles.J.G- "Steering, Suspension and tyres"- Iiiffe Book Co., London- 1988.
5. Crouse W.H- "Automotive Chassis and Body"- McGraw-Hill, New York- 1971.

ME1304 ENGINEERING METROLOGY AND MEASUREMENTS 3 0 0 100

(Common to Mechanical and Automobile)

OBJECTIVE

To understand the principles of metrology and measurements, methods of measurement and its application in manufacturing industries.

1. CONCEPT OF MEASUREMENT 9

General concept – Generalised measurement system-Units and standards-measuring instruments-sensitivity, readability, range of accuracy, precision-static and dynamic response-repeatability-systematic and random errors-correction, calibration, interchangeability.

2. LINEAR AND ANGULAR MEASUREMENT 9

Definition of metrology-Linear measuring instruments: Vernier, micrometer, interval measurement, Slip gauges and classification, interferometery, optical flats, limit gauges- Comparators: Mechanical, pneumatic and electrical types, applications.
Angular measurements:-Sine bar, optical bevel protractor, angle Decker – Taper measurements, coordinate measuring machine (CMM).

3. FORM MEASUREMENT 9

Measurement of screw threads-Thread gauges, floating carriage micrometer-measurement of gears-tooth thickness-constant chord and base tangent method-Gleason gear testing machine – radius measurements-surface finish, straightness, flatness and roundness measurements.

4. LASER AND ADVANCES IN METROLOGY 9

Precision instruments based on laser-Principles- laser interferometer-application in linear, angular measurements and machine tool metrology
Coordinate measuring machine (CMM)- Constructional features – types, applications – digital devices-computer aided inspection.

5. MEASUREMENT OF POWER, FLOW AND TEMPERATURE RELATED PROPERTIES 9

Force, torque, power :-mechanical, pneumatic, hydraulic and electrical type-Flow measurement**:** Venturi, orifice, rotameter, pitot tube –Temperature: bimetallic strip, pressure thermometers, thermocouples, electrical resistance thermister.

TOTAL : 45

TEXT BOOKS

1. Jain R.K., Engineering Metrology, Khanna Publishers, 1994
2. Alan S. Morris, The Essence of Measurement, Prentice Hall of India, 1997

REFERENCES

1. Gupta S.C, Engineering Metrology, Dhanpat rai Publications, 1984
2. Jayal A.K, Instrumentation and Mechanical Measurements, Galgotia Publications 2000
3. Beckwith T.G, and N. Lewis Buck, Mechanical Measurements, Addison Wesley, 1991
4. Donald D Eckman, Industrial Instrumentation, Wiley Eastern, 1985.

AT1304 VEHICLE DYNAMICS 3 0 0 100

OBJECTIVE

When the vehicle is at dynamic condition more vibration will be produced. It is essential to study about vibrations and how to reduce the vibration under different loads, speed and road conditions in order to improve the comfort for the passengers and life of the various components of the vehicle. In this subject these aspects have been given.

UNIT – I INTRODUCTION 9

Single degree of freedom, two degree of freedom, free, forced and damped vibrations modeling and simulation studies, model of an automobile, magnification factor, transmissibility, vibration absorber.

UNIT – II MULTI DEGREE FREEDOM SYSTEMS 8

Closed and coupled far system, orthogonality of mode shapes, modal analysis.

UNIT – III STABILITY OF VEHICLES 9

Load distribution, stability on a curved track slope and a banked road, calculation of tractive effort and reactions for different drives.

UNIT – IV SUSPENSION TYRES AND VEHICLES HANDLING 10

Requirements, sprung mass frequency, wheel hop, wheel wobble, wheel shimmy, choice of suspension spring rate, calculation of effective spring rate, vehicle suspension in fore and aft, roll axis and vehicle under the action of side forces, tyre, dynamics, ride characteristics power consumed by a tyre. Oversteer, under steer, steady state cornering, effect of braking, driving torques on steering, effect of camber, transient effects in cornering.

UNIT – V NUMERICAL METHODS 9

Approximate methods for determining fundamental frequency, Dunkerleys lower bound, Rayleighs upper bound, Holzer method for closed coupled system and branched system.

TOTAL : 45

TEXT BOOKS

1. Giri N.K – Automotive Mechanics, Khanna Publishers, 2002.
2. Rao J.S and Gupta. K “Theory and Practice of Mechanical Vibrations”, Wiley Eastern Ltd., New Delhi -2, 2002.

REFERENCES

1. Heldt.P.M -”Automotive Chassis”- Chilton Co., New York- 1992
2. Ellis.J.R - “Vehicle Dynamics”- Business Books Ltd., London- 1991
3. Giles.J.G.Steering - “Suspension and Tyres”, Illiffe Books Ltd., London- 1998
4. Ham B, Pacejka - Tyre and Vehicle Dynamics - SAE Publication - 2002.
5. Gillespie T.D, “Fundamentals of Vehicle Dynamics”, SAE USA 1992.

AT1305 AUTO ELECTRICAL AND ELECTRONICS LABORATORY 0 0 3 100

a. **Electrical Laboratory**

1. Testing of batteries and battery maintenance
2. Testing of starting motors and generators
3. Testing of regulators and cut – outs
4. Diagnosis of ignition system faults
5. Study of Automobile electrical wiring

b. **Electronics Laboratory**

6. Study of rectifiers and filters
7. Study of logic gates, adder and flip-flops
8. Study of SCR and IC timer
9. Interfacing A/D converter and simple data acquisition
10. Micro controller programming and interfacing

TOTAL : 45 PERIODS

LIST OF EQUIPMENTS
(for a batch of 30 students)

i.	Battery, hydrometer, voltage tester	- 1 No. each
ii.	Starter motor, regulator, cut-out	- 1 No. each
iii.	Distributor, ignition coil, spark plug	- 1 No. each
iv.	Auto electrical wiring system	- 1 No.
v.	Rectifiers, filters	- 1 No. each
vi.	Amplifier	- 1 No.
vii.	IC timer	- 1 No.
viii.	Data logger	-1 No.

AT1306 AUTOMOTIVE CHASSIS COMPONENTS LAB 0 0 3 100

LIST OF EXPERIMENTS

Study and measurement of the following chassis frames:

1. Heavy duty vehicle frame (Leyland, Tata etc)
2. Light duty vehicle frame (Ambassador, Maruti van etc)

Study, dismantling and assembling of

3. Front Axle
4. Rear Axle
5. Differential
6. Steering systems along with any two types of steering gear box
7. Braking systems – hydraulic servo vacuum, compressed air power brakes.
8. Leaf spring, coil spring, torsion bar spring, Hydraulic shock absorber

Study, Dismantling and Assembling of

9. Clutch assembly of different types
10. Gear Box
11. Transfer case

TOTAL : 45

LIST OF EQUIPMENTS

(for a batch of 30 students)

1. Heavy duty vehicle chassis frame (Leyland or Tata) - 1 No.
2. Light duty vehicle chassis frame - 1 No.
3. Front axle - 1 No.
4. Rear axle - 1 No.
5. Steering system - 1 No.
6. Steering gear box (Rack and pinion, recirculating ball type) - 1 No. each
7. Hydraulic brake system - 1 No.
8. Air brake system - 1 No.
9. Leaf spring, coil spring, torsion bar - 1 No. each
10. Hydraulic shock absorber - 1 No.
11. Diaphragm clutch assembly - 1 No.
12. Gear box (light duty, heavy duty) - 1 No. each
13. Transfer case - 1 No.

AT1307 COMPUTER AIDED ENGINE DESIGN LAB 0 0 3 100

1. Design and drawing of piston.
2. Piston pin and piston rings and drawing of these components.
3. Design of connecting rod small end and big end, shank design, design of big end cap, bolts and drawing of the connecting rod assembly
4. Design of crankshaft, balancing weight calculations.
5. Development of short and long crank arms, front end and rear end details, drawing of the crankshaft assembly.
6. Design and drawing of flywheel.
7. Ring gear design, drawing of the flywheel including the development of ring gear teeth.
8. Design and drawing of the inlet and exhaust valves.
9. Design of cam and camshaft, cam profile generation, drawing of cam and camshaft.
10. Design of combustion chamber.

TOTAL : 45

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

1. Computer nodes - 30 Nos.
2. Software like AutoCAD or Pro-E - 15 licenses

GE1352 COMMUNICATION SKILLS LABORATORY 0 0 4 100

(Common to all Branches)

Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students' overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES:

- To equip students of engineering and technology with effective speaking and listening skills in English
- To help them develop their soft skills and people skills, which will make the transition from college to workplace smoother and help them to excel in their jobs.
- To enhance students' performance at Placement Interviews, Group Discussions and other recruitment exercises.

I. PC based session (weightage-40%) 24 periods

A. English Language Lab (18 Periods)

1. Listening Comprehension (6)

Listening and typing – Listening and sequencing of sentences – Filling in the blanks – Listening and answering the questions

2. Reading Comprehension and Vocabulary (6)

Filling in the blanks - Cloze Exercises – Vocabulary building – Reading and answering questions.

3. Speaking: (6)

Phonetics: Intonation – Ear Training – Correct Pronunciation – Sound recognition exercises -Common Errors in English

Conversations: Face to Face Conversation - Telephone conversation – Role play activities (Students take on roles and engage in conversation)

B. Career Lab (6 periods)

(Samples are available to learn and practice in the class room session)

1. Resume / Report Preparation / Letter Writing (1)

Structuring the resume / report – Letter writing / E-mail communication – Samples

2. Presentation Skills (1)

Elements of an effective presentation – Structure of a presentation – Presentation tools – Voice Modulation – Audience analysis – Body Language – Video Samples

3. Soft Skills (2)

Time Management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity – Stress Management & Poise – Video Samples

4. Group Discussion (1)

Why is GD part of selection process? – Structure of a GD – Moderator-led and other GDs – Strategies in GD – Team work – Body Language – Mock GD – Video Samples

5. Interview Skills (1)

Kinds of Interviews – Required Key Skills – Corporate culture – Mock Interviews – Video Samples

II. Class Room Session (weightage-60%) 24 periods

1. **Resume / Report Preparation /Letter writing :** Students prepare their own resume and report. (2)
2. **Presentation Skills:** Students make presentations on given topics. (8)
3. **Group Discussion:** Students participate in group discussions. (6)
4. **Interview Skills:** Students participate in Mock interviews. (8)

Note: Classroom sessions are practice sessions.

EQUIPMENTS / SOFTWARE REQUIRED FOR COMMUNICATION SKILLS LABORATORY

I. PC based session: (For 60 user network environment)

1. 60 P-IV PCs and one server

Server

- **PIV system**
- **1 GB RAM / 40 GB HDD**
- **OS: Win 2000 server**
- **Audio card with headphones (with mike)**

- **JRE 1.3**

Client Systems

- **PIII or above**
- **256 or 512 MB RAM /40 GB HDD**
- **OS: Win 2000**
- **Audio card with headphones (with mike)**
- **JRE 1.3**

2. Interactive Teacher Control Software:

3. English Language Lab Software:

4. Career Lab software:

II. Class Room session:

Essential:

a) Handicam Video Camera (with video lights and mic input)

b) Television - 29”

c) Collar mike (1) and cordless mikes (3) with audio mixer

d) DVD Recorder / Player

Desirable:

LCD Projector with MP3 /CD /DVD provision for audio / video facility

References:

Books:

1. Meenakshi Raman and Sangeetha Sharma, *Technical Communication – Principles and Practice,* Oxford University Press, New Delhi (2004)
2. Barker. A - *Improve your communication skills* – Kogan Page India Pvt Ltd, New Delhi (2006)
3. Adrian Doff and Christopher Jones – *Language in Use (Upper-Intermediate)*, Cambridge University Press, First South Asian Edition (2004)
4. John Seely, *The Oxford Guide to writing and speaking*, Oxford University Press, New Delhi (2004)

Guidelines for the course

COMMUNICATION SKILLS LABORATORY 0 0 4 100

1. A batch of 60 / 120 students is divided into two groups – one group for the PC- based session and the other group for the Class room session.

2. The English Lab (2 Periods) will be handled by a faculty member of the **English Department**. The Career Lab (2 Periods) may be handled by any competent teacher, **not necessarily from English Department**

3. **Record Notebook:** At the end of each session of English Lab, review exercises are given for the students to answer and the computer evaluated sheets are to be compiled as record notebook. Similar exercises for the career lab are to be compiled in the record notebook.

4. **Internal Assessment:** The 15 marks (the other 5 marks for attendance) allotted for the internal assessment will be based on the record notebook compiled by the candidate. 10 marks may be allotted for English Lab component and 5 marks for the Career Lab component.

5. **End semester Examination:** The end-semester examination carries 40% weightage for English Lab and 60% weightage for Career Lab.

   Each candidate will have separate sets of questions assigned by the teacher using the teacher-console enabling PC–based evaluation for the 40% of marks allotted.

   The Career Lab component will be evaluated for a maximum of 60% by a local examiner & an external examiner drafted from other Institutions, similar to any other lab examination conducted by Anna University.

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MG1351 PRINCIPLES OF MANAGEMENT 3 0 0 100

(Common to all Branches)

OBJECTIVE

Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the

managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management.

1. HISTORICAL DEVELOPMENT 9

Definition of Management – Science or Art – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organisation.

2. PLANNING 9

Nature & Purpose – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Strategies, Policies & Planning Premises- Forecasting – Decision-making.

3. ORGANISING 9

Nature and Purpose – Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process - Techniques – HRD – Managerial Effectiveness.

4. DIRECTING 9

Scope – Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication – Process of Communication – Barriers and Breakdown – Effective Communication – Electronic media in Communication.

5. CONTROLLING 9

System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology in Controlling – Use of computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.

TOTAL : 45

TEXT BOOKS

1. Harold Kooritz & Heinz Weihrich “Essentials of Management”, Tata McGraw-Hill, 1998
2. Joseph L Massie “Essentials of Management”, Prentice Hall of India, (Pearson) Fourth Edition, 2003.

REFERENCES

1 Tripathy PC And Reddy PN, “ Principles of Management”, Tata McGraw-Hill, 1999.
2. Decenzo David, Robbin Stephen A, “Personnel and Human Reasons Management”, Prentice Hall of India, 1996
3. JAF Stomer, Freeman R. E and Daniel R Gilbert Management, Pearson Education, Sixth Edition, 2004.
4. Fraidoon Mazda, “Engineering Management”, Addison Wesley, 2000.

AT1351 AUTOMOTIVE CHASSIS DESIGN 3 1 0 100

OBJECTIVES

At the end of the course the student will be able to understand the fundamental principles involved in design of components of automotive chassis, the complete design exercise and arrive at important dimensions of chassis components and appreciate the use of modern techniques like CAD.

UNIT – I CLUTCH DESIGN CALCULATION 9+3

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

UNIT – II GEAR BOX 9+3

Performance of vehicle, total resistance to motion, traction and tractive effort, acceleration, calculation of gear ratio, design of three speed gear box, design of four speed gear boxes.

UNIT – III VEHICLE FRAME AND SUSPENSION 9+3

Study of loads, moments and stresses on frame members, computer aided design of frame for passenger and commercial vehicles, computer aided design of leaf springs, coil springs and torsion bar springs.

UNIT – IV FRONT AXLE AND STEERING SYSTEMS 9+3

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

UNIT – V FINAL DRIVE AND REAR AXLE 9+3

Design of propeller shaft, design details of final drive gearing, design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings.

TOTAL : 60

TEXT BOOKS

1. Giri.N.K- "Automobile Mechanics"- Khanna Publisher, New Delhi- 2002

REFERENCES

1. Heldt.P.M - "Automotive Chassis"- Chilton Co., New York- 1992
2. Steeds. W -"Mechanics of Road Vehicles"- Illiffe Books Ltd., London- 1990
3. Giles.K.G - Steering, Suspension and tyres"- Illiffe Books Ltd., London - 1988
4. Newton Steeds & Garret- "Motor Vehicle"- Illiffe Books Ltd., London – 2000
5. Heldt.P.M- "Torque converter" - Chilton Book Co., New York - 1982
6. Dean Averns - "Automobile Chassis Design"- Illiffe Books Ltd – 1992

AT1352 COMPUTER AIDED VEHICLE DESIGN CHARACTERISTICS 3 1 0 100

OBJECTIVE

To make the students understand the basic principles involved in the computer aided vehicle design and apply the same for the optimum designing of the vehicle components.

UNIT – I INTRODUCTION 9+3

Study and selection of vehicle specifications - Choice of Cycle, fuel, speed, cylinder arrangement, number of cylinders, method of cooling, material, design variables and operating variables affecting performance and emission.

UNIT – II PERFORMANCE CURVES 9+3

Residence, Power and torque curve, Driving force against vehicle speed – Acceleration and gradability in different gears for a typical car or truck plotted from specifications.

UNIT – III RESISTENCE TO VEHICLE MOTION 9+3

Calculation and plotting the curves of air, rolling and gradient resistences, driving force – Engine power, speed, rear axle ratio, Torque and mechanical efficiency at different vehicle speeds.

UNIT – IV ENGINE DESIGN 9+3

Pressure volume diagram, frictional mean effective pressure, engine capacity, calculation of bore and stroke length, velocity and acceleration, gas force, inertia and resultant force at various crank angles – Side thrust on cylinder walls.

UNIT – V GEAR RATIOS 9+3

Determination of Gear Ratios, Acceleration and gradability - typical problems.

TOTAL : 60

TEXT BOOKS

1. Giri. N.K. "Automobile Mechanics" Khanna Publishers – New Delhi – 2002.
2. Heldt P.M "High Speed Combustion Engine" Oxford & IBH Publishing Co., Calcutta 1989.

REFERENCES

1. Lichty "IC Engines", Kogakusha Co., Ltd. Tokyo, 1991.

AT1353 AUTOMOTIVE POLLUTION AND CONTROL 3 0 0 100

OBJECTIVES

To make the students to realize the impact of automobile emissions on the environment and expose student to factors affecting the formation and control of automobile pollutants.

UNIT – I INTRODUCTION 9

Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution.

UNIT – II POLLUTANT FORMATION IN SI ENGINES 9

Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two stroke SI engines, NOx formation in SI engines, effects of design and operating variables on emission formation, control of evaporative emission. Two stroke engine pollution.

UNIT – III POLLUTANT FORMATION IN CI ENGINES 9

Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions. Nox formation and control. Noise pollution from automobiles, measurement and standards.

UNIT – IV CONTROL OF EMISSIONS FROM SI AND CI ENGINES 9

Design of engine, optimum selection of operating variables for control of emissions, EGR, Thermal reactors, secondary air injection, catalytic converters, catalysts, fuel modifications, fuel cells, Two stroke engine pollution control.

UNIT – V MEASUREMENT TECHNIQUES EMISSION STANDARDS AND TEST PROCEDURE 9

NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles – USA, Japan, Euro and India. Test procedures – ECE, FTP Tests. SHED Test – chassis dynamometers, dilution tunnels.

TOTAL : 45

TEXT BOOKS

1. Paul Degobert – Automobiles and Pollution – SAE International ISBN-1-56091-563-3, 1991.
2. Ganesan, V- "Internal Combustion Engines"- Tata McGraw-Hill Co.- 2003.

REFERENCES

1. SAE Transactions- "Vehicle Emission"- 1982 (3 volumes).
2. Obert.E.F.- "Internal Combustion Engines"- 1988
3. Marco Nute- " Emissions from two stroke engines, SAE Publication – 1998

AT1354 AUTOMOTIVE TRANSMISSION 3 0 0 100

OBJECTIVES

To impart basic knowledge to students with respect to transmission system of automobiles and impart knowledge that will enable the student to understand the latest developments in the field.

UNIT – I **10**

Gear Box: method of calculation of gear ratios for vehicles, performance characteristics in different speeds, different types of gear boxes, speed synchronizing devices, gear materials, lubrication.
Fluid coupling: advantages and limitations, construction details, torque capacity, slip in fluid coupling, performance characteristics. Means used to reduce drag torque in fluid coupling.

UNIT – II **7**

All spur and internal gear type planetary gearboxes, Ford T-model, Cotal and Wilson Gear box, determination of gear ratios, automatic overdrives.

UNIT – III **8**

Principal of torque conversion, single, multi stage and polyphase torque converters, performance characteristics, constructional and operational details of typical hydraulic transmission drives (e.g.) Leyland, White Hydro torque drives.

UNIT – IV **10**

Automatic transmission: relative merits and demerits when compared to conventional transmission, automatic control of gears, study of typical automatic transmissions, Ford and Chevrolet drive, automatic control of gear box.

UNIT – V **10**

Hydrostatic drives: advantages and disadvantages, principles of hydrostatic drive systems, construction and working of typical hydrostatic drives, Janney Hydrostatic drive.

Electrical drives: advantages and limitations, principles of Ward Leonard system of control Modern electric drive for buses and performance characteristics.

TOTAL : 45

TEXT BOOKS

1. Heldt P.M - Torque converters- Chilton Book Co.-1992
2. Newton and Steeds - Motor Vehicle- Illiffee Publisher- 2000

REFERENCE

1. Design Practices, passenger Car Automotive Transmissions- SAE Hand book- 1994.

AT1355 RE-CONDITIONING LABORATORY 0 0 3 100

1. Cylinder reboring – checking the cylinder bore.
2. Setting the tool and reboring.
3. Valve grinding, valve lapping.
4. Setting the valve angle and checking for valve leakage
5. Calibration of fuel injection pump
6. Wheel alignment – testing of camber, caster.
7. Testing kingpin inclination, toe-in and toe-out.
8. Chassis alignment testing
9. Brake adjustment
10. Brake bleeding.

TOTAL : 45

LIST OF EQUIPMENTS

(for a batch of 30 students)

1. Cylinder reboring machine - 1 No.
2. Valve grinding machine - 1 No.
3. Valve lapping machine - 1 No.
4. Fuel injection calibration test bench with nozzle tester - 1 No.
5. Wheel alignment apparatus - 1 No.

AT1356 AUTOMOTIVE ENGINE COMPONENTS LAB 0 0 3 100

1. Dismantling of 4 cylinder petrol engine.
2. Assembling of 4 cylinder petrol engine.
3. Dismantling of 6 cylinder diesel engine.
4. Assembling of 6 cylinder diesel engine.
5. Study of oil filter, fuel filter, fuel injection system, carburetor, MPFI
6. Study of ignition system components – coil, magneto and electronic ignition systems.
7. Study of engine cooling system components
8. Study of engine lubrication system components
9. Ovality and taper measurement of cylinder bore and comparison with standard specifications
10. Ovality and taper measurement of engine crank shaft and comparison with standard specification

TOTAL : 45

LIST OF EQUIPMENTS

(for a batch of 30 students)

1. Four cylinder petrol engine -1No.
2. Six cylinder diesel engine -1No.
3. Fuel filter, fuel injection pump, injector, carburetor, MPFI component -1No.each
4. Ignition coil, magneto, electronic ignition system components -1No.each
5. Water pump, thermostat, radiator, temperature gauge -1No.each
6. Lub oil pump, pressure relief valve, filter, oil pressure gauge -1No.each
7. Internal micrometer, external micrometer, dial gauges -1No.each

AT1357 COMPUTER AIDED CHASSIS DESIGN LAB 0 0 3 100

CLUTCH

1. Complete design of clutch components.
2. Assembly drawing of clutch using drafting software.

GEAR BOX

3. Gear train calculations.
4. Layout of gear box.
5. Calculation of bearing loads
6. Selection of bearings.
7. Assembly drawing of gear box using drafting software.

TOTAL : 45 PERIODS

LIST OF EQUIPMENTS
(for a batch of 30 students)

1.	Computer nodes	-	30 Nos.
2.	Software like AutoCAD or Pro-E	-	15 licenses

GE1302 TECHNICAL SEMINAR 0 0 3 0

(Common to all Branches)

OBJECTIVE

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

GE1351 PRESENTATION SKILLS AND TECHNICAL SEMINAR 0 0 3 0

(Common to all Branches)

OBJECTIVE

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

MG1401 TOTAL QUALITY MANAGEMENT 3 0 0 100

(Common to all branches)

OBJECTIVE

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.

- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

1. INTRODUCTION 9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES 9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

3. STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS **9**

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

5. QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

TOTAL : 45

TEXT BOOK

1. Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCES

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0- 324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers Wood Head Publishers, 1991.

MH1003 FINITE ELEMENT ANALYSIS 3 1 0 100

(Common to Mechanical, Automobile, Mechatronics (Elective) and Metallurgical Engineering (Elective))

OBJECTIVES

- To understand the principles involved in discretization and finite element approach
- To learn to form stiffness matrices and force vectors for simple elements

1. INTRODUCTION **9**

Historical background – Matrix approach – Application to the continuum – Discretisation – Matrix algebra – Gaussian elimination – Governing equations for continuum – Classical Techniques in FEM – Weighted residual method – Ritz method

2. ONE DIMENSIONAL PROBLEMS **9**

Finite element modeling – Coordinates and shape functions- Potential energy approach – Galarkin approach – Assembly of stiffness matrix and load vector – Finite element equations – Quadratic shape functions – Applications to plane trusses

3. TWO DIMENSIONAL CONTINUUM **9**

Introduction – Finite element modelling – Scalar valued problem – Poisson equation –Laplace equation – Triangular elements – Element stiffness matrix – Force vector – Galarkin approach - Stress calculation – Temperature effects

4. AXISYMMETRIC CONTINUUM 9

Axisymmetric formulation – Element stiffness matrix and force vector – Galarkin approach – Body forces and temperature effects – Stress calculations – Boundary conditions – Applications to cylinders under internal or external pressures – Rotating discs

5. ISOPARAMETRIC ELEMENTS FOR TWO DIMENSIONAL CONTINUUM 9

The four node quadrilateral – Shape functions – Element stiffness matrix and force vector – Numerical integration - Stiffness integration – Stress calculations – Four node quadrilateral for axisymmetric problems.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. Chandrupatla T.R., and Belegundu A.D., Introduction to Finite Elements in Engineering, Pearson Education 2002, 3rd Edition.
2. David V Hutton "Fundamentals of Finite Element Analysis"2004. McGraw-Hill Int. Ed.

REFERENCES

1. Rao S.S., The Finite Element Method in Engineering, Pergammon Press, 1989
2. Logan D.L., A First course in the Finite Element Method, Third Edition, Thomson Learning, 2002.
3. Robert D.Cook., David.S, Malkucs Michael E Plesha , "Concepts and Applications of Finite Element Analysis", 2003.
4. Ed. Wiley.Reddy J.N., An Introduction to Finite Element Method, McGraw-Hill International Student Edition, 1985.
5. O.C.Zienkiewicz and R.L.Taylor, The Finite Element Methods, Vol.1. The basic formulation and linear problems, Vol.1, Butterworth Heineman, 5th Edition, 2000.

AT1401 VEHICLE MAINTENANCE 3 0 0 100

OBJECTIVE

At the end of the course, the students will be able to have a complete knowledge of the vehicle maintenance procedures and acquire skills in handling situations where the vehicle is likely to fail.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES 9

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists. Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE – REPAIR AND OVERHAULING 9

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE - REPAIR AND OVERHAULING 9

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system. Maintenance servicing of suspension systems. Brake systems, types and servicing techniques. Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE - SERVICING AND REPAIRS 9

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems. Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VECHICLE BODY 9

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply. Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives. Lubrication maintenance, lubricating oil changing, greasing of parts. Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TOTAL : 45

TEXT BOOK

1. John Doke "Fleet Management", McGraw-Hill Co. 1984.

REFERENCES

1. James D Halderman - Advanced Engine Performance Diagnosis – PHI - 1998.
2. Service Manuals from Different Vehicle Manufacturers.

AT1402 VEHICLE BODY ENGINEERING 3 1 0 100

OBJECTIVE

At the end of the course, the students will be able to have a sound knowledge for the design of the vehicles body to give maximum comfort for the passengers and exposed to the methods of stream lining the vehicles body to minimize drag.

UNIT- I CAR BODY DETAILS 8

Types: saloon, convertibles, limousine, estate car, racing and sports car. Visibility: regulations, driver's visibility, tests for visibility, methods of improving visibility and space in cars. Safety: safety design, safety equipments for cars. Car body construction; design criteria, prototype making, initial tests, crash tests on full scale model, Dummies and Instrumentation

UNIT-II VEHICLE AERODYNAMICS 10

Objectives. Vehicle drag and types; various types of forces and moments, effects of forces and moments, side wind effects on forces and moments, Various body optimization techniques for minimum drag, wind tunnel testing: flow visualization techniques, scale model testing, component balance to measure forces and moments.

UNIT- III BUS BODY DETAILS 8

Types: mini bus, single decker, double-decker, two level and articulated bus. Bus body layout; floor height, engine location, entrance and exit location, seating dimensions. Constructional details: frame construction, double skin construction, types of metal sections used, Regulations, Conventional and integral type construction.

UNIT-IV COMMERCIAL VEHICLE DETAILS 9

Types of body; flat platform, drop side, fixed side, tipper body, tanker body, Light commercial vehicle body types. Dimensions of driver's seat relation to controls. Drivers cab design.

UNIT –V BODY MATERIALS, TRIM AND MECHANISMS 10

Steel sheet, timber, plastic, GRP, properties of materials; Corrosion, anticorrosion methods. Selection of paint and painting process. Body trim items. Body mechanisms.

TOTAL : 45

TEXT BOOK

1. J.Powloski - "Vehicle Body Engineering" - Business Books Ltd, London -1989

REFERENCES

1. Giles.J.C. - "Body construction and design" - Liiffe Books Butterworth & Co. - 1971.
2. John Fenton - "Vehicle Body layout and analysis" - Mechanical Engg. Publication Ltd., London – 1982.
3. Braithwaite.J.B. - "Vehicle Body building and drawing" - Heinemann Educational Books Ltd., London – 1977.

AT1403 VEHICLE MAINTENANCE LABORATORY 0 0 3 100

1. Study and layout of an automobile repair, service and maintenance shop.
2. Study and preparation of different statements/records required for the repair and maintenance works.
3. Study and preparation of the list of different types of tools and instruments required
4. Minor and major tune up of gasoline and diesel engines
5. Fault diagnosis in electrical ignition system, gasoline fuel system, diesel fuel system and rectification
6. Study of the electrical systems such as head lights, side or parking lights, trafficator lights, electric horn system, windscreen wiper system, starter system and charging system.
7. Study and checking of wheel alignment
8. Simple tinkering, soldering works of body panels, study of door lock and window glass rising mechanisms.
9. Practice the following:
   i) Adjustment of pedal play in clutch, brake, hand brake lever and steering wheel play
   ii) Air bleeding from hydraulic brakes, air bleeding of diesel fuel system
   iii) Wheel bearings tightening and adjustment
10. Practice the following
    i) Adjustment of head lights beam
    ii) Removal and fitting of tyre and tube

TOTAL : 45 PERIODS

LIST OF EQUIPMENTS

(for a batch of 30 students)

1.	Engine Analyzer	- 1 No.
2.	Cylinder compression pressure gauge	- 1 No.
3.	Vacuum gauge	- 1 No.
4.	Spark plug cleaner and tester	- 1 No.
5.	Cam angle and rpm tester	- 1 No.
6.	Tachometer	- 1 No.
7.	Wheel alignment apparatus	- 1 No.
8.	Gas welding equipment	- 1 No.
9.	Tyre remover	- 1 No.
10.	Bearing puller	- 1 No.
11.	Head light alignment gauge	- 1 No.
12.	Service manuals of petrol, diesel engines	

AT1404 COMPUTER AIDED MANUFACTURING LAB 0 0 3 100

Modeling and Simulation of Manufacture of the following parts :

1. Cylinder Head.
2. Cylinder.

3. Piston.
4. Liner.
5. Piston Pin and Piston Rings.
6. Connecting Rod.
7. Crankshaft
8. Inlet and Exhaust Valves
9. Cam.
10. Cam Shaft.

TOTAL : 45 PERIODS

LIST OF EQUIPMENTS
(for a batch of 30 students)

1.	Computer system	- 30 Nos.
2.	Software like Pro-E	- 15 licenses

AT1405 IDENTIFICATION OF PROJECT WORK 0 0 2 0
(No examination)

MG1452 ENGINEERING ECONOMICS AND COST ANALYSIS 3 0 0 100
(Common to Mechanical, Production, Automobile)(Metallurgy, Mechatronics - VIII Semester Elective)

OBJECTIVE

To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.

1. INTRODUCTION TO ECONOMICS 8

Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis- V ratio, Elementary economic Analysis – Material selection for product Design selection for a product, Process planning.

2. VALUE ENGINEERING 10

Make or buy decision, Value engineering – Function, aims, Value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.

3. CASH FLOW 9

Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method, Examples in all the methods.

4. REPLACEMENT AND MAINTENANCE ANALYSIS 9

Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

5. DEPRECIATION **9**

Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation- Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity method of depreciation, service output method of depreciation-Evaluation of public alternatives- introduction, Examples, Inflation adjusted decisions – procedure to adjust inflation, Examples on comparison of alternatives and determination of economic life of asset.

TOTAL : 45

TEXT BOOK

1. Panneer Selvam, R, Engineering Economics, Prentice Hall of India Ltd, New Delhi, 2001.

REFERENCES

1. Chan S.Park, "Contemporary Engineering Economics", Prentice Hall of India, 2002.
2. Donald.G. Newman, Jerome.P.Lavelle, "Engineering Economics and analysis" Engg. Press, Texas, 2002
3. Degarmo, E.P., Sullivan, W.G and Canada, J.R, "Engineering Economy", Macmillan, New York, 1984
4. Grant.E.L., Ireson.W.G., and Leavenworth, R.S, "Principles of Engineering Economy", Ronald Press, New York,1976.
5. Smith, G.W., "Engineering Economy", Lowa State Press, Iowa, 1973.

AT1452 COMPREHENSION **0 0 3 0**

(Common to all Branches)

OBJECTIVE

The objective of comprehension is to provide opportunity for the student to apply the knowledge acquired during the earlier semesters to real life problems which he / she may have to face in future as an engineer. While learning as how to solve the real life problems, student will receive guidance from the faculty and also review various courses learnt earlier.

AT1453 PROJECT WORK **0 0 6 200**

(Common to all Branches)

OBJECTIVE

The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

Each student shall finally produce a comprehensive report covering back round information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

The continuous assessment shall be made as prescribed by the regulation (vide clause 10.3 of Anna University regulations 2004 for B.E., B.Tech. programmes)