GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Approved by AICTE, Accredited by NBA & NAAC 'A' Grade, Recognized under 2(f) and 12(b) of UGC, Permanently Affiliated to JNTUK, Kakinada.

Chaitanya Knowledge City, Rajanagaram, Rajamahendravaram – 533294. E.G.Dt. - AP.

GR14

DEPARTMENT OF AUTOMOBILE ENGINEERING

4 YEARS B.Tech. COURSE STRUCTURE & SYLLABUS

With Effective from 2014-15 Batch

NBA ACCREDITED & NAAC 'A' GRADE

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B.Tech. Automobile Engineering

COURSE STRUCTURE

I YEAR **4+0+0+0+0 (T+P+D+ACC+NCC)** **I SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
	Name	Code	T	P	D		Internal	External	Total
1	English – I	14198101	4	-	-	3	30	70	100
2	Mathematics - I	14198102	4	-	-	3	30	70	100
3	Mathematics – II (Mathematical Methods)	14198103	4	-	-	3	30	70	100
4	Engineering Physics	14198104	4	-	-	3	30	70	100
5	Computer Programming	14198105	4	-	-	3	30	70	100
6	Environmental Studies	14198106	4	-	-	3	30	70	100
7	English Communication Skills Lab-1	14198111	-	3	-	2	50	50	100
8	Engineering Physics Lab. (Engineering Physics Virtual lab assignments)	14198112	-	3	-	2	50	50	100
9	C- Programming Lab	14198113	-	3	-	2	50	50	100
	Total		**24**	**9**	**-**	**24**	**-**	**-**	**900**

I YEAR **4+0+0+0+0 (T+P+D+ACC+NCC)** **II SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
	Name	Code	T	P	D		Internal	External	Total
1	English – II	14198201	4	-	-	3	30	70	100
2	Mathematics – III	14198202	4	-	-	3	30	70	100
3	Engineering Chemistry	14198203	4	-	-	3	30	70	100
4	Engineering Mechanics	14198204	4	-	-	3	30	70	100
5	Engineering Drawing	14198275	1	-	3	3	30	70	100
6	Professional Ethics and Human Values*	14198296	4	-	-	-	-	-	-
7	English Communication Skills Lab – 2	14198211	-	3	-	2	50	50	100
8	Engineering Chemistry Lab	14198212	-	3	-	2	50	50	100
9	Engineering Workshop & IT Workshop	14198213	-	3	-	2	50	50	100
	Total		**21**	**9**	**3**	**21**	-	-	**800**

T : Theory P: Practical D: Drawing C: Credits
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*Professional Ethics & Human Values is an Audit Course / add on course with internal assessment only, Pass at 40% is compulsory, No credit/Marks. Result shown as Satisfactory / Not Satisfactory.

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II YEAR **4+0+0+0+0 (T+P+D+ACC+NCC)** **I SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
	Name	Code	T	P	D		Internal	External	Total
1	Metallurgy & Materials Science	14170302	4	-	-	3	30	70	100
2	Mechanics of Solids	14170303	3+1	-	-	3	30	70	100
3	Thermodynamics	14170304	3+1	-	-	3	30	70	100
4	Basic Automobile Engineering	14170301	4	-	-	3	30	70	100
5	Fluid Mechanics & Hydraulic Machinery	14170305	4	-	-	3	30	70	100
6	Computer Aided Engineering Drawing Practice	14170376	1	-	3	2	30	70	100
7	Automobile Engineering Lab-1	14170311	-	3	-	2	50	50	100
8	Mechanics of Solids & Fluid Mechanics lab	14170312	-	3	-	2	50	50	100
	Total		**21**	**6**	**3**	**21**	-	-	**800**

II YEAR **4+0+0+0+0 (T+D+P+ACC+NCC)** **II SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
	Name	Code	T	P	D		Internal	External	Total
1	Kinematics of Machinery	14170401	3+1	-	-	3	30	70	100
2	Automotive Engines	14170402	3+1	-	-	3	30	70	100
3	Basic Electrical & Electronics Engineering	14170403	3+1	-	-	3	30	70	100
4	Industrial Engineering & Management	14170404	3+1	-	-	3	30	70	100
5	Manufacturing Processes	14170405	3+1	-	-	3	30	70	100
6	**Soft Skills -1**	14179406	1	3	-	-	-	-	-
7	Machine Drawing	14170477	-	-	3	3	30	70	100
8	Automobile Engineering Lab -II	14170411	-	3	-	2	50	50	100
9	Basic Electrical & Electronics Engineering Lab	14172412	-	3	-	2	50	50	100
	Total		**21**	**9**	**3**	**22**	-	-	**800**

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III YEAR **4+0+0+0+0 (T+D+P+ACC+NCC)** **I SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
	Name	Code	T	P	D		Internal	External	Total
1	Dynamics of Machinery	14170501	3+1	-	-	3	30	70	100
2	Automotive Electrical & Autotronics	14170502	3+1	-	-	3	30	70	100
3	Design of Machine Elements	14170503	3+1	-	-	3	30	70	100
4	Vehicle Transport Management	14170504	3+1	-	-	3	30	70	100
5	Heat Transfer	14170505	3+1	-	-	3	30	70	100
6	Vehicle Performance & Testing	14170506	3+1	-	-	3	30	70	100
7	Heat Transfer Lab	14170511	-	3	-	2	50	50	100
8	Manufacturing processes Lab	14170512	-	3	-	2	50	50	100
9	**Mini Project***	14170521	-	-	-	2	100	-	100
	Total		**24**	**6**	**-**	**24**	**-**	**-**	**900**

* Student should carry **Mini Project** during summer vacation after II B.Tech. II Sem. Course work and it will be evaluated during III B.Tech. I Sem.

III YEAR **4+0+0+0+0 (T+D+P+ACC+NCC)** **II SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
	Name	Code	T	P	D		Internal	External	Total
1	Machine Tools & Metrology	14170602	3+1	-	-	3	30	70	100
2	Instrumentation & Control Systems	14170603	3+1	-	-	3	30	70	100
3	Managerial Economics & Financial Analysis	14170601	3+1	-	-	3	30	70	100
4	Alternative Energy Sources for Automobiles	14170604	3+1	-	-	3	30	70	100
5	Departmental Elective - I	(See List)	3+1	-	-	3	30	70	100
6	Product Design and Assembly Automation	14170606	3+1	-	-	3	30	70	100
7	**Soft Skills - 2**	14178697	-	3	-		-	-	-
8	Machine Tools & Metrology Lab	14170611	-	3	-	2	50	50	100
9	Auto Scanning & Vehicle Testing Lab	14170612		3	-	2	50	50	100
	Total		**24**	**9**	**-**	**22**	**-**	**-**	**800**

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IV YEAR **4+0+0+0+0 (T+D+P+ACC+NCC)** **I SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
			T	P	D		Internal	External	Total
1	Departmental Elective – II	(See List)	3+1	-	-	3	30	70	100
2	Vehicle Dynamics	14170702	3+1	-	-	3	30	70	100
3	CAD / CAM	14170703	3+1	-	-	3	30	70	100
4	Finite Element Methods	14170704	3+1	-	-	3	30	70	100
5	Automotive Pollution & Control(Open Elective)	14170765a	3+1	-	-	3	30	70	100
6	Automotive Chassis & Suspension	14170706	3+1	-	-	3	30	70	100
7	Automobile Engineering LabIII &Instrumentation Lab	14170711	-	3	-	2	50	50	100
8	CAD / CAM LAB	14170712	-	3	-	2	50	50	100
9	**Summer Internship**	14170731	-	-	-	3	100	-	100
	Total		**24**	**6**	**-**	**25**	**-**	**-**	**900**

** Student should carry **Summer Internship** during summer vacation after III B.Tech. II Sem. and it will be evaluated during IV B.Tech. I Sem.

IV YEAR **4+0+0+0+0 (T+D+P+ACC+NCC)** **II SEMESTER**

S. No.	Subject		Periods per week			C	Scheme of Examination Maximum Marks		
			T	P	D		Internal	External	Total
1	Automotive Control Systems	14170801	3+1	-	-	3	30	70	100
2	Vehicle maintenance	14170802	3+1	-	-	3	30	70	100
3	Departmental Elective – III	(See List)	3+1	-	-	3	30	70	100
4	Departmental Elective – IV	(See List)	3+1	-	-	3	30	70	100
5	**Project Work**	14170841	-	-	-	9	60	140	200
6	**IPR& PATENTS**	14179895	2	-	-	-	-	-	-
	Total		**18**	**-**	**-**	**21**	**-**	**-**	**600**

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ELECTIVES

OPEN ELECTIVE

1. Automotive Pollution and Control	-	14170765a
2. Advanced Materials	-	14170765b
3. Industrial Hydraulics and Pneumatics	-	14170765c

DEPARTMENTAL ELECTIVE- I

1. Vehicle Body Engineering & Safety	-	14170665a
2. Trouble Shooting, Servicing & Maintenance of Automobiles	-	14170665b
3. Design for Safety & Comfort of Automobiles	-	14170665c
4. Automotive Aerodynamics	-	14170665d

DEPARTMENTAL ELECTIVE- II

1. Microprocessors & Micro controllers	-	14174761a
2. Computational Fluid Dynamics	-	14173761b
3. Electronic Engine & Vehicle Management Systems	-	14170761c
4. Condition Monitoring of Vehicle Dynamics	-	14170761d

DEPARTMENTAL ELECTIVE- III

1. Automotive Safety	-	14170863a
2. Automotive Manufacturing	-	14170863b
3. Automobile Air Conditioning	-	14170863c
4. Hybrid, Electric & Fuel cell vehicles	-	14170863d

DEPARTMENTAL ELECTIVE- IV

1. Management Science	-	14179864a
2. Principles of Entrepreneurship	-	14179864b
3. Simulation of SI & CI Engines	-	14170864c
4. Modern Vehicle Technology	-	14170864d

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B. Tech. I Year – I Sem.

ENGLISH -I [14198101]

(Common to all branches)

Course Outcomes: At the end of the semester the student will be able to

- Understand doing self introspection and self vigilance
- Achieve high quality of life, strength and sovereignty of a developed nation
- Understand the importance of writing skills and its techniques
- Envision the dangers of scientific and technological innovations
- Improve the exposure to universal happenings
- Communicate the necessity to exercise humour in the daily life

DETAILED TEXT-I **English Essentials : Recommended Topics :**

1. IN LONDON: M.K.GANDHI

OBJECTIVE: To apprise the learner how Gandhi spent a period of three years in London as a student.

2. THE KNOWLEDGE SOCIETY- APJ KALAM

OBJECTIVE: To make the learners rediscover India as a land of Knowledge.

3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE

OBJECTIVE: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.

4. PRINCIPLES OF GOOD WRITING:

OBJECTIVE: To inform the learners how to write clearly and logically.

5. MAN'S PERIL

OBJECTIVE: To inform the learner that all men are in peril.

6. THE DYING SUN—SIR JAMES JEANS

OBJECTIVE: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.

7. LUCK—MARK TWAIN

OBJECTIVE: This is a short story about a man's public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

Prescribed Text Book : "English Essentials", by Ravindra Publications

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B. Tech. I Year – I Sem.

ENGLISH ***(Common to all branches)***

Course outcomes: At the end of the semester the student will be able to

- **Take inspiration by reading autobiographies**
- **Help the common man and achieve the social cause**
- **Aspire for the useful innovations to improve living**
- **Achieve the target without compromise**

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)

1. G.D.Naidu

OBJECTIVE: To inspire the learners by G.D.Naidu‟s example of inventions and contributions.

2. G.R.Gopinath

OBJECTIVE: To inspire the learners by his example of inventions.

3. Sudhamurthy

OBJECTIVE: To inspire the learners by the unique interests and contributions of Sudha Murthy.

4. Vijay Bhatkar

OBJECTIVE: To inspire the learner by his work and studies in different fields of engineering and science.

Text Book : "Trail Blazers" by Orient Black Swan Pvt. Ltd. Publishers

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B. Tech. I Year – I Sem.

MATHEMATICS – I(DIFFERENTIAL EQUATIONS) [14198102]
(Common to all branches)

Course Outcomes: At the end of the course the student will be able to

- Solve first and higher order ordinary differential equations (ODE) with applications by various techniques
- Apply Laplace Transforms to solve initial value problems and evaluate infinite integrals
- Apply partial differentiation to solve inequalities and to find Maxima and Minima
- Solve First and higher order PDE with their applications to heat equation, Wave equation, Laplace equation

UNIT I: Differential equations of first order and first degree:
Objective: Solution of First order and First degree ODE with applications
Linear-Bernoulli-Exact-Reducible to exact.
Applications : Newton‟s Law of cooling-Law of natural growth and decay-orthogonal trajectories.

UNIT II: Linear differential equations of higher order:
Objective: Solution of Higher order Linear ODE with applications.
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e *ax* , Sin ax, cos ax, polynomials in x, e *ax* V(x), xV(x).
Applications: LCR circuit, Simple Harmonic motion.

UNIT III Laplace transforms:
Objective: Application of Laplace Transform to solution of IVP and Evaluation of Integrals.
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac‟s delta function- Inverse Laplace transforms– Convolution theorem (with out proof).
Applications: Solutions of ordinary differential equations using Laplace transforms.

UNIT IV Partial differentiation:
Objective: Mean value theorems and their applications to solve inequalities and Maxima and Minima.
Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent‟s series for two variables– Functional dependence-Jacobian.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT V First order Partial differential equations:
Objective: Formation and solution of First Order PDE
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations.

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UNIT VI Higher order Partial differential equations:

Objective: Solution and application of higher order PDE

Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Books:

1. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL,** advanced Engineering Mathematics, Cengage Learning.

Web links:

1. NPTEL – Courses from reputed IIT's as available in the websites.
2. WEBEX
3. COURSERA

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I Year B.Tech – I Semester

MATHEMATICS –II (Numerical Methods and Integral Transforms) [14198103]
(Common to AME, CE, ME, MM)

Course Outcome: At the end of the course the student will be able to

- **Apply Numerical Techniques to solve Algebraic and Transcendental Equations and also Initial Value problems and ODE**
- **To interpolate the tabulated data at the given values using various interpolation techniques**
- **Express a given function satisfying certain conditions in Fourier series**
- **Use finite and infinite Fourier integral transforms to solve BVPs**
- **Solve Difference Equations using Z-Tranforms**

UNIT I: Solution of Algebraic and Transcendental Equations
Objectives: To enable the student to solve algebraic and Transcendental equations by Numerical Methods.
Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method.

UNIT II: Interpolation
Objective: To enable the student to use interpolation techniques for a given tabulated data
Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton‟s formulae for interpolation – Interpolation with unevenly spaced points - Lagrange‟s Interpolation formula

UNIT III: Numerical solution of Ordinary Differential equations
Objective: To enable the student to use Numerical Techniques to solve IVP's in ODE.
Solution by Taylor‟s series-Picard‟s Method of successive Approximations-Euler‟s Method-Runge-Kutta Methods

UNIT IV: Fourier Series
Objective: To enable the student to expand a function in Fourier series
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series
application: Amplitude, spectrum of a periodic function

UNIT V: Fourier Transforms
Objective: To enable the student to use Fourier Integral theorem and transforms to BVP's
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms

UNIT VI: Z-transform
Objective: To enable the student to use Z-Transform to solve Difference Equations.
Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse z transform- -Convolution theorem – Solution of difference equation by Z -transforms.

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REFERENCE BOOKS:

1. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press
3. **V.RAVINDRANATH and P. VIJAYALAXMI,** Mathematical Methods, Himalaya Publishing House
4. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India

Web links:

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I Year B.Tech – I Semester

ENGINEERING PHYSICS [14198104]

(Common to AME, CE, ME and MINING Engineering)

UNIT I: PHYSICAL OPTICS FOR INSTRUMENTS

Objective: *"Designing an instrument and enhancing the resolution for its operation would be effect as achieved through study of application aspects of physical Optics"*

INTERFERENCE: Introduction – Interference in thin films by reflection – Newton‟s rings.
DIFFRACTION: Introduction – Fraunhofer diffraction – Fraunhofer diffraction at double slit (qualitative)–Diffraction grating–Grating spectrum–Resolving power of a grating Rayleigh's criterion for resolving power.
POLARIZATION: Introduction – Types of Polarization – Double refraction – Quarter wave plate and Half Wave plate.

UNIT II: COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objective*: "Lasers are trusted Non-linear coherent sources establishing for the fitness of Instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base".*

LASERS: Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Three and Four level pumping
schemes – Ruby laser – Helium Neon laser.
CRYSTALLOGRAPHY: Introduction – Space lattice – Basis – Unit Cell – Lattice parameters –Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC
X-RAY DIFRACTION TECHNIQUES: Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law.
FIBER OPTICS: Introduction – Principle of wave propagation in Optical Fiber – Acceptance angle and acceptance cone- Numerical aperture.

UNIT III: MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

Objective: *"Many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance".*

MAGNETIC PROPERTIES: Magnetic permeability – Magnetization – Organ or magnetic moment– Classification of Magnetic materials – Dia, para, Ferro,anti ferro and ferri-magnetism Hysteresis curve.
DIELECTRIC PROPERTIES: Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation –
Dielectric loss, Breakdown and Strength.
SUPERCONDUCTIVITY: General properties – Meissner effect – Type I and Type II superconductors–BCS Theory Flux quantization London‟s equations – Penetration depth-DC and AC Josephson effects–SQUIDS.

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UNIT IV: ACOUSTICS AND EM – FIELDS

Objective: *"The utility and nuances of ever pervading SHM and its consequences would be the first handonto as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding".*

ACOUSTICS: Sound absorption, absorption coefficient and its measurements, Reverberations time –Sabine's formula, Eyring's formula.

ELECTRO-MAGENTIC FIELDS: Gauss and stokes theorems (qualitative) – Fundamental laws of Electro magnetism – Maxwell's Electromagnetic Equations (Calculus approach).

UNIT V: QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT

Objective: *"The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence".*

QUANTUM MECHANICS: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

FREE ELECTRON THEORY: Classical free electron theory – electrical conductivity–Mean free path–Relaxation time and drifty velocity–Quantum free electron theory - Fermi-Dirac (analytical) and its dependence on temperature–Fermi energy–density of states–derivations for current density.

BAND THEORY OF SOLIDS: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors &insulators – Concepts of effective mass of electron - concept of hole.

UNIT VI: SEMICONDUCTOR PHYSICS

Objective: *"In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base".*

Introduction to Semiconductors, Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein's equation – Hall Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells.

TEXT BOOKS

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. A text book of Engineering Physics by M.N.Avadhanulu & P.G.Kshirasagar (S.Chand publications)
3. Engineering Physics by M.R. Srinivasan (New Age international publishers)

REFERENCE BOOKS

1. Introduction to solid state physics by Charles Kittle (Willey India Pvt.Ltd)
2. Applied Physics by T. Bhimasenkaram (BSP BH Publications)
3. Applied Physics by M.Arumugam (Anuradha Agencies)
4. Engineering Physics by Palanisamy (Scitech Publishers)
5. Engineering Physics by D.K.Bhattacharya (Oxford University press)
6. Engineering Physics by Mani Naidu S (Pearson Publications)
7. Engineering Physics by Sanjay D Jain and Girish G Sahasrabudhe (University Press)
8. Engineering Physics by B.K.Pandey & S. Chaturvedi (Cengage Learning)

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

***I Year B.Tech. – I Sem*ester**

COMPUTER PROGRAMMING [14198105]
(Common to ME, CE, AME, MIN)

Objective: Formulating algorithmic solutions to problems & implementing algorithms in C

UNIT I:

Objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux

Introduction: Computer systems, Hardware and Software Concepts**,**

Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling(gcc), Linking and Executing in under Linux.

BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:

objective: understanding branching, iteration and data representation using arrays

SELECTION – MAKING DECISION: TWO WAY SELECTION: If-else, null else, nested if, examples, Multiway selection: switch, else-if, examples**.**

ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix**.**

STRINGS: concepts, c strings.

UNIT III:

Objective: Modular programming and recursive solution formulation

FUNCTIONS- MODULAR PROGRAMMING: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:

Objective: Understanding pointers and dynamic memory allocation

POINTERS: pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

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UNIT V:
Objective: Understanding miscellaneous aspects of C
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications
BIT-WISE OPERATORS: logical, shift, rotation, masks**.**

UNIT VI:
Objective: Comprehension of file operations
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs.

Text Books:
1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

Reference Books and web links:
1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

B. Tech. I Year – I Sem.

ENVIRONMENTAL STUDIES[14198106]

(Common to ME, CE, AME, MIN)

Course Learning Objectives:

The objectives of the course is to impart

1. Overall understanding of the natural resources

2. Basic understanding of the ecosystem and its diversity

3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities

4. An understanding of the environmental impact of developmental activities

5. Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.

UNIT I:

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – **Sustainability: Stockholm and Rio Summit–Global Environmental Challenges:** Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Ecosystems: 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 Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT II:

Natural Resources: Natural resources and associated problems Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest 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

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

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Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.
Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III:
Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation – Hot spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – **Conservation of biodiversity:** conservation of biodiversity.

UNIT IV:
Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.
Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT V:
Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns.
Environmental ethics: Issues and possible solutions. Environmental 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 VI:
Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:
1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:
1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Environmental Studies by *Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning,* New Delhi

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B. Tech., I Year – I Sem.

ENGLISH COMMUNICATION SKILLS LAB-1[14198111]

(Common to AME, CE, ME, MM)

Course Outcomes: At the end of the semester the student will be able to

- Communicate in different situations
- Improvise his ability to meet different industry needs
- Envisions his necessity to improve employability

Course Objectives:

- To motivate the students to accept global linguistic environment
- To refine social and psychological language inhibitions
- To make them industry ready
- To cultivate communicative competence

S. No.	UNIT	TOPIC
1	I	A:Greetings,introducing and taking leave B:Pure vowels
2	II	A:Giving Information and asking Information B: Diphthongs
3	III	A:Inviting,Accepting and Declining Invitations B:Consonants
4	IV	A:Commands,Instructions and Requests B:Accent and rhythm
5	V	A:Suggestions and Opinions B:Intonation

Suggested Text Book: Strengthen Your Communication Skills by Maruthi Publishing House

Suggested Software: English in Mind, Pronunciation Power by Hi-Class software solutions.

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B. Tech. I Year – I Sem.

Engineering Physics Lab (Engineering Physics Virtual lab assignments) [14198112]

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton‟s rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde‟s experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee‟s apparatus.
14. Energy Band gap of a Semiconductor p-n junction.
15. Hall Effect for semiconductor.

Note: Assignment / Virtual Lab --- 5Marks
Virtual Lab URL:

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I Year B.Tech – I Semester

C - PROGRAMMING LAB [14198113]
(Common to ME,CE,AME,MIN)

Exercise l

a) Write a C Program to calculate the area of triangle using the formula
area = (s (s-a) (s-b)(s-c))1/2
where s= (a+b+c)/2
b) Write a C program to find the largest of three numbers using ternary operator.
c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2"s complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequenceUse the summing series method to compute the value of SIN(x),COS(x) and e^x
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value Supplied by the user.

Exercise 4

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to implement a liner search.
c) Write a C program to implement binary search.

Exercise 6

a) Write a C function to find both the largest and smallest number of an array of integers.
b) Write C programs illustrating call by value and call by reference concepts.

Exercise 7

a) Write a C program that uses functions to perform the following operations:
i. To insert a sub-string in to given main string from a given position.
ii. To delete n Characters from a given position in a given string.
b) To replace a character of string either from beginning or ending or at a specified location

Exercise 8

Write a C program that uses functions to perform the following operations using Structure:
i) Reading a complex number ii) Writing a complex number
iii) Addition of two complex numbers iv) Multiplication of two complex numbers

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Exercise 9

a) Write C Programs for the following string operations without using the built in functions
   i. to concatenate two strings
   ii. to append a string to another string
   iii. to compare two strings.

Exercise 10

a) Write C Programs for the following string operations without using the built in functions
   i. to find t he length of a string
   ii. to find whether a given string is palindrome or not.

Exercise 11

a) Write C programs that use both recursive and non recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD of two given integers.
   iii) To find Fibonacci sequence.

Exercise 12

a) Write C Program to reverse a string using pointers.
b) Write a C program to compare two arrays using pointers.

Exercise 13

a) Write a C Program consisting of pointer based function to exchange value of two integers using passing by address.
b) Write a C Program to swap two numbers using pointers.

Exercise 14

Examples which explores the use of structures, union and other user defined variables.

Exercise 15

a) Write a C program which copies one file to another.
b) Write a C program to count the number of Characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

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B. Tech. I Year – II Sem.

ENGLISH - II [14198201]

(Common to all branches)

Course Outcomes: At the end of the semester the student will be able to

- Understand the proposed technology is people's technology and its service to the humanity instead of making them servant of machines.
- Understand that climate must be preserved.
- Adopt the applications of modern technologies such as Nanotechnology.
- Understand the water is the elixir of life.
- Learn to work hard with devotion and dedication.
- Understand the advantages of work. They will overcome their personal problems and address themselves to National and other problems.

DETAILED STUDY:

UNIT-1: Technology with a human face

Objective: *"To make the learner understand how modern life has been shaped by technology."*

UNIT II: Climate change and human strategy

Objective*: "To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained."*

UNIT III: Emerging technologies

Objective: *"To introduce the technologies of the 20th century and 21st centuries to the learners".*

UNIT IV: Water- the elixir of life

Objective: "*To inform the learner of the various advantages and characteristics of water".*

UNIT V: The secret of work

Objective: *"In this lesson, Swami Vivekananda highlights the importance of work for any development".*

UNIT VI: Work brings solace

Objective: *"In this lesson Abdul Kalam highlights the advantage of work".*

PRESCRIBED TEXT BOOK: "Sure Outcomes" by Orient Black Swan Pvt. Ltd. Publishers

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NON-DETAILED TEXT:

Course Outcomes: At the end of the semester the student will be able to

- Be inspired by Bose's achievements so that he may start his own original work
- Be inspired by Bhabha's achievements so as to make his own experiments
- Realize that development is impossible without scientific research
- Appreciate the art of writing a short story and try his hand at it

UNIT V: J.C. Bose

Objective: *"To apprise of J.C.Bose's original contributions."*

UNIT VI: Homi jehangir bhaba

Objective: *"To show Bhabha as the originator of nuclear experiments in India*

UNIT VII: Vikram sarabhai

Objective: "*To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes".*

UNIT VIII: A Shadow- R.K.Narayan

Objective: "*To expose the reader to the pleasure of the humorous story".*

PRESCRIBED TEXT BOOK: "Trail Blazers" by Orient Black Swan Pvt. Ltd. Publishers

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B. Tech. I Year – II Sem.
MATHEMATICS –III (LINEAR ALGEBRA & VECTOR CALCULUS) [14198202]
(Common to all branches)

Course Outcomes: *At the end of the course the student will be able to*

- *Use matrix theory to solve linear system of equations*
- *Find eigen values and eigen vectors and use Cayley Hamilton theorem to find inverse and powers of a matrix and also reduce a given quadric form to Canonical form*
- *Learn applications of integration and evaluation of multiple integral*
- *Use Beta, Gamma functions to evaluate improper integrals*
- *Use vector differentiation and integration with vector integral theorems*

UNIT I: Linear systems of equations
Objective: *To enable the student to use matrix theory to solve linear system of equations.*
Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.
Application: Finding the current in a electrical circuit.

UNIT II: Eigen values - Eigen vectors and Quadratic forms
Objective: *To enable the student to find eigen values and eigen vectors of a matrix and apply Cayley Hamilton theorem.*
Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem – **without proof** Inverse and powers of a matrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.
Application: Free vibration of a two-mass system.

UNIT III: Multiple integrals
***Objective*:** *To enable the student to apply integration to find length, volume and surface areas. Also the student will learn evaluations of multiple integrals.*
Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)- **No question from this part**
Applications of Integration to Lengths, Volumes and Surface areas of revolution in cartesian and Polar Coordinates.
Multiple integrals - double and triple integrals – change of variables – Change of order of Integration
Application: Moments of inertia

UNIT IV: Special functions
Objective: *To enable the student to evaluate improper integrals using Beta, Gamma functions.*
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals
Application: Evaluation of integrals

UNIT V: Vector Differentiation
Objective: *To enable the student to apply vector differentiation to physical and engineering situations.*
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities
Application: Equation of continuity, potential surfaces

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UNIT VI: Vector Integration

Objective: *To enable the student to apply vector integration to find work done and force applied.*

Line integral – work done – Potential function – area- surface and volume integrals Vector integral trheorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

application: work done by Force

REFERENCE BOOKS:

1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata McGrawhill
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University Press

Web Links:

1. NPTEL- Courses from reputed IIT's as available in the websites.

2. WEBEX

3. COURSERA

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

B. Tech. I Year – II Sem.

ENGINEERING CHEMISTRY - 14198203
(Common to AME, CE, ME, MM)

UNIT-1: Water technology

Objective: *"For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of water of hard water, boiler troubles and modern methods of softening hard water is introduced."*

Hard water: Estimation of hardness by hardness by EDTA method – Potable water – Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and forming, scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process.

UNIT II: Electrochemistry

Objective: *"Knowledge of galvanic cells, electrode potentials, and concentration cells is necessary for enginees to understand corrosion problem and its control; also this knowledge helps in understanding modern bio-sensors, fuel cells and improves them."*

Concept of Ionic mobilities – Applications of Kohlrausch law – Conductometic titrations – Galvanic cells – Elctrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode: Batteries and Fuel cells.

UNIT III: Corrosion

Objective: *"The problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them".*

Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors effecting corrosion – Corrosion control methods – Cathode protection – Sacrificial Anodic, Impressed current methods – Surface coating – Methods of application on metals (Hot dipping, Galvanizing, tinning, Cladding, Electroplating, Electro less, plating) – Organic surface coatings – Paints – Their constituents and their functions.

UNIT IV: High polymers

Objective: "*Plastics are materials used very widely an engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purpose ".*

Types of Polymerization – Stereo Polymers – Physical and mechanical properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Styrene butadiene rubber – Thiokol – applications.

UNIT V: Fuels

Objective: *"A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them".*

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Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific value – HCV and LVC – Problems based calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking: Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

UNIT VI: Chemistry of advanced materials

Objective: *"With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here. ".*

Nanomaterials (Preparation of carbon nanotubes and fullerences – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting Deterioration of cement concrete.

STANDARD BOOKS

1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd.,
2. N. Y. S. Murthy, V. Anuradha, K. RamaRao, "A Text Book of Engineering Chemistry" Maruthi Publications.
3. C. Parameswara Murthy, C. V. Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B. S. Publications.
4. B. Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.
5. Ch. Venkata Ramana Reddy and Rama devi (2013), Engineering Chemistry, Cengage Learning.

REFERENCES

1. S. S. Dara (2013) Text Book of Engineering Chemistry, S. Chand Technical Series.
2. K. Sesha Maheswaeamma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R. Gopalan, D. Venkatappayya, Sulochana, Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B. Viswanathan and M. Aulice Scibioh (2009), Fuel cells, Principals and applications.

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B.Tech. I Year– II Sem.

ENIGINEERING MECHANICS - 14198204
(Common to AME, CE, ME, MN)

Course Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I

Learning objectives: To understand the concepts of forces and its resolution in different planes.

Introduction to Engg. Mechanics – Basic Concepts.
Systems of Forces : Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction.

UNIT II

Learning objectives: To understand the concepts of Equilibrium of Systems of Forces, law of Triangle of forces and converse of the law of polygon of forces.

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT – III

Learning objectives: To understand the concepts of Centroid, Centre of Gravity law of Triangle of forces and pappus theorem.

Centroid : Centroids of simple figures (from basic principles) – Centroids of Composite Figures.
Centre of Gravity : Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, pappus theorem.

UNIT IV

Learning objectives: To understand the concepts of Area moments of Inertia, Mass Moment of Inertia.

Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia : Moment of Inertia of Masses, Transfer Formula for Mass Moments of

Inertia, mass moment of inertia of composite bodies.

UNIT – V

Learning objectives: To understand the concepts of Rectilinear and Curvilinear motions, Analysis as a Particle and Analysis as a Rigid Body in Translation.

Kinematics : Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VI

Learning objectives: To understand the concepts of Equations for Translation, D'Alembert's principle in rotation.

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.
Mechanical Vibrations: Definitions, Concepts – Simple Harmonic motion – Free Vibrations, Simple and Compound pendulums – Torsional Vibrations.

TEXT BOOKS:

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics statics and dynamics:A Nelson , Mc Graw Hill publications
3. Engineering Mechanics: GS Sawhney, PHI Learning Pvt. Ltd.
4. Engineering Mechanics: Basudeb Bhattacharyya, Oxford University Press

REFERENCES:

1. Engineering Mechanics: statics and dynamics – I.H.Shames, – Pearson Publ.
2. Mechanics For Engineers, dynamics: - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
3. Engineering Mechanics: Fedinand . L. Singer , Harper – Collins

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Useful Web-links : http://nptel.ac.in/courses.php
http://mit.espe.edu.ec/courses/mechanical-engineering/

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

ENGINEERING DRAWING - 14198275
(Common to AME, CE, ME, MN)

Course Objectives: Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I

Learning objectives: To understand the concepts and use of drawing Instruments and Curves used in Engineering Practice.

Introduction to drawing Instruments and uses. Lettering.

Polygons : Construction of regular polygons using given length of a side; Curves used in Engineering Practice, conic sections, construction of conics by different methods, cycloidal curves, epi and hypo-cycloids. Involutes.

UNIT II

Learning objectives: To understand the concepts of Vernier and Diagonal scales and concepts of orthographic projections.

Scales : Vernier and Diagonal scales.
Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III

Learning objectives: To understand the concepts of projections of straight lines and traces.

Projections of straight lines inclined to both the planes, determination of true lengths and angle of inclinations and traces.

UNIT IV

Learning objectives: To understand the concepts of Projections of planes.

Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

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UNIT V

Learning objectives: To understand the concepts of Projections of various solids.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI

Learning objectives: To understand the concepts of Projections of isometric views to orthographic views.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Graphics by PI Varghese, McGrawHill Publishers
2. Engineering Drawing by N.D. Butt, Chariot Publications
3. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.

REFERENCE BOOKS:

1. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
2. Engineering Drawing by Shah & Rana, Pearson Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

Useful Web-links : http://nptel.ac.in/courses.php
http://mit.espe.edu.ec/courses/mechanical-engineering/

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

B. Tech. I Year – II Sem.

PROFESSIONAL ETHICS and HUMAN VALUES- 14198296
(Common to AME, CE, ME, MM)

Course Outcomes:
Upon completion of this course, students should have

- Understood the core values that shape the ethical behavior of an engineer
- Exposed awareness on professional ethics and human values
- Known their role in technological development
- The knowledge of contemporary issues related to human and professional interactions at work place which helps students to understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.

UNIT I: Human values
Objective: *To understand the moral values that ought to guide the engineering profession. It is intended to develop a set of beliefs, attitudes, and habits that engineers should display concerning morality.*

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT II: Engineering ethics
Objective: *Important goal of engineering ethics is the discovery of the set of justified moral principles of obligation, rights and ideals that ought to be endorsed by the engineers and apply them to concrete situations.*

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg‟s Theory – Gilligan‟s Argument – Heinz's Dilemma.

UNIT III: Engineering as social experimentation
Objective: *To impart reasoning and analytical skills need to apply ethical concept to engineering decisions.*

Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' responsibility for safety and risk
Objective: *To make the students aware of the safety concept, risk factors and risk benefit analysis.*

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences – Expected Probability - Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk – Safety and the Engineer - Designing for Safety – Risk - Benefit Analysis-Accidents.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT V: Engineer's responsibilities and rights

Objective: *To identify the moral issues involved in both management and engineering areas, an understanding of the engineer's rights such as collegiality, conflict of interest, collective bargaining.*

Collegiality - Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty – misguided – Loyalty - professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self Interest , Customs and Religion- Ethical egoism-Collective bargaining Confidentiality Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational in other companies -Occupational - price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

UNIT VI: Global issues

Objective: *To provide an understanding of interface between social technological and natural environments on global issues.*

Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research Analysing Ethical Problems in Research-Intellectual Property Rights.

TEXT BOOKS

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009

2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana - Maruthi - Publications

3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications

4. "Professional Ethics and Human Values" by Prof.D.R.Kiran-

5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.

7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

B. Tech. I Year – II Sem.

ENGLISH COMMUNICATION SKILLS LAB-II - 14198211

(Common to all branches)

Course Outcomes: At the end of the semester the student will be able to

- Understand the benefits of learning kinesics
- Make the social life comfortable with conversational ability
- Adopt employability skills
- Develop coordinating skills
- Exhibit good argumentative skills

Course Objectives:

- To make the learner industry ready
- To enlighten the importance of non-verbal skills along with verbal
- To equip with good conversational abilities
- To improve public speaking ability

S. No.	UNIT	TOPIC
1	I	Body language
2	II	Dialogues
3	III	Interviews and telephonic interviews
4	IV	Group discussions
5	V	Presentation skills
6	VI	Debates

Prescribed text book:
Strengthen your communication skills by Maruti publishing house
Suggested software:
Strengthen your communication skills by Maruti publishing house

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

B. Tech. I Year – II Sem.

ENGINEERING CHEMISTRY LABORATORY - 14198212

List of Experiments:

1. Introduction to chemistry laboratory - Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na_2CO_3 solution.
3. Estimation of $KMnO_4$ using standard Oxalic acid solution.
4. Estimation of Ferric ion using standard $K_2Cr_2O_7$ solution.
5. Estimation of Copper using standard $K_2Cr_2O_7$ solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter.
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base.
11. Conductometric Titrations between strong acid and weak base.
12. Potentiometric Titrations between strong acid and strong base.
13. Potentiometric Titrations between strong acid and weak base.
14. Estimation of Zinc using standard potassium ferrocyanide solution.
15. Estimation of Vitamin - C

Standard Books:

1. Dr. Jyotsna Cherukuri (2012) Laboratory manual of engineering chemistry-2, VGS Techno series.
2. Chemistry practical manual, Lorven publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, BS Publicaitons

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

I Year B.Tech. – II Sem.

ENGINEERING WORKSHOP & IT WORKSHOP - 14198213

ENGINEERING WORKSHOP:

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Note: At least two exercises to be done from each trade.

Trades:

Carpentry
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tennon Joint

Fitting
1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Black Smithy
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IT WORKSHOP:

Objectives: The IT Workshop for engineers is a 6 training lab course spread over 45 hours .The modules include training on PC hardware ,Internet and WWW and Productivity tools including MS-Word,Excel,Powerpoint and Publisher.

1. Identify the components of a computer, components in a CPU and its functions. Draw block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a viva.

3. Every student should individually install windows XP on the personal computer. Lab instructors should verify the installation and follow it up with a viva.

4. Every student should install Linux on the computer. This computer should have windows installed .The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a viva.

5. Several mini tasks would be that covers Basic commands in Linux and Basic system administration in Linux which includes: Basic Linux commands in Bash, Create hard and symbolic links .Text processing, using wildcards.

6. Web Browsers and Surfing the web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and popup blockers.also, plugins like Macromedia Flash and JRE for Applets should be configured.

7. Search Engines and Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors.

8. Cyber Hygiene: Students would be exposed to the various threats on then internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block popups, block activeX downloads to avoid virus and/or worms.

9. Creating Project Abstract features to be covered: Formatting styles, inserting table, bullets and numbering, changing text direction ,cell alignment, footnote, hyperlink, symbols, spell check, track changes.

10. Creating A NewsLetter: Features to be covered-table of content, news paper coloums, images from files and clipart, drawing toolbar and wordart, formatting images, textboxes and paragraphs.

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11. Excel orientation: The mentor needs to tell the importance of Ms-Excel as a spreadsheet tool, give the details of the four tasks and features that would be covered in each using Excel- Accessing, Overview of toolbars, saving Excel files, using help and resources.

12. Students will be working on basic power point utilities and tools which help them create a basic power point presentation.

13. PPT orientation slide layouts, inserting text, wordart, formatting text, bullets and numbering auto shapes lines and arrows in both Latex and Power point.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – I Sem.

METALLURGY & MATERIALS SCIENCE - 14170302

Course Objective: To understand the basic fundamentals of Material science and Physical metallurgy. The basic concepts to be taught will help for the improvement, proper selection and effective utilization of materials which is essential to satisfy the ever increasing demands of the society.

UNIT – I

Learning Objective: To know the basic concepts of bonds in metals and alloys. To understand the basic requirements for the formation of solid solutions and other compounds.

Structure of Metals and Constitution of alloys: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size. Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT –II

Learning objectives: To understand the regions of stability of the phases that can occur in an alloy system in order to solve the problems in practical metallurgy.

Equilibrium Diagrams : Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cus-Sn and Fe-Fe3C.

UNIT –III

Learning objectives: To study the basic differences between cast irons and steels, their properties and practical applications.

Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

UNIT – IV

Learning objectives: To study the affect of various alloying elements on iron-iron carbide system. To understand the various heat treatment and strengthening processes used in practical applications.

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe3C system, Annealing, normalizing, Hardening, TTT diagrams, tempering , Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT – V

Learning objectives: To study the properties and applications of widely used non-ferrous metals and alloys so as to use the suitable material for practical applications.

Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.
Introduction to powder metallurgy and basic principles.

UNIT – VI

Learning objectives: To study the properties and applications of ceramic, composite and other advanced materials so as to use the suitable material for practical applications.

Ceramic and composite materials: Crystalline ceramics, glasses, cermaets, abrasive materials, nanomaterials – definition, properties and applications of the above.
Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and C – C composites.

TEXT BOOKS:

1. Introduction to Physical Metallurgy - Sidney H. Avener - McGrawHill
2. Essential of Materials science and engineering - Donald R.Askeland -Thomson.

REFERENCES :

1. Material Science and Metallurgy – Dr. V.D.kodgire.
2. Materials Science and engineering - Callister & Baalasubrahmanyam
3. Material Science for Engineering students – Fischer – Elsevier Publishers
4. Material science and Engineering - V. Rahghavan
5. Introduction to Material Science and Engineering – Yip-Wah Chung CRC Press
6. Material Science and Metallurgy – A V K Suryanarayana – B S Publications
7. Material Science and Metallurgy – U. C. Jindal – Pearson Publications

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – I Sem.

MECHANICS OF SOLIDS - 14170303

Objective: The students completing this course are expected to understand the basic terms like stress, strain, poisons ratio… etc. and different stress induced in beams, thin cylinders, thick cylinders and columns. Further the student shall be able to understand the shear stresses in circular shafts.

UNIT – I

Objective: After studying this unit the student will know the basic terms like stress, strain, poisons ratio and stress in bars of varying section, composite bars, Temperature stresses and Mohr's circle.

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section – composite bars – Temperature stresses.

Stresses on an inclined plane under different uniaxial and biaxial stress conditions. Principal planes and principal stresses –concept of Mohr's circle limited to simple problems only.

UNIT – II

Objective: After studying this unit the student will know the basics of beams, S.F and B.M diagrams of different beams under various loading conditions and also how to solve problems.

SHEAR FORCE AND BENDING MOMENT : Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Objective: After studying this unit the student will know the basics of bending and bending equation. Evaluation of bending stress in various cross sections and also how to solve problems.

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T sections – Design of simple beam sections.

SHEAR STRESSES : Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T sections.

UNIT – IV

Objective: After studying this unit the student will know how to find the slope and deflection for different support arrangements by double integration method and Macaulay's methods. Statistically indeterminate Beams and problem solving techniques.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

DEFLECTION OF BEAMS : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads & U.D.L. Mohr's theorems – Moment area method – application to simple cases including overhanging beams. Brief explanation of statistically indeterminate Beams and solution methods.

UNIT – V

Objective: After studying this unit the student will know how a cylinder fails, what kind of stress are induced in cylinders subjected to internal and external pressures and problem solving techniques.

THIN CYLINDERS & SPHERES: Thin cylindrical vessels subjected to internal pressure, longitudinal and circumferential stresses & strains, Volumetric strains – changes in dimensions of thin cylinders – Thin spherical shells.

Thick cylinders – Stresses in a thick cylindrical shell, lame's equation – cylinders subjected to inside & outside pressures – streeses in compound thick cylinders.

UNIT – VI

Objective: After studying this unit the student will know shear stresses induced in circular shafts and composite shafts. Difference between Columns & Struts, Failure, different end conditions and problem solving techniques.

TORSION: Introduction- Derivation- Torsion of Circular shafts –Transmission of power by circular shafts, composite shafts.

COLUMNS & STRUTS: Buckling and stability, slenderness ratio, Failure of Columns & Struts, End conditions for long columns, effect of end conditions on column buckling, Expressions for crippling loads. Euler's theory of Columns, Rankine's Formula.

TEXT BOOKS:

1. Strength of materials by R.K.Bansal , Laxmi Publications .
2. Strength of materials by Bhavikatti, Lakshmi publications.
3. Strength of materials by RK Rajput, S Chand publications.
4. Solid Mechanics, Schaum's Outline series

REFERENCES:

1. Analysis of structures by Vazirani and Ratwani.
2. Strength of Materials by S.Timshenko
3. Strength of Materials by Andrew Pytel and Ferdinond L. Singer Longman.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – I Sem.

THERMODYNAMICS - 14170304

Course Objectives:

To impart the knowledge of the thermodynamic laws and principles so as to enable the student to prepare an energy audit of any mechanical system that exchange heat and work with the surroundings.

UNIT – I

Objectives: The student should be able to understand the basic concepts like thermodynamic system, its boundary and related fundamental definitions. Difference between point function and path function shall be made with respect to energy, work and Heat.

Introduction: Basic Concepts : System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry –Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale – PMM I

UNIT II

Objectives: To learn the first law of thermodynamics, which is also the energy conservation principle, and should be able to apply to different thermodynamic systems. To understand the concept of equality of temperature and the principle of operation of various temperature measuring devices. To learn the applications of steady flow energy equation to the various mechanical components.

Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation. Throttling and free expansion processes – deviations from perfect gas model – vander Waals equation of state – compressibility charts – variable specific heats – gas tables.

UNIT – III

Objectives: To understand the second law statements and the associated terms and should be able to apply the principles to heat engines. Should be able to analyse the concepts of Carnot cycle, entropy, availability and irreversibility. Should be able to understand the use of Maxwells relations and thermodynamic functions.

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics.

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UNIT IV

Objectives: Should understand the process of steam formation and its representation on property diagrams with various phase changes and should be able to calculate the quality of steam after its expansion in a steam turbine, with the help of standard steam tables and charts.

Pure Substances, p-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry.

UNIT – V

Objectives: Should be able to use Psychrometric chart and calculate various psychrometric properties of air.

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation , Carrier's Equation – Psychrometric chart.

UNIT - VI

Objectives: To understand the concept of air standard cycles and should be able to calculate the efficiency and performance parameters of the systems that use these cycles.

Power Cycles : Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericcson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.
Refrigeration Cycles : Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell- Coleman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS :

1. Engineering Thermodynamics , PK Nag 4th Edn , TMH.
2. Thermodynamics – An Engineering Approach with student resources DVD – Y.A.Cengel & M.A.Boles , 7th Edn - McGrawHill

REFERENCES :

1. Engineering Thermodynamics – Jones & Dugan PHI
2. Thermodynamics – J.P.Holman , McGrawHill
3. An Introduction to Thermodynamics - Y.V.C.Rao – Universities press.
4. Engineering Thermodynamics – P.Chattopadhyay – Oxford Higher Edn Publ.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – I Sem.

BASIC AUTOMOBILE ENGINEERING - 14170301

UNIT-I INTRODUCTION TO AUTOMOTIVES

An Overview of different types of automobiles and their power sources. Specifications, Performance Parameters, Quality standards, Trends in automobile design.

UNIT-II ENGINE AND SUB SYSTEMS

Reciprocating Engine systems, Rotary Engine Systems, Pollutant emission Standards, Engine Lubrication, splash and pressure lubrication system, oil filters, oil pumps, Engine cooling system, Engine fuel system, Engine intake & exhaust systems.

UNIT-III TRANSMISSION, SUSPENSION

Clutches, principle of operations, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel-gear boxes, types, sliding mesh, construct mesh, synchro- mesh gear boxes, over drive torque converter. propeller shaft, Torque tube drive, universal joint & slip joint, Hotch-kiss drive , differential rear axles-types-wheels and tyres, Frame & front axles.

UNIT-IV STEERING AND BRAKING SYSTEM

Steering geometry-camber, castor, king pin rake, combined angle toe-in, center point steering. types of steering mechanism-Ackerman steering mechanism, steering gears-types, steering linkages. Mechanical, hydraulic, pneumatic & vacuum brakes-brief description, anti lock brake system (ABS) and electro magnetic retarder.

UNIT-V OTHER AUXILIARY SYSTEMS

Electrical and electronic systems, safety systems, voltage regulators, bendix drive mechanism solenoid switch, lighting system, horn, wiper, fuel gauge, Heating, Ventilation, and Air Conditioning (HVAC) systems, Vehicle Thermal Management System and Vehicle body design features**.**

UNIT-VI ENGINE SPECIFICATION AND SAFETY SYSTEMS

Engine Specifications with regard to power, speed, torque, no.of cylinders and arrangement, lubrication and cooling etc.

Safety: Introduction to safety systems, seat belt, air bags, bumper, wind shield, suspension sensors, traction control, mirrors, central locking and electric windows, speed control.

Text Books:

1. Automotive Mechanics, William H Crouse and Donald L Anglin, Tata McGraw – Hill Publishing Co. Ltd. 2004, 10th Edition.
2. Automobile Engineering (Vol. 1) – Dr. Kirpal Singh
3. Automobile Engineering (Vol. 2) – Dr. Kirpal Singh

Reference Books:

1. Automobile Engineering --- G.B.S. Narang.
2. IC Engines – V.Ganeshan/TMH
3. IC Engines – ML Mathur & RP Shrma
4. IC Engines – Domkundvar
5. BP Obert IC Engines & Air Pollution – Harper & Row pub.
6. Bosch Gasoline Engines Management – Bosch Pub.
7. Bosch Diesel Engine Management – Bosch Pub.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – I Sem.

FLUID MECHANICS & HYDRAULIC MACHINERY - 14170305

UNIT I

Objective: The objective of this unit is to make student understand the properties of fluids, specific gravity, viscosity and measurement of pressure.

Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT II

Objective: The objective of this unit is to make student understand the Fluid kinematics and Fluid dynamics. Euler's and Bernoulli's equations of fluid flow, momentum equation and its application.

Fluid kinematics: stream line, path line and streak lines and stream tube, classification of flows- steady & Unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows- equation of continuity for one dimensional flow.
Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT III

Objective: The objective of this unit is to make student understand flow in closed conduits. Losses and hydraulic gradient line. Momentum equation and its application. Measurement of fluid flow.

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter.

UNIT IV

Objective: The objective of this unit is to make student understand dimensional analysis and dimensional numbers and their significance. Boundary layer theory and applications. Drag and lift on immersed bodies.

Dimensional analysis and similitude: Dimensional homogeneity, Buckingham's theorem, important dimensional numbers and their significance, geometric, Kinematic and dynamic similarity, model studies.
Boundary Layer Theory and Applications: Concepts of boundary layer, boundary layer thickness and equations, momentum integral equation, boundary layer separation and its control, cavitation. Circulation, Drag and lift on immersed bodies, Magnus effect.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT V

Objective: The objective of this unit is to make student understand basics of turbo machinery: hydrodynamic force of jets. Hydraulic pumps and their Classification, performance characteristic curves of Centrifugal and reciprocating pumps.

Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work don and efficiency, flow over radial vanes.
Centrifugal pumps: classification, working, work done – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH.
Reciprocating Pumps: Working, Discharge, slip, indicator diagrams.

UNIT VI

Objective: The objective of this unit is to make student understand basics of Hydraulic Turbines and Performance of hydraulic turbines.

Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design – draft tube- theory- functions and efficiency.
Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

TEXT BOOKS:

1. Fluid Mechanics and Hydraulic Machines by Rajput.
2. Hydraulics, fluid mechanics and Hydraulic machinery by Modi and Seth.

REFERENCE BOOKS:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – I Sem.

COMPUTER AIDED ENGINEERING DRAWING PRACTICE- 14170376

Course Objective: To enhance the student's knowledge and skills in engineering drawing and to introduce drafting packages and commands for computer aided drawing and modeling.

UNIT-I:

Objective: The knowledge of projections of solids is essential in 3D modeling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection and sections of solids.

Projections Of Planes & Solids : Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

UNIT-II:

Objective: The knowledge of development of surfaces of solids is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection. The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic.

Development And Interpenetration Of Solids: Development of Surfaces of Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.
Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT-III:

Objective: Isometric projections provide a pictorial view with a real appearance. Perspective views provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.

Isometric Projections : Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.
Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions.

Perspective Projections: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods(General Method only).

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In part B computer aided drafting is introduced.

UNIT IV:

Objective: The objective is to introduce various commands in AutoCAD to draw the geometric entities and to create 2D and 3D wire frame models.

Introduction to Computer aided Drafting: Generation of points, lines, curves, polygons, dimensioning. Types of modeling : object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling,.

UNIT V:

Objective: By going through this topic the student will be able to understand the paper-space environment thoroughly.

View points and view ports: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint, single option.

UNIT VI:

Objective: The objective is to make the students create geometrical model of simple solids and machine parts and display the same as an Isometric, Orthographic or Perspective projection.

Computer aided Solid Modeling: Isometric projections, orthographic projections of isometric projections, Modeling of simple solids, Modeling of Machines & Machine Parts.

TEXT BOOKS :

1.Engineering Graphics, K.C. john, PHI Publications
2.Engineering drawing by N.D Bhatt , Charotar publications.

REFERENCES:

1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex
2. Auto CAD 2013 fundamentals- Elisemoss, SDC Publ.
3. Engineering Drawing and Graphics using Auto Cad – T Jeyapoovan, vikas
4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age
5. Engineering Drawing – RK Dhawan, S Chand
6. Engineering Drawing – MB Shaw, BC Rana, Pearson
7. Engineering Drawing – KL Narayana, P Kannaiah, Scitech
8. Engineering Drawing – Agarwal and Agarwal, Mc Graw Hill
9. Engineering Graphics – PI Varghese, Mc Graw Hill
10. Text book of Engineering Drawing with auto-CAD , K.venkata reddy/B.S . publications.

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II Year B.Tech. (AME) – I Sem.

AUTOMOBILE ENGINEERING LAB 1 - 14170311

1. Identification, location, study and preparation of schematic layout of automobile vehicle and its components.
2. Study of Automobile Components & Functions (Measurement of dimensions of different components) -
    a. Single Cylinder Four Stroke Diesel Engine.
    b. Two Stroke Petrol Engine (Two Wheeler)
    c. Four Stroke Petrol Engine (Two Wheeler)
    d. MPFI Engine
    e. CRDI Engine
3. Writing technical specifications and descriptions of all types of automobile engines (petrol and diesel)- materials, functions with sketches.
4. Valve spring testing
5. Connecting rod alignment
6. Piston ring testing
7. Dismantling and Inspection of Wear & Tear of Engine Components
8. Study, Identification and Application of Special Tools/ Components/ Gauges/ Hand Tools/ Power Tools for automobiles.
9. Special Tools for Adjustment of Engine Components
10. Study of Multi Cylinder V Type Diesel Engine

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – I Sem.

MECHANICS OF SOLIDS & FLUID MECHANICS LAB - 14170312

Objective: The students completing this course are expected to understand the testing methods to find the strength of different materials of various materials.

(A) MECHNICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test on

a) Simple supported

b) Cantilever beam

3. Torsion test
4. Hardness test

a) Brinells hardness test

b) Rockwell hardness test

5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

(B) FLUID MECHANICS LAB

Course Objective: To impart hands-on practical exposure on study of fluid flow and working of hydraulic machinery.

1. Impact of jets on Vanes.
2. Performance Test on Single Stage Centrifugal Pump.
3. Performance Test on Reciprocating Pump.
4. Calibration of Venturimeter.
5. Calibration of Orifice meter.
6. Determination of friction factor for a given pipe line.
7. Determination of loss of head due to sudden contraction in a pipeline.
8. Turbine flow meter.

Note : Any 6 of the above 8 experiments are to be conducted.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – II Sem.

KINEMATICS OF MACHINERY - 14170401

Objective: The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines. The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope, chain and gear drives and their working principles and their merits and demerits.

UNIT – I

Objective: The objective of this unit is to make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved.

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely
constrained .
Khubralrs criteria , Grashoff's law , Degrees of freedom, Kutzbach criterian for planar mechanisms, Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT – II

Objective: The objective of this unit is to make student understand various mechanisms for straight line motion and their applications including steering mechanism.

LOWER PAIR MECHANISM: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.
Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio; Hooke's Joint: Single and double – Universal coupling–application–problems.

UNIT – III

Objective : The objective of this unit is to make student understand the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain. To understand the application of slider crank mechanism etc. and study of plane motion of the body.

KINEMATICS: Velocity and acceleration – Motion of a link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Velocity and acceleration analysis of for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT – IV

Objective The objective of this unit is to make student understand the theories involved in cams. Further the students are exposed to the applications of cams and their working principles.

CAMS: Definitions of cam and followers – their uses – Types of followers and cams – Terminology –Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

UNIT – V

Objective: The objective of this unit is to make student understand gears, power transmission through different types of gears including gear profiles and its efficiency.

Gears: Higher pairs, friction wheels and toothed gears–types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

UNIT – VI

Objective: The objective of this unit is to make student understand different types of gear trains in the principles of operation. Students are exposed to merits and demerits of each gear train.

Gear Trains:

Introduction to gear trains, train value,types- simple and reverted wheel train – epicyclic gear train. Methods of finding train value or velocity ratio-epicyclic gear trains. Selection of gear trains- differential gear train for an automobile.

TEXT BOOKS:

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines – S. S Rattan- TMH
3. Theory of machines and Mechanisms – J.J Uicker, G.R.Pennock & J.E.Shigley – Oxford publishers.

REFERENCES:

1. Theory of Machines Sadhu Singh Pearsons Edn
2. Theory of machines and Machinery /Vickers /Oxford .
3. Theory of Mechanisms and machines – A.Ghosh & A.K.Malik – East West Press Pvt. Ltd.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – II Sem.

AUTOMOTIVE ENGINES - 14170402

UNIT-1

Objectives: To make the students understand the development in internal combustion engines, classification and constructional details in detail.

Introduction: Historical development of Automobiles, Different Types of Automotive Power plants, principles of I.C engines, supercharging and turbo charging.

Two stroke and four stroke engines: different types of scavenging systems, scavenging efficiency. Valve and Port timing diagrams, Special types of I.C engines like Stirling, Wankle rotary, Variable compression ratio engines and Variable valve timing engines.

Automobile engine components: Classification, Function , Materials, Constructional details and Manufacturing process of various engine components.

UNIT-2

Objectives: To make the students understand the fuel admission in S.I engines and related systems.

Carburetion: Mixture requirements in S.I engines, fundamental of carburetion flow characteristics of carburetion, Methods of mixture correction, calculation of throat and jet sizes of a carburettor, Types of carburettors and working. Timed and continuous injection systems, multipoint fuel injection system, Introduction to Gasoline Direct Injection (GDI).

Advantages of petrol injection, need to have a close control over air fuel ratio in S.I engines for emission reduction, cylinder port on the manifold injection systems

UNIT-3

Objectives: To make the students understand the fuel admission in C.I engines and understand the functioning of various components involved in fuel injection in C.I engines.

Fuel injection in C.I engines: Fuel filters, transfer pumps, injection pumps, injection nozzles, their functions, Diesel fuel pumps: principle delivery characteristics of fuel pumps, effects of ignition lag on injection, pressure waves in fuel lines, rotary distributor pumps. Factors affecting atomization and vaporization.

Fuel spray characteristics: Types of injection nozzles and their characteristics, Multihole, Pintle and Pintaux nozzles. Unit injectors. Common Rail Direct Injection.

UNIT-4

Objectives: To make the students understand the combustion phenomenon in S.I engines and learn about the fuel characteristics.

Combustion in S.I engines: Normal combustion and Abnormal combustion- Importance of flame speed and effect on engine variables- Types of abnormal combustion, pre-ignition and knocking (explanation of)- Fuel requirements and fuel ratings, Anti-knock additives- Combustion chamber- Requirements, types.

UNIT-5

Objectives: To make the students understand the combustion phenomenon in C.I engines and learn about the fuel characteristics.

Combustion in C.I engines: Four stages of combustion- Delay period and its importance- Effect of engine variables- Diesel Knock- Need for air movement, suction, compression and combustion induced turbulence- open and divided combustion chambers and nozzles used- fuel requirements and fuel rating. Types of turbochargers

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT-6

Objectives: To make the students understand the importance of Governors, lubrication systems and cooling system for effective functioning of internal combustion engine.

Governors: Maximum and minimum speed governors. Mechanical and pneumatic governors.

Lubrication systems: Characteristics of lube oils, Functions of the lubrication system, classification of lubricating oils, lubricating systems- wet sump lubrication- dry sump lubrication, oil filters, oil pumps, crankcase ventilation, oil additives. Air and water cooling systems, thermo siphon and forced water cooling systems. Types of fans- Viscous fan/ EMFC. Characteristics of coolant oil.

Textbooks:

1. **ML MATHUR & RP SHARMA-** A course in Internal combustion engines- Dhanpat Rai
2. **V. GANESAN**- TMH- I.C ENGINES
3. **K. NEWTON and STEEDS-** The Motor Vehicle, SAE Publications

References books:

1. **B.P OBERT I C ENGINES & AIR POLLUTION-** Harper & ROW Publications
2. **BOSCH GASOLINE & DIESEL MANAGEMENT-** Bosch Publication

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(AUTONOMOUS)
Approved by AICTE, Accredited by NBA & NAAC 'A' Grade, Recognized under 2(f) and 12(b) of UGC,
Permanently Affiliated to JNTUK, Kakinada.

B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME) – II Sem.

BASIC ELECTRICAL & ELECTRONICS ENGINEERING - 14170403

Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various
electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:
i. To learn the basic principles of electrical law's and analysis of networks.
ii. To understand the principle of operation and construction details of DC machines.
iii. To understand the principle of operation and construction details of transformer.
iv. To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
v. To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
vi. To learn the operation of PNP and NPN transistors and various amplifiers.

UNIT - I
ELECTRICAL CIRCUITS: Basic definitions, Types of network elements, Ohm's Law, Kirchhoff's Laws, inductive networks, capacitive networks, series, parallel circuits and star-delta and delta-star transformations.

UNIT - II
DC MACHINES : Principle of operation of DC generator – emf equation - types – DC motor types
–torque equation – applications – three point starter, swinburn's Test, speed control methods.

UNIT - III
TRANSFORMERS: Principle of operation of single phase transformers – e.m.f equation – losses –efficiency and regulation.

UNIT - IV
AC MACHINES: Principle of operation of alternators – regulation by synchronous impedance method –principle of operation of 3-Phase induction motor – slip-torque characteristics - efficiency –
applications.

UNIT V
RECTIFIERS & LINEAR ICs: PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPs (inverting,
non inverting, integrator and differentiator).

UNIT VI
TRANSISTORS: PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Outcomes:
i. Able to analyse the various electrical networks.
ii. Able to understand the operation of DC generators,3-point starter and conduct the Swinburne's Test.
iii. Able to analyse the performance of transformer.
iv. Able to explain the operation of 3-phase alternator and 3-phase induction motors.
v. Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.
vi. Able to explain the single stage CE amplifier and concept of feedback amplifier.

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TEXT BOOKS:

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
2. Electrical Technology by Surinder Pal Bali, Pearson Publications.
3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group

REFERENCE BOOKS:

1.Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications
2.Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2nd edition
3. Basic Electrical Engineering by Nagsarkar,Sukhija, Oxford Publications,2nd edition
4. Industrial Electronics by G.K. Mittal, PHI

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME). – II Sem.

INDUSTRIAL ENGINEERING & MANAGEMENT - 14170404

Course Objective:

To impart knowledge on scientific principles of management to improve productivity in manufacturing industry.

Unit – I

Objective: To introduce fundamentals of industrial engineering and management.

Introduction: Definition of Industrial Engineering, Development, Applications, Role of an industrial engineer, Quantitative tools of IE and productivity measurement, Concepts of Management, Importance, Functions of management, Scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.

Unit – II

Objective: To teach basics of plant layout and its design.

Plant layout: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, Plant maintenance, preventive and breakdown maintenance.

Unit – III

Objective: To introduce basic tools of operations management.

Operations Management: Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.

Unit – IV

Objective: To teach statistical quality control techniques**.**

Statistical Quality Control: Quality control, its importance, Single and double sampling plans, OC curves and their uses; Control charts – $\bar{X}$ and R charts, $\bar{X}$ and S charts and their applications, numerical examples.

Unit – V

Objective: To teach concepts of personnel management and value engineering.

Resource management: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.

Value analysis: value engineering, implementation procedure.

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Unit – VI

Objective: To provide fundamental principles of project management.

Project management: PERT, CPM – differences & applications, Critical path, determination of floats, importance, project crashing, smoothing and numerical examples.

TEXT BOOKS:

1. Industrial Engineering and Management by O.P Khanna, Khanna Publishers.
2. Industrial Engineering and Production Management, Martand Telsang, S.Chand & Company Ltd. New Delhi

REFERENCES:

1. Operations Management by J.G Monks, McGrawHill Publishers.
2. Production and Operations Management – R.Panneerselvam- PHI- 3rd Edition
3. Industrial Engineering by Banga & Sharma.
4. Principles of Management by Koontz O' Donnel, McGraw Hill Publishers.
5. PERT/CPM by L.S Srinath, East west Press.
6. Production and operations management by K.C Arora.
7. Statistical Quality Control by Gupta.
8. Manufacturing Organization and Management, Harold T. Amrine, John A. Ritchey, Colin L. Moodie & Joseph F. Kmec, Pearson
9. Production Management by Buffa.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

II Year B.Tech. (AME). – II Sem.

MANUFACTURING PROCESSES - 14170405

Course Objective:

To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods of plastics.

UNIT – I

Objective: To make the students understand fundamentals of casting.

CASTING: Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT – II

Objective: To provide insight into sand casting and introduce other casting processes.

Methods of melting and types of furnaces, Solidification of castings, Solidification of pure metals and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investment casting.

UNIT – III

Objective: To impart fundamentals of gas welding and arc welding.

Welding : Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting.

Basic principles of Arc welding, Manual metal arc welding, Sub merged arc welding, Inert Gas welding- TIG & MIG welding.

UNIT – IV

Objective: To teach principles of advanced welding processes and their applications.

Resistance welding, Solid state welding processes- Friction welding, Friction stir welding, Forge welding, Explosive welding; Thermit welding, Plasma welding, Laser welding, electron beam welding, Soldering & Brazing.

Heat affected zones in welding; pre & post heating, Weldability of metals, welding defects – causes and remedies – destructive and nondestructive testing of welds, Design of welded joints.

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UNIT – V

Objective: To impart knowledge on bulk forming processes.

Plastic deformation in metals and alloys, Hot working and Cold working, Strain hardening and Annealing.
Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, Roll forging, Forging hammers, Rotary forging, forging defects; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing. Introduction to powder metallurgy – compaction and sintering, advantages and applications

UNIT – VI

Objective: To provide understanding of various sheet metal forming and processing of plastics.

Sheet metal forming - Blanking and piercing, Forces and power requirement in these operations, Deep drawing, Stretch forming, Bending, Springback and its remedies, Coining, Spinning, Types of presses and press tools.

Processing of Plastics: Types of Plastics, Properties, Applications and their processing methods, Blow and Injection molding.

TEXT BOOKS:

1. Manufacturing Processes for Engineering Materials - Kalpakjian S and Steven R Schmid- Pearson
   Publ , 5th Edn.
2. Manufacturing Technology -Vol I- P.N. Rao- TMH
3. Fundamentals of Modern Manufacturing - Mikell P Groover- Wiley publ – 3rd Edition

REFERENCES :

1. Manufacturing Science – A.Ghosh & A.K.Malik – East West Press Pvt. Ltd
2. Process and materials of manufacture- Lindberg- PHI
3. Production Technology- R.K. Jain- Khanna
4. Production Technology-P C Sharma-S. Chand
5. Manufacturing Processes- H.S. Shaun- Pearson
6. Manufacturing Processes- J.P. Kaushish- PHI

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II Year B.Tech. (AME) – II Sem.

SOFT SKILLS-1 - 14179406

Course Objective: To strengthen the four language skills of the learners and to prepare them for success in academics and the job market.

Semester I 60hours+Assessment 3hrs
Total:15 weeks Theory: 45 hours Practical: 15 hours
Per Week: 4 hours Theory: 3 hours Practical: 1hour

UNIT 1: PLACES		Theory/Lab	Time frame
Reading	Introducing the theme; Scanning for information/numbers; understanding key vocab; making predictions	Punctuation Understanding unknown text	
Writing	Punctuation, sentence structure, writing different sentences		
Listening & Pronunciation	listening for main ideas/details; wordstress vowel sounds	Lab	
Speaking	Organizing information for a presentation*;* Making a presentation	Lab	
Grammar	Parts of speech: Nouns, verbs and adjectives; Subject + verb; There is / There are; Past simple		
Vocabulary	Vocabulary to describe places		
UNIT 2: FESTIVALS AND CELEBRATIONS		Theory/Lab	Time frame
Reading	Previewing a text using the title, sub-titles and photographs; recognizing text types, skimming the text	Pre-reading requires viewing of a video	
Writing	Organizing sentences into a paragraph*;* writing a first draft; writing paragraph :descriptive ,narrative etc.		
Listening & Pronunciation	Listening and taking notes; listening for examples; Stressed words and unstressed sounds	Lab	
Speaking	Making suggestions*;* Giving a poster presentation, understanding intonation	Lab	
Grammar	Prepositions of time and place: *on, in, at;* Adverbs of frequency*;* Sentence structure: subject and verb order; Prepositional phrases; Present tense question forms		
Vocabulary	Vocabulary to describe festivals; Collocations		
UNIT 3: SCHOOL AND EDUCATION		Theory/Lab	Time frame
Reading	Skimming for main ideas; reading for details; making inferences	Pre-reading requires viewing of a video	

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Writing	Paragraph organization: topic sentence and supporting sentences, selection of type of paragraph, ordering and sequencing		
Listening & Pronunciation	Using visual clues to listen; following native accent and intonation	Lab	
Speaking	Giving opinions in a debate: agreeing and disagreeing,convincing	Lab	
Grammar	Tense and aspect, use of *because* and *so;* basic verb patterns		
Vocabulary	Vocabulary in academic context; Collocations about learning; Prepositional phrases		
UNIT 4: THE INTERNET AND TECHNOLOGY		Theory/Lab	Time frame
Reading	Understanding theme; Scanning to predict content; Making inferences	Pre-reading requires viewing of a video	
Writing	Describing an ordering steps,structurizing information		
Listening & Pronunciation	Listening for reasons; Listening and predicting the inner theme and conclusion ,consonant sounds	Lab	
Speaking	Presenting additional or contrasting information;	Lab	
Grammar	Compound nouns; *and, also* and *too*; *but* and *however; can* / *be able to*		
Vocabulary	Vocabulary for Internet and technology		
UNIT 5: LANGUAGE AND COMMUNICATION		Theory/Lab	Time frame
Reading	Reading for main ideas, identifying the meaning, preparing captions	Pre-reading requires viewing of a video	
Writing	Writing supporting sentences; Reviewing a paragraph for content and structure, report writing ,types of report		
Listening & Pronunciation	Listening for genre; Listening for instructions; Consonant sounds	Lab	
Speaking	Sequencing words to organize instructions; Planning and giving a set of instructions	Lab	
Grammar	Countable and uncountable nouns; Articles *a, an* or no article; Quantifiers: *some, many, a lot of, a few, a little;* Imperative clauses; Verb patterns		
Vocabulary	Vocabulary for every day communication		

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II Year B.Tech. (AME) – II Sem.

MACHINE DRAWING - 14170477

Course Objective: The student will acquire knowledge of fastening arrangements such as welding, riveting the different styles of attachment for shaft. The student also is enabled to prepare the assembly of various machine or engine components and miscellaneous machine components.

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions
a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
d) Title boxes, their size, location and details - common abbreviations & their liberal usage
e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts

Objective: To provide basic understanding and drawing practice of various joint, simple mechanical parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.
a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
b) Keys, cottered joints and knuckle joint.
c) Rivetted joints for plates
d) Shaft coupling, spigot and socket pipe joint.
e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Objective: The student will be able to draw the assembly from the individual part drawing.

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.
a) Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly.
b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.
c) Valves : Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE : First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

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TEXT BOOKS:

1. Machine Drawing – Dhawan, S.Chand Publications
2. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers

REFERENCES:

1. Machine Drawing – N.Siddeswar, K.Kannaiah & V.V.S.Sastry - TMH
2. Machine Drawing – P.S.Gill,
3. Machine Drawing – Luzzader
4. Machine Drawing – Rajput
5. Machine Drawing – N.D. Junnarkar, Pearson
6. Machine Drawing – Ajeeth Singh, McGraw Hill
7. Machine Drawing – KC John, PHI
8. Machine Drawing – B Battacharya, Oxford
9. Machine Drawing – Gowtham and Gowtham, Pearson

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II Year B.Tech. (AME). – II Sem.

AUTOMOBILE ENGINEERING LAB 2 - 14170411

1. Dismantling and Assembly of 4 Wheeler and understanding its components.
2. Testing of IC Engine –Measurement of Speed, Fuel flow, Air consumption and measurement of BHP.
3. Determination of IHP, BHP, Mechanical efficiency, brake thermal efficiency, indicated thermal efficiency, volumetric efficiency, SFC and drawing heat balance sheet for petrol and diesel engines.
4. Test on multi cylinder engines, Morse test
5. Valve and port timing diagrams, determination of compression ratio
6. Tests on fuel and lubricants.
    a. Viscosity-Viscometer Redwood
    b. Viscosity Index – Saybolt Viscometer
    c. Flash and Fire Points of fuels
       Flash and Power points of Lubricants
    d. Calorific Value of Liquid Fuels
       Calorific Value of Gaseous Fuels
    e. Density Test of Petrol/ Diesel
7. Performance test on VCR (Variable Compression Ratio) Engine.

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II Year B.Tech. (AME). – II Sem.

Basic Electrical and Electronics Engineering Lab - 14172412

Any five experiments are to be conducted from each section.

Section A: Electrical Engineering:

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's test on D.C. Shunt machine(Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).
3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by
a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

Section B: Electronics Engineering:

1. PN junction Diode characteristics A. Forward bias, B. Reverse bias.(Cut in voltage & Resistance calculations)
2. Transistor CE Characteristics (Input and Output).
3. Full wave Rectifier with and without filters.
4. CE Amplifiers.
5. RC Phase Shift Oscillator.
6. Class A Power Amplifier.

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III Year B.Tech. (AME) – I Sem.

DYNAMICS OF MACHINERY - 14170501

Course Objectives:

1. To equip the student with fundamental knowledge of dynamics of machines so that student can appreciate problems of dynamic force balance, transmissibility of forces, isolation of systems, vibrations.
2. Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
3. Develop understanding of vibrations and its significance on engineering design.
4. Develop understanding o f dynamic balancing, flywheel analysis, gyroscopic forces and moments.

UNIT – I

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships, static and dynamic force analysis of planar mechanisms.

UNIT – II

FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.

BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle. General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission,

UNIT – III

TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism, inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams – fluctuation of energy – fly wheels and their design.

UNIT-IV

GOVERNERS: Watt, porter and proell governors, spring loaded governors– Hartnell and Hartung with auxiliary springs. sensitiveness, isochronism and hunting.

UNIT – V

BALANCING: Balancing of rotating masses single and multiple – single and different planes, use of analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples – examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

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UNIT – VI

VIBRATIONS: Free Vibration of spring mass system – oscillation of pendulums, centers of oscillation and suspension, transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems. Introduction to damped and forced vibrations.

TEXT BOOKS :

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.
2. Mechanism and machine theory by Ashok G. Ambedkar, PHI Publications.

REFERENCES :

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / NewAge.
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi / S.Chand.

Course outcomes:

Upon successful completion of this course the student should be able to:

1. Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
2. Compute frictional losses, torque transmission of mechanical systsms.
3. Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
4. Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
5. Understand balancing of reciprocating and rotary masses..

Useful Web-links : http://nptel.ac.in/courses.php
http://mit.espe.edu.ec/courses/mechanical-engineering/

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III Year B.Tech. (AME) – I Sem.

AUTOMOTIVE ELECTRICAL AND AUTOTRONICS - 14170502

Course Objectives: To impart the knowledge of various automotive electrical and electronic systems. To study and understand the functioning of different systems like ignition system, starter motors, electronic controls of carburetion, dash board units and other auto electrical Systems.

Unit-I

Objective: To make the student understand the working of storage battery and the principles involved in it. Further the factors affecting the performance of the battery will be studied.

Storage Battery: Principles of lead acid cells and their characteristics. construction and working of lead acid battery. types of batteries, testing of batteries, effect of temperature on capacity and voltage, battery capacity, voltage, efficiency, charging of batteries, sulphation and desulphation, maintenance and servicing. Fault diagnosis. New developments in electrical storage.

Unit-II

Objective: To make the student understand the ignition system and electronic components involved in automobiles.

a)Ignition System: Conventional ignition system and study of its components. Types of ignition systems, spark advance and retarding mechanisms. Types of spark plugs.

b)Starter motor: Construction and working of series and shunt automotive starter motor, starter motor troubles and repairs.

Objective: To make the students understand the working of alternator and charging systems.

c)Charging system: Principle of generation of direct current. construction and working of alternator generating systems. Maintenance, servicing and trouble shooting. Bosch compact alternator.

Unit-III

Objective: To make the students understand the working of fusing systems and wiring involved in auto electrical systems.

Wiring for auto electrical Systems: Earth return and insulated return systems, six volt and twelve volt systems, fusing of circuits, low and high voltage automotive cables, wiring diagram for typical automotive wiring systems, maintenance and servicing.

Objective: To make the students understand the dash board units and electrical accessories.

Dash board units and electrical accessories: Principle of automobile illumination, head lamp construction and wiring, horn, wind screen wiper signaling devices, fog lamps, auxiliary lighting , temperature gauge, oil pressure gauge, fuel gauge, speedometer, odometer, Central locking, Power windows.

Unit-IV BASICS OF ELECTRONICS

Objective: To make the student understand the basic electronic components

Semiconductors, Transistors, Amplifiers, Integrated circuits – Analog and Digital, Logic Gates,

Microcontrollers, Analog to Digital and Digital to Analog Converters.

SENSORS

Sensors - Air flow, Pressure, Temperature, Speed, Exhaust gas Oxygen, Knock and Position, Principle of operation, construction and characteristics.

Unit-V

Objective: To make the student understand the electronic engine control systems

ELECTRONIC GASOLINE INJECTION SYSTEMS

Open loop and closed loop systems, Mono-point, Multi-point, Direct injection systems and Air assisted systems – Principles and Features, Types of injection systems, Idle speed, lambda, knock and spark timing control.

ELECTRONIC DIESEL INJECTION SYSTEMS

Heat release, control of fuel injection, Inline injection pump, Rotary Pump and Injector– Construction and principle of operation, Electronic control, Common rail and unit injector systems – Construction and principle of operation.

Unit – VI

Objective: To make the student understand the applications of electronics in various automobile systems.

Electronic ignition systems, Antilock brake system circuit, Traction control, Electronic control of automobile transmission, Active suspension, Engine management system, ESP, EEA, AMT, ECAS, GPS (Telematics), SLD.

Course outcomes: The students completing the course will be able to understand the different
automotive electrical systems, energy storages and ignition systems and the electronic components involved. The student will be in position to identify the fault diagnosis and preventive measures.

TEXTBOOKS

1. Automotive Electrical auxiliary systems -By N. R. Khatawale
2. Automotive Electrical & Electronic Systems - Tom Denton, SAE International
3. Automobile Electrical & Electronic Equipments- Young, Griffithe, The English Language book co., London
4. Understanding Automotive Electronics- William B.Ribbens-ELSEVIER
5. Gasoline Engine management, 3rd Edition, Robert Bosch, Bently pub., 2004
6. Diesel Engine Management, 4th Edition, Robert Bosch, Newness Publications, 2005

REFERENCES

1. Automotive Electrical systems -By Young and Griffith, Butterworth
2. Basic automotive electrical systems -By C.P.Nakra, Dhanpat Rai.
3. Automotive mechanics -By William H. Grouse, TMH 5. Modem Electrical Equipments - By A. W. Judge,
4. Automotive Electrical Equipment -By P.l. Kohli, TMH

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – I Sem.

DESIGN OF MACHINE ELEMENTS - 14170503

Course Objectives: To impart the knowledge of the design procedures and principles so as to enable the student, understand and design basic mechanical elementals that are subjected to various loads.

UNIT – I
Objective: To learn various factors to be considered in designing an element and to understand
different theories of failures.
INTRODUCTION: General considerations in the design of Engineering Materials and their properties – Manufacturing consideration in design. Tolerances and fits –BIS codes of steels.
STRESSES IN MACHINE MEMBERS: Simple stresses – Combined stresses – Torsional and bending stresses - Various theories of failure – factors of safety – Design for strength and rigidity – preferred numbers. Static strength design based on fracture toughness.
STRENGTH OF MACHINE ELEMENTS : Stress concentration –Fatigue stress concentration factor-notch sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Goodman's line – Soderberg's line – Modified goodman's line.

UNIT – II
Objectives: The students are to be exposed to the design of riveted, welded joints and bolted joints.
Rivited and welded joints – Design of joints with initial stresses, Bolted joints – Design of bolts with pre-stresses – both of uniform strength.

UNIT – III
Objective: To learn various factors to be considered in designing shafts subjected to different
loads. Further, design aspects of rigid and flexible couplings.
Shafts, keys and cotters:
SHAFTS : Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. Design of Keys-stresses in keys-cottered joints-spigot and socket, sleeve and cotter.
COUPLINGS: Design of Rigid couplings: Muff, Split muff and Flange couplings-Flexib le couplings.
UNIT – IV
Objective: The students are to be exposed to learn various factors to be considered in designing
different types of springs.
Mechanical Springs: Stresses and deflections of helical springs – Extension and compression springs – Springs for fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs – Co-axial springs, leaf springs, Bogie leaf springs, Parabolic leaf springs.

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UNIT – V

Objective: The objective is to make the students learn fundamentals of lubrication, various
bearings and estimation of bearing life.

BEARINGS : Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings – Clearance ratio – Heat dissipation of bearings, bearing materials – journal bearing design
– Ball and roller bearings – Static loading of ball & roller bearings, Bearing life.
Lubricants Types & properties.

UNIT – VI

Objective: The objective is to make the students use the design concepts to design various engine
components.

ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – Cranks and Crank shafts, strength and proportions of over hung and center cranks – Crank pins, Crank shafts. Pistons, Forces acting on piston – Construction Design and proportions of piston, Cylinder liners.

Course outcomes:

The students completing the course will be able to understand the concepts of various theories of failure, factors of safety, Design for strength and rigidity. Further the same will be used to design mechanical parts such as joints, shafts couplings, springs, bearings and other engine components.

TEXT BOOKS:

1. Dr P. Kannaiah Scitech Publishers
2. Design of Machine Elements/ T.J. Prabhu
3.Machine Design / Soundararaja Murthy and shanmugam
4. Machine design – Pandya & shah.

REFERENCES:

1. Design of Machine Elements / V.M. Faires
2. Machine design / Schaum Series.
3. Mech. Engg. Design / JE Shigley
4. Machine Design / Sarma and Agarwal
5. Machine Design / V.V. Bhandari
6. Machine Design Hand Book / V.V. Bandari

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – I Sem.

VEHICLE TRANSPORT MANAGEMENT - 14170504

Course Objectives: To impart the knowledge of organization and managing different kinds of vehicle transport systems. Should be able to develop an efficient transport management system considering infrastructure, public relations, route planning, schedules, and fare structure.

UNIT – I

Objective: The objective is to understand the history of transport management and the infrastructure requirements. The student will be able to understand the need of preventive maintenance.

Historical Back ground: Introduction, the growth of a network, trams, trolley buses, private car's subsidies. The Infrastructure: Road- Approach Road. Highways National, State, District, traffic condition, relief of congestion, pedestrians, zebra lines, margins, shopping centres. Bus-stops. Shelters, Bus stations, Garages layout of premises, equipment, use of machinery, conveyance of staff, facilities for passengers. Maintenance -preventive, breakdown, overhauling -major, minor.

UNIT - II

Objective: The objective is to introduce the concepts of organization, administration and inter departmental liaison.

Organization and Management: Forms of ownership, principle of transport management - STU (State Transport Undertaking) staff administration: industrial relation, administration, recruitment and training, welfare, health and safety.

Public relations divisions: Dissemination of information, handling complaints, traffic advisory. Committees- local contractors -inter departmental liaison advertisements, signs, notice and directions- general appearance of premises, specialized publicity.

UNIT - III

Objective: The student will be exposed how to prevent accidents by recording and estimating using different mechanisms.

Prevention of accidents: Emphasis of safe driving-annual, awards, bonus encouragement vehicle design platform, layout, location of steps, scheduled route hazards records elimination of accident prone devices.

Route planning: Source of traffic, town planning, turning points, stopping places, shelters survey of route preliminary schedule test runs elimination of hazards factors affecting. Frequency direction of traffic flow estimated traffic possibility single verses double deck.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT - IV

Objective: The objective is to make the students schedule vehicle and crew timings and fare
collection systems.

Timing, bus working and schedules : Time table layout uses of flat graph method of presentation preparation of vehicle and crew schedule preparation of the duty roster, co-operation with employers use of the vehicle running numbering- determination of vehicle efficiency, checking efficiency of crew, duty arrangements.

UNIT - V

Objectives: The students are to be exposed to derive fare structure by estimating the operating costs for various types of vehicles.

Fare collections systems: Principles of collection the way bill, bell punch system, Box system personal and common stock flat fare platform control.

The fare structure: Basis of fares historical background effects of competition and control calculating average zone system straight and tapered scale.

UNIT - VI

Objectives: The objective is to make the students understand various types of vehicles and to estimate the operating cost by considering factors like depreciation, obsolescence, life of vehicles
and wages etc.,

Operating cost and types of vehicles: Classification costs, average speed running costs supplementary costs depreciation obsolescence, life of vehicles- sinking fund factor- wages and overheads 100 seats miles basis, average seating capacity vehicles size and spread overs, types of vehicle economic considerations authorization of trolley, bus services, statuary procedure taxes and hire cars.

Course outcomes:

The students completing the course will be able to understand the concepts of transport management, various types of roads, preventive breakdown and overhauling. Further the student shall be able to understand route planning, crew schedule and fare structure fixation.

TEXT BOOKS:

1. Bus Operation -L.D.Kitchen, Lliffe & Sons
2. Bus & Coach Operation -Rex W. Fautks, Butterworth Version Of 1987

REFERENCES:

1. Compendium Of Transport Terms Cirt, Pune
2. M.V. Act 1988 Central Law Agency, Allahabad
3. The Elements Of Transportation -R.J. Eaton
4. Goods Vehicle Operation -By C.S. Dubbar
5. Road Transport Law- L. Dkitchen
5. Road Transport Law – L.D. Kitchen
6. Compendium Of Transport Terms Cirt, Pune (Report
7. M.V. Act 1988, Pub Central Law Agency, Allahabad

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – I Sem.

HEAT TRANSFER - 14170505

(Heat transfer data book allowed)

Course Objectives:

This course is intended to impart knowledge of principles of heat transfer and analyze the heat exchange process in various modes for the evaluation of rate of heat transfer and the temperature distribution in different configurations.

UNIT – I

INTRODUCTION: Modes and mechanisms of heat transfer – basic laws of heat transfer –General discussion about applications of heat transfer.

CONDUCTION HEAT TRANSFER: Fourier rate equation – general heat conduction equation in cartesian, cylindrical and Spherical coordinates. Steady, unsteady and periodic heat transfer – initial and boundary conditions.

ONE DIMENSIONAL STEADY STATE CONDUCTION HEAT TRANSFER: Homogeneous slabs, hollow cylinders and spheres – overall heat transfer coefficient – electrical analogy – critical radius of insulation- Variable thermal conductivity – systems with heat sources or heat generation.

UNIT – II

ONE DIMENSIONAL TRANSIENT CONDUCTION HEAT TRANSFER: Systems with negligible internal resistance – significance of biot and fourier numbers - chart solutions of transient conduction systems. Extended surface (fins) heat Transfer – long fin, fin with insulated tip and short fin, application to error measurement of temperature

UNIT – III

CONVECTIVE HEAT TRANSFER: Classification of convective heat transfer – dimensional analysis as a tool for experimental investigation – Buckingham Pi Theorem for forced and free convection, application for developing semi – empirical non-dimensional correlation for convective heat transfer – Significance of non-dimensional numbers – concepts of continuity, momentum and Energy Equations.

UNIT –IV

FREE CONVECTION: Development of hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relations for vertical plates and pipes.

FORCED CONVECTION

EXTERNAL FLOWS: Concepts about hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer-flat plates and cylinders.

INTERNAL FLOWS: Concepts about hydrodynamic and thermal entry lengths – division of internal flow based on this –use of empirical relations for horizontal pipe flow and annulus flow.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT – V

HEAT TRANSFER WITH PHASE CHANGE

BOILING: Pool boiling – regimes- calculations on nucleate boiling, critical heat flux and film boiling.

CONDENSATION: Film wise and drop wise condensation –nusselt's theory of condensation on a vertical plate - film condensation on vertical and horizontal cylinders using empirical correlations.

HEAT EXCHANGERS:

Classification of heat exchangers – overall heat transfer coefficient and fouling factor – concepts of LMTD and NTU methods – Problems.

UNIT – VI

RADIATION HEAT TRANSFER:

Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities – laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between grey bodies – radiation shields – electrical analogy for radiation networks.

TEXT BOOKS:

1. Heat Transfer - HOLMAN/TMH
2. Heat Transfer – P.K.Nag/ TMH
3. Principles of Heat Transfer – Frank Kreith, RM Manglik & MS Bohn, Cengage learning publishers.

REFERENCE BOOKS:

1. Heat and Mass Transfer – Arora and Domkundwar, Dhanpatrai & sons.
2. Fundamentals of Engg. Heat and Mass Transfer / R.C.SACHDEVA / New Age International.
3. Heat and Mass Transfer –Cengel- McGraw Hill.
4. Heat and Mass Transfer – D.S.Kumar / S.K.Kataria & Sons.

Course outcomes:

The student after undergoing this course is expected to know the principles of heat transfer and be able to apply to practical situations where in heat exchange takes place through various modes of heat transfer including phase change.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – I Sem.

VEHICLE PERFORMANCE & TESTING - 14170506

INSTRUCTIONAL OBJECTIVES

1. To understand the concept of vehicle performance estimation
2. To understand transmission performance
3. To understand the Laboratory testing of vehicles
4. To understand road testing of the vehicle

UNIT I - VEHICLE PERFORMANCE ESTIMATION & PREDICTION

Aerodynamic drag, methods of estimation of resistance to motion, power requirement for propulsion, Power plant characteristics & transmission related requirements, arrangement of power train, vehicle controls, vehicle acceleration, maximum speed, and gradiability drive systems comparison, hill climbing, handling and ride characteristics on different road surfaces. Effect of pressure, temperature and humidity on power output. Heat Balance, combustion, Emission, Load test.

UNIT II – VEHICLE TRANSMISSION PERFORMANCE

Characteristics & features of friction clutches, mechanical gear transmission & Epicyclic gear boxes.

UNIT III - OPERATIONAL PERFORMANCE

Engine performance & operating characteristics, Operation at full load and part load conditions, fuel economy, effect of vehicle condition, tyre and road condition, traffic condition and driving habits on fuel economy, vehicle safety.

UNIT IV - CONTROL SYSTEMS

Braking arrangements & Characteristics, weight transfer, steering arrangements, rigid & independent suspension, roll centre, torsion bar, stabilizer, radius bar.

UNIT V - VEHICLE PERFORMANCE TESTING IN LABORATORY

Testing of major components of vehicle like clutch, Transmission (Gear box), Rear axle, wheels, suspension, braking, steering etc., Engine testing – noise, vibrations, emission, power & fuel consumption, Vehicle testing on chassis dynamometers.

UNIT VI- VEHICLE PERFORMANCE TESTING ON ROAD & TRACK

Initial inspection, running in and durability, extensive driving, maximum speed & acceleration, Brake testing on the road, Hill climbing, handling & ride characteristics on different road surfaces, ride comfort.

TEXT BOOK

1. Martyr A. J, Plint M. A, *"Engine Testing Theory and Practice",* 3rd edition, Butterworth-Heinemann, 2007.

REFERENCES

1. Gousha H. M, *"Engine Performance Diagnosis & Tune Up Shop Manual".*
2. Giles J. G, *"Vehicle Operation & Performance".*
3. Crouse. W. H, Anglin. D. L, *"Motor Vehicle Inspection"*, McGraw Hill, 1978.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – I Sem.

HEAT TRANSFER LAB - 14170511

Objectives:

The laboratory course is aimed to provide the practical exposure to the students with regard to the determination of amount of heat exchange in various modes of heat transfer including condensation & boiling for several geometries.

1. Determination of overall heat transfer co-efficient of a composite slab.
2. Determination of heat transfer rate through a lagged pipe.
3. Determination of heat transfer rate through a concentric sphere.
4. Determination of thermal conductivity of a metal rod.
5. Determination of efficiency of a pin-fin.
6. Determination of heat transfer coefficient in natural convection.
7. Determination of heat transfer coefficient in forced convection .
8. Determination of effectiveness of parallel and counter flow heat exchangers.
9. Determination of emissivity of a given surface.
10. Determination of Stefan Boltzman constant.
11. Determination of heat transfer rate in drop and film wise condensation.
12. Determination of critical heat flux.
13. Demonstration of heat pipe.
14. Study of two – phase flow.
15. Drop wise and Film wise condensation.

Outcomes: The student should be able to evaluate the amount of heat exchange for plane, cylindrical & spherical geometries and should be able to compare the performance of extended surfaces and heat exchangers.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – I Sem.

MANUFACTURING PROCESSES LAB - 14170512

Course Objective: To impart hands-on practical exposure on manufacturing processes andequipment.

Minimum of 12 Exercises need to be performed

I. METAL CASTING:

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - for strength and permeability
3. Mould preparation, Melting and Casting

II WELDING:

1. Gas welding
2. Gas cutting
3. Manual metal arc welding - Lap & Butt Joints
4. TIG/MIG Welding
5. Resistance Spot Welding
6. Brazing and soldering

III METAL FORMING AND POWDER METALLURGY:

1. Blanking & Piercing operations and study of simple, compound and progressive dies.
2. Deep drawing and extrusion operations.
3. Bending and other operations
4. Basic powder compaction and sintering

IV PROCESSING OF PLASTICS:

1. Injection Moulding
2. Blow Moulding

Course outcomes:

Attending the laboratory the students shall be able to

1. To apply some of the manufactures process directly in the industry for preparation of complicated jobs.
2. At the end of the lab learn preparation of various jobs using various manufacturing process
3. The student will be trained to implement similar features in preparation of jobs can be extended to implement in the preparation of complicated jobs.

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III Year B.Tech. (AME) – I Sem.

MINI PROJECT - 14170521

Student should carry Mini project during summer vacation after II B.Tech., II Sem. Course and it will be evaluated during III B.Tech., I Sem.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

MACHINE TOOLS & METROLOGY - 14170602

Course Objectives: The students completing this course are expected to understand the concept of various working principles of various machine tools and concepts of metal cutting. Further there are exposed to the importance of metrology.

UNIT – I

Objective: The fundamentals of metal cutting and forces involved will be given enough exposer to the student.

Elementary treatment of metal cutting theory – element of cutting process – geometry of single point tool angles, chip formation and types of chips – built up edge and its effects chip breakers, mechanics of orthogonal cutting –Merchant's force diagram, cutting forces, cutting speeds, feed, depth of cut, tool life, coolants, tool materials.

UNIT – II

Objective: the students are to be exposed the fundamental concepts of Engine Lathe and its various operations that can be performed.

Engine Lathe :– principle of working, specification of lathe – types of lathe – work holders tool holders – operations performed- box tools taper turning, thread turning – for lathes and attachments, turret and capstan lathes – collet chucks – other work holding – tool holding devices. Principal features of automatic lathes – classification – single spindle and multi-spindle automatic lathes.

UNIT – III

Objective: the students are to be exposed the fundamental concepts of Shaping, Slotting, and Planning, Drilling and boring machines and its various operations that can be performed.

Shaping, slotting and planning machines**:** Principles of working – principal parts – specifications, operations performed, machining time calculations.

Drilling & Boring machines: Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring Machines – jig boring machine, deep hole Drilling Machine.

UNIT – IV

Objective: the students are to be exposed the fundamental concepts of Milling machines, grinding machines and its various operations that can be performed.

Milling machine: Principles of working – specifications – classification of Milling Machines – machining operations, types of cutters and geometry.

Grinding: Theory of grinding – classification of grinding machines, different types of abrasives, bonds, specification and selection of a grinding wheel. Lapping, Honing & Broaching operations, comparison to grinding.

UNIT-V

Objective: The students are to be exposed to the fundamental concepts and systems of limits and tolerances and measurement instruments.

SYSTEMS OF LIMITS AND FITS: Introduction, nominal size, tolerance, limits, deviations, fits and their types-unilateral and bilateral tolerance system, hole and shaft basis systems interchangeability.

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Linear measurement: Length standards, end standards, slip gauges- calibration of the slip gauges, dial indicators, micrometers.
Measurement of angles and tapers: Different methods – bevel protractor, angle slip gauges inclinometer Limit gauges: Taylor's principle – design of go and no go gauges; plug, ring, snap, gap, taper, profile and position gauges.

UNIT-VI

Objective: The students are to be exposed the fundamental concepts of optical measuring instruments and surface measurement instruments.

Optical measurement instruments: Tools maker's microscope and uses - collimators, optical projector, optical flats and their uses.
Surface roughness measurement: Differences between surface roughness and surface waviness.
Comparators: Types - mechanical, optical, electrical and electronic, pneumatic comparators and their uses.

Course outcomes: The students completing the course will be able to understand the various machines tools and their operating principles and various precision measuring procedures.

TEXT BOOKS

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Workshop Technology – B.S.Raghu Vamshi – Vol II
3. Engineering Metrology by Mahajan / Dhanpat Rai Publishers

REFERENCES

1. Production Engineering, K.C Jain & A.K Chitaley, PHI Publishers
2. Engineering Metrology by R.K.Jain / Khanna Publishers

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

INSTRUMENTATION & CONTROL SYSTEMS - 14170603

Course Objectives:

The course focuses on imparting the principles of measurement which includes the working mechanism of various sensors and devices, that are in use to measure the important physical variables of various mechatronic systems.

UNIT – I

Definition – Basic principles of measurement – measurement systems, generalized configuration and functional descriptions of measuring instruments – examples. dynamic performance characteristics – sources of error, classification and elimination of error.

MEASUREMENT OF DISPLACEMENT: Theory and construction of various transducers to measure displacement – piezo electric, inductive, capacitance, resistance, ionization and photo electric transducers, calibration procedures.

UNIT – II

MEASUREMENT OF TEMPERATURE: Classification – ranges – various principles of measurement – expansion, electrical resistance – thermistor – thermocouple – pyrometers – temperature indicators.

MEASUREMENT OF PRESSURE: Units – classification – different principles used. manometers, piston, bourdon pressure gauges, bellows – diaphragm gauges. low pressure measurement – thermal conductivity gauges

– ionization pressure gauges, McLeod pressure gauge.

UNIT – III

MEASUREMENT OF LEVEL : Direct method – indirect methods – capacitative, ultrasonic, magnetic, cryogenic fuel level indicators – bubbler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, ultrasonic, turbine flow meter, hot – wire anemometer, laser Doppler anemometer (LDA). MEASUREMENT OF SPEED: Mechanical tachometers – electrical tachometers – stroboscope, noncontact type of tachometer

Measurement of Acceleration and Vibration: Different simple instruments– principles of seismic instruments – vibrometer and accelerometer using this principle.

UNIT – IV

STRESS STRAIN MEASUREMENTS : Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, strain gauge rosettes.

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UNIT – V

MEASUREMENT OF HUMIDITY – Moisture content of gases, sling psychrometer, absorption psychrometer, dew point meter.

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, torsion meters, dynamometers.

UNIT – VI

ELEMENTS OF CONTROL SYSTEMS: Introduction, importance – classification – open and closed systems, servomechanisms–examples with block diagrams–temperature, speed & position control systems.

TEXT BOOKS:

1. Measurement Systems: Applications & design by D.S Kumar.
2. Mechanical Measurements / BeckWith, Marangoni,Linehard, PHI / PE.

REFERENCES:

1. Measurement systems: Application and design, Doeblin Earnest. O.Adaptation by Manik and Dhanesh/ TMH.
2. Experimental Methods for Engineers / Holman.
3. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers.
4. Instrumentation, measurement & analysis by B.C.Nakra & K.K.Choudhary, TMH.

Course outcomes:

After undergoing the course the student can select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS - 14170601

Course Aim:

The aim of this is to equip the students with fundamental concepts of economics, budgeting, management and accounting. It helps them to understand the intricacies of business units. The study of this subject strengthens them to start an enterprise on their own accord.

Course outcomes:

Up on successful completion of the course, the student should be familiar with and able to:

- Known economic activities performed by the business man
- Aware the significance of demand, its analysis, measurement of demand and its forecasting.
- Understand the different structures of market covering how price is determined under different market structures.
- Gain the knowledge how double entry book keeping in given an exposure to the maintenance of books of records and allocation of profits in an enterprise?
- Know how the allocation of capital plays a vital role in a business organization?

UNIT- I

Objective: To understand the concept ;and nature of Managerial Economics and its relationship with other disciplines, concepts of Demand and Demand forecasting for Proper Production Planning.

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope – Managerial Economics and its relation with other subjects – Concepts of Demand – Types – Determinants, Law of Demand its Exception – Elasticity of Demand – Types and Measurement - Demand forecasting and its methods.

UNIT-II

Objective: To understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost – Volume – Profit Analysis.

Production and Cost Analysis:

Production function Isoquants and Isocosts – Law of Variable proportions – Cobb-Douglas Production function- Economies of Scale- Cost Concepts-Opportunity Cost-Fixed Vs Variable Costs – Explicit Cost Vs Implicit Costs – Out of Pocket Costs Vs Imputed Costs – Cost Volume Profit Analysis- Determination of Break-Even Point (Simple Problems)

UNIT-III

Objective: To understand the nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods.

Introduction to Markets, Theories of the Firm and Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, And Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT- IV

Objective: To know the different forms of Business Organization and their Merits and Demerits both Public and Private Enterprises and the concepts of Business Cycles.

Types of Business Organizations and Business Cycles:

Features and Evaluation of Sole trader – Partnership – Joint Stock Company – State / Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

UNIT- V

Objective: To understand the different Accounting Systems preparation of Financial Statements and uses of Different tools for performance evaluation.

Introduction to Financial Accounts:

Introduction to Double Entry Systems, Preparation of Journal – Subsidiary Books- Ledger- Cash Book-Trial Balance- Preparation of Financial Statements, Analysis of Financial Statements through Ratio Analysis (Simple Problems).

UNIT – VI

Objective: To understand the concept of Capital, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods.

Capital, Capital Budgeting:

Capital, Significance of Capital, Sources of Finance (Capital) - Meaning of Capital Budgeting Need for Capital Budgeting - Techniques of Capital Budgeting - Traditional and Modern Methods.

TEXT BOOKS:

1. Prof. J.V. Prabhakara Rao, Prof.P. Venkata Rao. "Managerial Economics and Financial Analysis", Ravindra Publication.
2. Dr.A.R.Aryasri- Managerial Economics and Financial Analysis – TMH Publications.
3. Dr.N.Appa Rao, Dr.P. Vijay Kumar 'Managerial Economics and Financial Analysis", Cengage Publications, New Delhi.

REFERENCE:

1. Dr.B. Kuberudu and Dr.T.V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House.
2. Dr. PVV Satyanarayana: Managerial Economics & Financial Analysis, Discover pub.

Useful Web-links : http://nptel.ac.in/courses.php
http://mit.espe.edu.ec/courses/mechanical-engineering/

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

ALTERNATIVE ENERGY SOURCES FOR AUTOMOBILES - 14170604

Course Objectives: To impart the necessity of finding alternative energy sources for automobiles. To understand merits and demerits, performance characteristics of various sources of fuels and their comparison.

Unit-I

Objective: The objective is to introduce the use and the application of different fuel types and characteristics.

Introduction: Need for non-conventional energy sources. Energy alternative : solar, photo-voltaic, Hydrogen, Bio mass. Electrical - their merits and demerits.

VEGETABLE OILS

Various vegetable oils for diesel engines, structure and properties, problems in using vegetable oils in diesel engines, methods to improve the engine performance using vegetable oils-preheating, Esterification (biodiesel, blending with good secondary fuels, semi-adiabatic engine, surface ignition engine, ignition accelerators dual fuelling with gaseous and liquid fuels, performance, combustion
and emission characteristics of vegetable oil fuelled diesel engines.

Unit-II GASEOUS FUELS

Objective: The objective is to expose the student about energy from gaseous fuels & bio-gases.

Properties of hydrogen, production and storage methods, safety precautions , use in SI and CI engines, biogas production and its properties, use in SI and CI engines, properties of LPG and CNG, use in SI and CI engines. Performance, combustion and emission characteristics of hydrogen, biogas, LPG and CNG in SI and CI engines.

Energy from Bio mass: Photosynthesis, photosynthetic oxygen production, energy plantation. Biogas production from organic waste, description and types of Bio gas plants, Application and limitations - Merits and demerits performance characteristics and their comparison.

Unit-III HYDROGEN FUEL

Objective: The objective is to expose the students to study and understand basic principles of hydrogen energy and thermo-chemical production.

Hydrogen Energy: Properties of Hydrogen, sources of Hydrogen, Thermodynamics of water splitting Production of Hydrogen, Electrolysis of water. Thermal decomposition of water. Thermo-chemical production, Biochemical production.

Hydrogen fuel, Storage and Transportation methods, Applications to engines modifications necessary, precautions and safety measures - Performance characteristics in Engine and their comparison.

UNIT IV ALCOHOL FUELS:

Properties of alcohols, engine modifications required to use alcohols in SI engines, performance, combustion and emission characteristics in SI engines, alcohol – gasoline blends, fuel flexible vehicle, methanol reformed gas engine, use of alcohols in CI engines-emulsions, dual fuel system, spark assisted diesel engine, surface ignition engine, ignition accelerators, performance, combustion and emission characteristics in CI engines.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

Unit-V ELECTRIC VEHICLES

Objective: To learn various factors to be considered in hydrogen fuel usage, study of performance. Design and study of future possibilities of electric automobiles.

Applicability of electric cars, Driving requirements, cost of' electric car, comparative use of fuel and energy. Availability of energy for recharging. impacts on use of fuel and energy. Impact on urban air quality, impact on price, material requirement Traction motors and types. Electric Automobiles: Design considerations, limitations. opportunities for improvement Batteries, problems. future possibilities , capacities, types , material requirement.

Unit-VI SOLAR & FUEL CELL VEHICLES

Objective: The student will be able to understand Solar photo-voltaic conversion and working principles.

Solar photo-voltaic conversion, Collection and storage of solar energy, collection devices, flat plate collectors, concentrating type collectors, principles and working of photo-voltaic Conversion, Applications to automobiles.

Course outcomes: The students completing the course will be able to understand the ever increasing quality of life. This phenomenon imposes high demand on conventional fossil fuels.

Hence search for alternate fuels is a continuous phenomenon. The student will have an overview of various alternate fuels along with their merits and limitations.

Text Books:

1. G.D. Rai 'Non-conventional sources of energy Khamma Lab.
2. William Hamilton 'Electric Automobiles', PHI
3. Alternative sources and control system.Yes Dee publishing pvt Ltd

Reference Books:

1. S.P. Sukhatme 'Solar Energy', Tata McGraw Hill .
2. S. Rao & B.B. Larulekar 'Energy Technology', Khamma Lab
3. Frank Kreith & Jan F. Krieder' Principles of Solar Engineering' McGraw Hill.
4. J.A. Duffie&W.A. Beckman 'Solar Energy -thermal Process' McGrawHil1
5. E, D ;Totta, 'Solar Hydrogeff Energy-Systems'
6. T.N. Veziroglu. Alternative energy sources.
7. Mitsui E. Stal, Biological solar energy conversion

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III Year B.Tech. (AME) – II Sem.

VEHICLE BODY ENGINEERING & SAFETY - 14170665a
(DEPARTMENTAL ELECTIVE-I)

Course objective: To impart the knowledge of the vehicle design procedures and safety measures to be considered in designing a vehicle. Further concepts of aerodynamic profile and to minimize noise and vibration are also introduced.

UNIT-1

INTRODUCTION: Classification of coachwork type: styling forms, coach and bus body style, Bus body code, truck body code, layout of cars, buses and coach with different seating and loading capacity, commercial vehicles types, vans and pickups. Terms used in body building construction, angle of approach, angle of departure, ground clearance, cross bearers, floor longitudes, posts, seat rail, waist rail, cant rail, roof stick, roof longitude, rub rail, skirt rail, truss panel, wheel arch structure, post diagonals, gussets.

UNIT-II

VEHICLE BODY MATERIALS: Aluminium alloys, steel, alloy steel, plastics, metal matrix composites, structural members- properties, glass reinforced plastics and high strength composites, thermoplastics, load bearing plastics, semi rigid PUR foams and sandwich panel construction. Paint adhesive and their properties, corrosion and their prevention.

UNIT-III

AERODYNAMICS: Basics, vehicle drag and types, various types of forces and moments, Pitching, Bounce, Jounce, Roll, Tramp, Shimmy, effects of forces and moments, various body optimization techniques for minimum drag, principle of wind tunnel technology, flow visualization techniques, tests with scale models, aerodynamic study for heavy vehicles.

VEHICLE STABILITY: Introduction, longitudinal, lateral stability, vehicle on a curvilinear path, critical speed for toppling and skidding. Effect of operating factors on lateral stability, steering geometry and stabilization of steerable wheels, mass distribution and engine location on stability.

UNIT-IV

LOAD DISTRIBUTION: Types of body structures, vehicle body stress analysis, vehicle weight distribution, calculation of loading, symmetrical, longitudinal loads, side loads, stress analysis of bus structure under bending and torsion, Camber, Caster, Steering lock angle, KPI (King pin Inclination), Toe in.

UNIT-V

INTERIOR ERGONOMICS: Introduction, seating dimensions, interior ergonomics, ergonomics system design, seat comfort suspension seats, split frame seating, back passion reducers, dash boards instruments, electronic displays, commercial vehicle cabin ergonomics, mechanical packages layout, goods vehicle layout. Visibility, regulations, drivers visibility, Blind spot, methods of improving visibility, window winding and seat adjustment mechanisms.

UNIT-VI

NOISE AND VIBRATION: Noise characteristics, sources of noise, noise level measurement techniques. Body structural vibrations, chassis bearing vibration, designing against fatigue, method of noise suppression.

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SAFETY: Impact protection basics, physics of impact between deformable bodies, design for crash worthiness, occupant and cargo restraint, passive restraint systems, side impact analysis, bumper system energy absorbent foams, laws of mechanisms applied to safety.

Course outcome: After completing the course the student will be in a position to choose the correct material for various parts of the vehicle. Student will have enough knowledge to address the problems arising out of aerodynamic forces noise, vibration and the factors influencing the vehicle stability.

TEXT BOOKS:

1. Sydney F pages, "Body Engineering" Chapman & Hall Ltd, London, 1956.
2. "Giles J Pawlowski", vehicle body engineering Business books limited, 1989.
3. John Fenton, "Vehicle body layout and analysis", Mechanical Engg. Publication ltd, London.

REFERENCES:

1. Hand book on vehicle body desing-SAE publication.
2. Vehicle safety 2002, Cornwell press, Townbridge, UK, ISBN 1356-1448.
3. Redesign of bus bodies – part I & part II – CIRT Pune (report), 1983.
4. Ed W.H. Hucho, Aerodynamics of Road Vehicles, 4th Edition, Butter worth's 1987.
5. Scibor-Rylski A.J, Road vehicle Aerodynamics, Pentech press, London 2nd Edition 1984.
6. Rae W.H & Pope A, Low Speed Wind Tunnel Testing wiley & sons, USA 1984.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

TROUBLE SHOOTING, SERVICING & MAINTENANCE OF AUTOMOBILES (DEPARTMENTAL ELECTIVE-I) - 14170665b

INSTRUCTIONAL OBJECTIVES

1. To input knowledge on Vehicle Trouble shooting and maintenance.
2. On completion of this course, the student will know about vehicle trouble shooting, maintenance of shop, its schedule and records. Maintenance, Repair and overhauling of engine, chassis vehicle body, electrical and electronic systems.
3. Enabling students to operate and manage maintenance workshops.

UNIT I - INTRODUCTION AND TROUBLE SHOOTING

Check list on trouble shooting - Engine, clutch, gear box, rear axle, front axle, steering, Brakes, Suspension, Tyre wear, electrical systems - Trouble shooting on engine management system - On board diagnosis using multi-scanner - Testing of SI engine using computerized engine analyzer.

UNIT II - MAINTENANCE OF WORKSHOP, ITS SCHEDULE AND RECORDS

Importance of maintenance - Types of maintenance, Periodic maintenance, Preventive maintenance, Annual maintenance, Statutory maintenance, seasonal maintenance, schedule and unscheduled maintenance - scope of maintenance - vehicle down time - vehicle inspection, reports, log books, trip sheet.

UNIT III - ENGINE REPAIR AND OVERHAULING

Dismantling of SI & CI engines and its components - Cleaning methods - inspection and checking - repair and reconditioning methods for all engine components - Maintenance of ignition system - fuel injection system – cooling system, lubrication system, Air intake & Exhaust system - Study of trouble shooting chart for MPFI & CRDI Engines.

UNIT IV - MAINTENANCE, REPAIR AND OVERHAULING OF THE CHASSIS

Maintenance - servicing and repair of clutch, fluid coupling, gear box, torque converter, propeller shaft - Maintenance of front axle, rear axle, brakes, steering systems, tyre.

UNIT V - MAINTENANCE AND REPAIR OF VEHICLE BODY & ELECTRICAL SYSTEMS

Body panel tools for repairing - Tinkering and painting - Use of soldering, metalloid paste, Wheel alignment, wheel balancing.

Service, maintenance, testing and trouble shooting of battery, starter motor, alternator rectifier and transistorized regulator.

UNIT VI - FLEET MAINTENANCE MANAGEMENT

Need for automobile dealer ships, 3s(Sales, Service & Spares),2s(Service & Spares),1s(Service), Types of dealer ships, Fleet maintenance requirement - investment and costs, types of work shop layout, tools and equipment - spare parts and lubricants stocking, manpower, training, workshop management, warranty, replacement policy.

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TEXT BOOK

1. Martin W. Stockel, Martin T. Stockel, Chris Johanson, "*Auto Service & Repair: Servicing, Troubleshooting, and Repairing Modern Automobiles: Applicable to All Makes and Models"*, Goodheart-Willcox Publisher, 1996.

REFERENCES

1. James D. Halderman, "Chase D. Mitchell, "*Automotive steering, suspension, and alignment"*, Prentice Hall, 2000.
2. Martin T. Stockel, Chris Johanson, "*Auto Diagnosis, Service, And Repair",* Goodheart-Willcox Publisher, 2003.
3. Vaughn D. Martin, *"Automotive Electrical Systems: Troubleshooting and Repair Basics"*, Prompt Publications, 1999
4. Crouse W., *"Everyday Automobile Repair"*, Intl. student edition, TMH, New Delhi, 1986.
5. BOSCH, "*Automotive Handbook"*, 8th Edition, BENTLEY ROBERT Incorporated, 2011.
6. John Doice, "*Fleet maintenance"*, Mcgraw Hill, New York, 1984.
7. Maleev V.L., *"Diesel Engine Operation and Maintenance*, McGraw Hill Book Co., New York, 1995.
8. Vehicle servicing manuals.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

DESIGN FOR SAFETY & COMFORT OF AUTOMOBILES
(DEPARTMENTAL ELECTIVE-I) - 14170665c

INSTRUCTIONAL OBJECTIVES

1. To provide an understanding to the automotive safety and comfort systems and its future prospects

UNIT I - DESIGN OF AUTOMOTIVE BODY AND SAFETY

Introduction to automotive safety systems - Design of the body for safety – engine location - concept of crumble zone - safety sandwich construction – deformation behavior of vehicle body - speed and acceleration characteristics of passenger compartment on impact.

UNIT II - SAFETY SYSTEMS

Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety, Fire Detection and Suppression System (FDSS).

UNIT III - CRASH WORTHINESS

Definition – Requirements – Tests – component, sled and full-scale barrier impacts-Active safety: driving safety, conditional safety, perceptibility safety, operating safety- passive safety: exterior safety, interior safety

UNIT IV - COLLISION WARNING AND AVOIDANCE

Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions.

UNIT V-COMFORT SYSTEMS

NVH (noise, vibration and harshness) of chassis, engines and power train, ride quality and sound quality; heating, ventilation and air conditioning systems. Steering and mirror adjustment, central locking system, Garage door opening system, tyre pressure control system, rain sensor system, environment information system

UNIT VI-ERGONOMICS IN AUTOMOBILES

Aspects of Ergonomics in automobile design, occupant packing, computer aided ergonomic design for automobiles, applications. SAMMIE CAD system, advantages, special instruments & equipment for automobile safety.

TEXT BOOK

1. Vivek D. "*Ergonomics in the Automotive Design Process"* Bhise publisher CRC press, Taylor and Francis group.

REFERENCES

1. Ronald K Jurgen, *"Automotive Electronics Handbook"* - Second edition- McGraw-Hill Inc., - 1999.
2. Bosch, *"Automotive Handbook"*, 5th edition - SAE Publication - 2000.
3. Jullian Happian, *"Smith An Introduction to Modern Vehicle Design"*, SAE, 2002.
4. Johnson W and Mamalis A.G, *"Crashworthiness of Vehicles",* MEP, London.
5. Richard Bishop, "*Intelligent Vehicle Technology and Trends"* – 2005.
6. George A. Peters , Barbara J. Peters, *"Automotive Vehicle Safety*" – 2002.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

AUTOMOTIVE AERODYNAMICS - 14170665d
(DEPARTMENTAL ELECTIVE-I)

Course objectives: The objective is to introduce the learner the concepts, principles of aerodynamics and principles of wind tunnel techniques to test the scale models for optimization of shape.

UNIT-I

Scope of automotive aerodynamics - historical development trends - Fundamental of fluid mechanics - Flow phenomenon related to vehicles - External & Internal flow problem - Resistance to vehicle motion - Performance - Fuel consumption and performance - Potential of vehicle aerodynamics.

UNIT-II

Aerodynamic Drag of Cars: Cars as a bluff body - Flow field around car - drag force - types of drag force - analysis of aerodynamic drag - drag coefficient of cars - strategies for aerodynamic development - low drag profiles.

UNIT-III

Effects of aerodynamics forces and moments various body optimisation techniques for minimum drag, principal of wind tunnel techniques, tests with scale models, aerodynamic study for heavy vehicles.

UNIT-IV

Shape Optimization of Cars: Front end modification - front and rear wind shield angle - Boat tailing - Hatch back, fast back and square back -Dust flow patterns at the rear - Effects of gap configuration - effect of fasteners.

UNIT-V

Vehicle Handling - The origin offerees and moments on a vechile - side wind problems - method to calculate forces and moments - vehicle dynamics under side winds - the effects of forces and moments - Characteristics offerees and moments.

UNIT-VI

Dirt accumulation on the vehicle -wind noise - drag reduction in commercial vehicles.
Wind Tunnels For Automotive Aerodynamic: Principle of wind tunnel technology - Limitation of simulation - Stress with scale models - fill scale wind tunnels - measurement techniques - Equipment and transducers - road testing methods - Numerical methods.

Course outcome: The students completing the course will be able to understand the concepts of
aerodynamic profile, usage of wind tunnel and scaled models for optimal design of vehicle body
profile.

Text Books:

1.Hucho.W.H., *Aerodynamic of Road Vehicles,* Butterworths Co., Ltd., - 1997.
2.A. Pope, *Wind Tunnel Testing,* John Wiley & Sons - 2nd Edition, New York 1974.
3.Automotive Aerodynamic: Update SP-706 - SAE - 1987
4.Vehicle Aerodynamics - SP-1145 - SAE - 1996.
Road vehicle aerodynamic design an introduction r.h.barnark

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

PRODUCT DESIGN AND ASSEMBLY AUTOMATION - 14170606

Couse objective: To impart the importance of various automatic feeding devices and automation and design of manual assembly systems. Further project design using latest sophisticated technologies using Robots in assembly lines.

UNIT –I

AUTOMATIC FEEDING AND ORIENTING DEVICES: Vibrator feeders : Mechanics of vibratory conveying, estimating the mean conveying velocity, load sensitivity, solutions to load sensitivity, spiral elevators, balanced feeders.

UNIT – II

Orientation of typical oriental system, effect of active orienting devices on feed rate, analysis of orienting systems, performance of an orienting device, natural resting aspects, of parts for automatic handing, analysis of a typical orienting system, out-of-bowl tooling. Mechanical feeders. Reciprocating -tube hopper feeder; magazines:

UNIT-III

Assemble Automation: Development of the assemble process, choice of assemble method assemble advantages social effects of automation.

Automatic assembly transfer systems: Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.

UNIT-IV

Product design for high speed automatic assembly and robot assembly :Introduction, design of parts for: high speed, feeding and orienting, example, additional feeding difficulties, high speed automatic insertion, example, analysis of an assembly, general rules for product design for automation, design of parts for feeding and orienting, summary of design rules for high speed automatic assembly, product for robot assembly.

UNIT-V

Design of manual assembly: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

UNIT-VI

Avoiding jams during assembly, reducing risk assembly problems, effects of holding down, manual assembly data base and design data sheets, application of the DFA methodology and general design guidelines.

Performance and economics of assembly systems: Indexing machines, free transfer machines, basis for economic comparisons of automation equipment, comparison of indexing and free – transfer machines' economics of robot assembly.

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Feasibility study for assembly automation: Machine design factors to reduce machine downtime due to defective parts. visibility study.

Course outcome: The students completing the course will be able to understand project design and mechanization of assembly lines. Further they will be having enough knowledge in robot assembly.

TEXT BOOKS

1. Geoffrey Boothroyd, "Assembly Automation and Product Design",
Marcel Dekker Inc., NY, 1992.

REFERENCES

1. Geoffrey Boothroyd, "Hand Book of Product Design" Marcel and Dekken, N.Y. 1990.
2. A Delbainbre "Computer Aided Assembly London, 1992.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech., (AME)- II Sem.

SOFT SKILLS-2 - 14178697

(Title: Professional Communication and Employability skills)

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management and goal setting, self-confidence and assertiveness.
4. Understand, what constitutes proper grooming and etiquette in a professional environment.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to manage time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate.

Unit-1

Communicative Competence – The Art of Communication, basic grammar, personal SWOT Analysis, Analyzing audience, role of emotions and body language in communication-Effective listening skills, using English in different situations

Unit-2

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence-Elements of effective presentation – Structure of presentation – Presentation tools

Unit-3

Interview Skills – Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-pre-interview planning, opening strategies, answering strategies, mock interviews

Unit-4

Personality Development through soft skills – Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values, success stories of great business people, Steve job, Chandra Kocher, warren buffet, Indra Nuyi.

Unit- 5

Technical Communication: Report writing: Importance, structure, drafting of reports, Business Writing: Sales letters, claim and adjustment letters, Job Application letter, preparing a personal resume, notices, agenda and minutes of the meeting

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

Unit-6

Development of Occupational Competency

Leadership skills - Problem solving skills - Organising and Co-ordination skills - Critical thinking Decision Making .

Prescribed Text:

1. English and soft skills by prof.Dhanvel, orient blackswan,2012.

Suggested Reading:

1. Soft Skills by Alex Ben, S Chand Publications.
2. Personality Development and Soft Skills-Barun.K.Mithra, Oxford Publications
3.Technical Communication –Principles and Practice-Meenakshi Raman,Sangeeta Sharma,Oxford Publications
4. Effective Technical Communication-Mc Grawhill-Ashraf Rizvi

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

MACHINE TOOLS & METROLOGY LAB - 14170611

Note: minimum of 6 experiments from each section

Couse Objective: This practical course covers the topics related to precession measuring instruments and the working and operations of various machine tools.

Section-I

METROLOGY LAB

1. Measurement of lengths, heights, diameters by vernier calipers, micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear tooth vernier calipers and checking the chordal thickness of spur gear.
4. Machine tool alignment test on the lathe.
5. Machine tool alignment test on milling machine.
6. Angle and taper measurements by bevel protractor, Sine bars, etc.
7. Use of spirit level in finding the straightness of a bed and flatness of a surface.
8. Thread measurement by two wire/ three wire method & tool makers microscope.
9. Surface roughness measurement by Talysurf.

Section-II

MACHINE TOOLS LAB

1. Introduction of general purpose machines -lathe, drilling machine, milling machine, shaper, planing machine, slotting machine, cylindrical grinder, surface grinder and tool and cutter grinder.
2. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on -lathe machine.
4. Drilling and tapping
5. Shaping and planning
6. Slotting
7. Milling
8. Cylindrical surface grinding
9. Grinding of tool angles.

Course Outcome: After completing the course the student will be able to operate various precession measuring instruments and working and operations of various machines tools.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

III Year B.Tech. (AME) – II Sem.

AUTO SCANNING & VEHICLE TESTING LAB - 14170612

OBJECTIVE: To impart to the learner the skills to analyze engine and to study its performance, wheel balancing and alignment machines. Further to scan the automobile in all aspects for correct diagnosis.

1. Computerized engine analyzer study and practice.
2. Computerized wheel balancing machine study and practice.
3. Computerized wheel alignment machine study and practice.
4. Exhaust emission test of petrol and diesel engine
5. Two wheeler chassis dynamometer study and practice
6. Study of wind tunnel -determining of coeff of drag for a given aerofoil .
7. Road worthiness test a) Acceleration b) Gradability c) Maximum speed d) Constant speed fuel
consumption (High way drive) e) city drive fuel consumption tests f) Braking distance test.
8. Head light focusing test.
9. Visibility test .
10. Drawings of automobile bodies -light and heavy vehicles for different seating capacities .
11. Dimensional drawings of bus depots and service station workshop layouts.

Course outcomes: The students completing the course will be able to understand *automotive scan* tools and diagnostic equipment for fault diagnosis and troubleshooting any problem arises in automobile.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

MICROPROCESSORS AND MICROCONTROLLERS- 14174761a (DEPARTMENTAL ELECTIVE-II)

COURSE OBJECTIVES: The student will

- **Learn concepts of microprocessor, different addressing modes and programming of 8086.**
- **Understand interfacing of 8086, with memory and other peripherals.**
- **Learn concept of DMA, USART RS-232 and PIC controller.**
- **Study the features of advanced processors and Pentium processors.**
- **Study the features of 8051 microcontoller, its instruction set and also other controllers.**

UNIT-I:
Objective: To learn concepts of microprocessor, different addressing modes and programming of 8086.

8086 ARCHITECTURE
Functional Diagram, Register Organization, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams.

UNIT-II:
Objective: To understand the basic concepts of 8086 programming.

ASSEMBLY LANGUAGE PROGRAMMMING OF 8086
Assembly Directives, Macro's, Simple Programs using Assembler, Implementation of FOR Loop, WHILE, REPEAT and IF-THEN-ELSE Features, String Manipulation, Procedures.
I/O INTERFACE : Parallel data transfer scream, Programmed I/O, Interrupt Driven I/O, 8255 PPI, Various modes of operations and interface of I/O devices to 8086, A/D, D/A Converter Interfacing, Stepper Motor Interfacing.

UNIT-III:
Objective: To learn concept of DMA, PIC controller and interfacing of 8086, with memory and other peripherals.

INTERFACING WITH ADVANCED DEVICES.
8086 System bus structure, Memory and I/O Interfacing with 8086, Interfacing through various IC Peripheral Chips, 8257 (DMA Controller), 8259 (Interrupt Priority Control), Memory Interface using RAMS, EPROMS and EEPROMS.

UNIT-IV:
Objective: To understand the concept of USART RS-232 and software debugging tools.

COMMUNICATION INTERFACE
Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tolls, MDS.

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UNIT-V:

Objective: To learn basic concepts of 8051 Microcontroller features, its instruction set and programming.

INTRODUCTION TO MICRO CONTROLLERS

Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming.

UNIT- VI:

Objective: To learn basic concepts of 8051 Microcontroller applications and interfacing.

INTERFACING AND INDUSTRIAL APPLICATIONS

Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

Course outcome: After completing the course the students are able to know about the various microprocessors and microcontrollers that can be used to have optimal performance of various systems.

TEXT BOOKS:

1. Kenneth J Ayala, — The 8051 Micro Controller Architecture, Programming and Applications,
Thomson Publishers, 2nd Edition.
2. Kenneth J Ayala, — The 8086 Micro Processors Architecture, Programming and Applications,
Thomson Publishers, 2005.

REFERENCE BOOKS:

1. Ajay V. Deshmukh, —Microcontrollers – theory applications, Tata McGraw-Hill Companies –2005.
2. D.V.Hall, —Micro Processor and Interfacing —, Tata McGraw-Hill.
3. Ray and BulChandi, — Advanced Micro Processors, Tata McGraw-Hill.
4. NPTEL online courses.
5. MOOCS online courses by JNTUK.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

COMPUTATIONAL FLUID DYNAMICS - 14173761b
(DEPARTMENTAL ELECTIVE – II)

Course Objectives:

The course aims at providing required numerical and software techniques for solving various engineering problems involving fluid flow.

UNIT-I

ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

APPLIED NUMERICAL METHODS: Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix inversion, direct methods for banded matrices.

REVIEW OF EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton's second law of motion, expanded forms of navier-stokes equations, conservation of energy principle, special forms of the navier-stokes equations.

UNIT - III

Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation.

Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT - IV

Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modeling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT - V

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme.

UNIT -VI

FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

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TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worthPublishers.
2. Computational fluid dynamics - Basics with applications - John. D.Anderson / Mc Graw Hill.

REFERENCES:

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications.
2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.
3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

Course Outcomes:

After undergoing the course the student shall be able to apply various numerical tools like finite volume, finite difference etc for solving the different fluid flow problems.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

ELECTRONIC ENGINE & VEHICLE MANAGEMENT SYSTEMS – 14170761c
(DEPARTMENTAL ELECTIVE-II)

COURSE OBJECTIVES:

1. To give an in-depth knowledge of various sensors used in engine management
2. To give an overview of different types of fuel injection and ignition systems
3. To know the latest technological advancements in vehicle power plant

UNIT I - FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS

Semiconductors, Transistors, Amplifiers – Integrated circuits – Analog and Digital, Logic Gates, Microcontrollers –Analog Digital / Digital Analog Converters. Microprocessor architecture, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI enignes and in the other parts of the automobile.

UNIT II - SENSORS

Sensors for Air flow, Pressure, Temperature, Fuel level, Coolant level, Engine Speed, Vehicle speed, Exhaust Oxygen, Knock and Position in engine management systems – Principle of operation, construction and characteristics, Fuel temperature sensor, coolant temperature sensor, Cam phase sensor, Brake pedal sensor, Clutch pedal sensor.

UNIT III - GASOLINE INJECTION SYSTEM

Open loop and closed loop systems, Mono point, Multi point, Direct injection systems and Air assisted systems – Principles and Features, examples of Bosch injection systems. Idle speed, lambda, knock and spark timing control. Three way catalytic converters, Lean NOx converters.

UNIT IV - DIESEL INJECTION SYSTEM

Heat release in the diesel engine and need for control of fuel injection. Inline injection pump, Types of Governors, Mechanical or Electronic Governor - Rotary Pump and injector– Construction and principle of operation, Electronic control of these pumps. Common rail and unit injector system – Construction and principle of operation.

UNIT V - IGNITION SYSTEMS

Ignition fundamentals, solid state ignition systems, high energy ignition distributors, Electronic spark timing and control. Combined ignition and fuel management systems. Dwell angle calculation, Ignition timing calculation.

UNIT VI -VEHICLE MANAGEMENT SYSTEMS

ABS system, its need, layout and working. Electronic control of suspension – Damping control, Electric power steering, Supplementary Restraint System of air bag system – crash sensor, seat belt
tightening. Cruise control. Vehicle security systems- alarms, vehicle tracking system. On board diagnostics. Collision avoidance Radar warning system, Telematics.

TEXT BOOKS

1. William B Ribbens "Understanding Automotive Electronics", SAE Publications, 1998
2. Eric Chowanietz "Automobile Electronics" SAE Publications, 1994

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3. Robert N. Brady, *"Automotive Computers and Digital Instrumentation",* Prentice Hall, 1988.
4. Tom Denton, "*Automotive Electrical and Electronic Systems"*, Edward Amold, 1995.

REFERENCES

1. Duffy Smith, *"Auto Fuel Systems*", The Good Heart Willcox Company Inc., Publishers, 1987.
2. *"Gasoline Engine Management",* Second Edition, Robert Bosch GmbH, 2004.
3. *"Engine Management"*, Second Edition, Robert Bosch GmbH, 1999.
4. Bosch Technical Instruction Booklets.
5. Eric Chowaniety, *"Automobile Electronics*", SAE Publications 1995.
6. William B. Ribbews, *"Understanding Automotive Electronics*", Fifth Edition, SAE Publications 1998.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

CONDITION MONITORING OF VEHICLE DYNAMICS - 14170761d
(DEPARTMENTAL ELECTIVE – II)

Course Objectives:

- This course is designed to introduce the benefits and opportunities of health Monitoring and covers a range of techniques
- The students will be exposed to a range of techniques from Vibration based methods, Thermography, Oil conditions, Debris and ultrasonic monitoring
- Using overall vibration, vibration limit zones, broadband vibration bandwidth, alert levels, typical severity guidelines, recording overall vibration, using overall vibration for fault finding, trending overall vibration.

Identifying Resonance, Hammer Test, Self Excitation, Exciter Testing. Reducing Resonance - Effects of Frequency, Stiffness, Mass, Damping, Isolation

UNIT-I

BASICS OF VIBRATION: Basic motion: amplitudes, period, frequency, basic parameters: displacement, velocity, acceleration, units (including dB scales) and conversions, Mass, spring and damper concept, Introduction to SDOF and MDOF systems, Natural frequencies and resonance, Forced response.

UNIT-II

VIBRATION MEASUREMENT AND ANALYSIS: Transducers and mounting methods, data acquisition using instrumentation recorders/data loggers, time domain signal analysis, orbit analysis, Filters, Frequency domain analysis (Narrow band FFT analysis), Nyquist criteria, Sampling, aliasing, windowing and averaging.

Use of phase; bode, polar and water fall plots, constant percentage band width analysis (1/3 and 1/1 Octave analysis), envelope detection /spike energy analysis, cepstral analysis, advances in analysis (PC based and portable instruments for vibration analysis).

UNIT-III

Fault Diagnosis, Interpreting vibration measurements for common machine faults , imbalance, misalignment, mechanical looseness, bearing and gearing faults, faults in induction motors, resonances, some case studies, static and dynamic balancing, international standards for vibration condition monitoring.

UNIT-IV

THERMOGRAPHY: The basics of infrared thermography, differences in equipment and specific wave length limitations, application of ir to: electrical inspection, mechanical inspection, energy conservation, how to take good thermal images, hands-on demonstrations focusing on proper camera settings and image interpretation, analysis of thermal images and report generation, study of thermo graphy applications

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

UNIT-V

OIL AND WEAR DEBRIS ANALYSIS: Basics of oil analysis, monitoring condition of oil, lubricant analysis, physio – chemical properties, moisture, tan tbn, wear debris analysis, particle counting, spectroscopy, uses & limitations, ferrography wear particle analysis, concept of ferrography, principle particle classification, size, shape, composition, concentration, analysis
procedure, sampling & analytical ferrography equipments, severity rating.

UNIT-VI

ULTRASONIC MONITORING AND ANALYSIS: Ultrasonic monitoring (leak, crack and thickness) basics of ultrasonic monitoring , ultrasonic theory, test taking philosophy, ultrasonic theory, mathematics of ultrasound, equipment and transducers, inspection parameters and calibration,
immersion theory, equipment quality control, flaw origins and inspection methods, UT Procedure
familiarization, and study recommendations, application of ultrasound to: air leaks, steam trap testing, bearing lubrication, electrical inspection, case studies.

TEXT BOOKS:

1. The Vibration Analysis Handbook, J I Taylor (1994)
2. Machinery Vibration Condition Monitoring, Lynn, Butterworth(1989)

REFERENCE BOOKS:

1. Machinery Vibration: Measurement and Analysis. Victor Wowk(1991)
2. Mechanical fault diagnosis and condition monitoring, RA Collacott(1977)
3. The Vibration Monitoring Handbook (Coxmoor's Machine & Systems Condition Monitoring)
(1998)

Course outcomes:

- Gaining invaluable insights into the benefits of Condition Monitoring
- Understanding the reasons for selecting particular maintenance strategies
- Understanding effective methodologies for implementing Condition Monitoring Techniques
- Identifying the optimum maintenance strategy for different types of equipment
- Gaining practical approaches to minimise the risk of plant and machinery breakdowns
- Awareness of International Standards covering asset management

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

VEHICLE DYNAMICS - 14170702

Objectives: To import knowledge of various kinds of vibrations caused due to different aspects like road construction, engine unbalance and vibration measuring techniques.

Unit-I

Undamped free vibration: Single degree of freedom Systems, introduction, undamped free vibration -Natural frequency' of free vibration, Rayleigh's method, stiffness of spring elements, effects of spring mass, Energy method, Newton's method and D' Alembert's principle-problems.

Unit-II

Damped free vibration: Single degree of freedom systems, different types of damping, concept of critical damping and its importance, response study of viscous damped systems for cases of under damping and over damping, logarithmic decrement.

Unit-III

Forced vibration: Single degree of freedom systems, steady state solution with viscous damping due to harmonic force solution by complex algebra, concept of response, reciprocating and rotating unbalance, vibration isolation Transmissibility ratio, energy dissipated by damping equivalent. viscous damping. Structural damping, sharpness or resonance. base excitation.

Unit-IV

Systems with two degree of freedom: Introduction, principle modes and normal modes coordinate coupling, generalised and principle co-ordinate, free vibrations in terms of natural conditions. Lagranges equation, semi-definite systems, forced oscillations. harmonic excitation.

Unit-V

Vehicle vibrations: Vehicle vibration with single degree of freedom free vibration, forced vibration, vibration due to road roughness, vibration due to engine unbalance, transmissibility of engine mounting vibration with two degree of freedom, free vibration, compensated suspension systems forced vibration, vibration due to road roughness.
Vibration measuring instruments -Accelerometers and vibrometers. whirling of shafts with and without air damping, discussion of speeds above and below critical speeds.

Unit-VI

Numerical methods for multi degree of freedom systems: Introduction, influence coefficients, Maxwell's reciprocal theorem, Dunkerley's equation, orthogonality principle, method of matrix iteration- method of determination of all the natural frequencies using sweeping matrix and orthogonality principle, Holzer's method for systems with free, fixed free and fixed ends.

Course outcome: After completing the course the student will be in a position to use various methods and techniques to minimize the vibrations caused during the operation and running of vehicles.

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TEXT BOOKS

1. Mechanical Vibration -By G.K.Grovcr, Nernchand & Brothers
2. Vehicle dynamics, Theory and applications-reza N. Jazar-Springer International
3. Vibration Theory & Applications -By William I Thomson, Prentice Hall
4. Theory & Problems of Mechanical Vibration -By William W. Seto, McGrawHil1
5. Problems in Automobile Mechanics-By N.K.Giri, Khanna Pub.
6. Mechanics of Pneumatic Tyre -By S.K.C. fark, Prentice Hall
7. Mechanical Vibration Analysis -By PSrinivasan, TMH
8. Mechanical Vibration -By Church. Wife) international

Prerequisites: Engineering mechanics, Mechanics of Solids, Kinematics of Machinery

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

CAD/CAM - 14170703

(Common to Mechanical and AME)

Course Objectives:

The general objectives of the course are to enable the students to

1. Understand the basic fundamentals of computer aided design and manufacturing.
2. To learn 2D & 3D transformations of the basic entities like line, circle, ellipse etc
3. To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication
4. To learn the part programming, importance of group technology, computer aided process planning, computer aided quality control
5. To learn the overall configuration and elements of computer integrated manufacturing systems.

UNIT – I

Computers in industrial manufacturing, product cycle, CAD / CAM Hardware, basic structure, CPU, memory types, input devices, display devices, hard copy devices, storage devices.
COMPUTER GRAPHICS: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT – II

GEOMETRIC MODELING: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired. **DRAFTING AND MODELING SYSTEMS:** Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling.

UNIT – III

PART PROGRAMMING FOR NC MACHINES: NC, NC modes, NC elements, CNC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming. Direct Numerical Control, Adaptive Control.

UNIT – IV

GROUP TECHNOLOGY: Part family, coding and classification, production flow analysis, types and advantages. Computer aided processes planning – importance, types.

UNIT – V

COMPUTER AIDED QUALITY CONTROL: Terminology used in quality control, use of computers in Quality control. Inspection methods- contact and noncontact types, computer aided testing, integration of CAQC with CAD/CAM. Coordinate Measuring Machine (CMM).

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UNIT – VI

COMPUTER INTEGRATED MANUFACTURING SYSTEMS: Types of manufacturing systems, machine tools and related equipment, material handling systems, material requirement planning, computer control systems, human labor in manufacturing systems, CIMS benefits.

TEXT BOOKS:

1. Computer Aided Design and Manufacturing by M.M.M.SARCAR, et al / PHI Pvt. Ltd.,
2. CAD / CAM / CAE Zimmers & M.Groover/Pearson Education
3. Automation, Production systems & Computer integrated Manufacturing/ Groover/P.E

REFERENCES:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
3. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.
4. Product manufacturing and cost estimation using CAD/CAE/ Kuang Hua Chang, Elsevier Publishers

Course Outcome:

At the end of the course the students shall be able to:

1. Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix
2. Describe the use of GT and CAPP for the product development
3. Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

FINITE ELEMENT METHODS - 14170704

Course Objectives:

1. To learn basic principles of finite element analysis procedure .
2. To learn the theory and characteristics of finite elements that represent engineering structures.
3. To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses performed by others.
4. Learn to model complex geometry problems and solution techniques.

UNIT -I

Introduction to finite element method, stress and equilibrium, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variational and weighted residual methods, concept of potential energy, one dimensional problems.

UNIT – II

Discretization of domain, element shapes, discretization procedures, assembly of stiffness matrix, band width, node numbering, mesh generation, interpolation functions, local and global coordinates, convergence requirements, treatment of boundary conditions.

UNIT – III

Analysis of Trusses: Finite element modeling, coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, strain and support reaction calculations. Analysis of Beams: Element stiffness matrix for Hermite beam element, derivation of load vector for concentrated and UDL, simple problems on beams.

UNIT – IV

Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric problems.

UNIT-V

Higher order and isoparametric elements: One dimensional quadratic and cubic elements in natural coordinates, two dimensional four noded isoparametric elements and numerical integration.

UNIT – VI

Steady state heat transfer analysis : one dimensional analysis of a fin and two dimensional analysis of thin plate, analysis of a uniform shaft subjected to torsion. Dynamic Analysis: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of eigen values and eigen vectors, free vibration analysis.

TEXT BOOKS:

1. Introduction to Finite Elements in Engineering / Chandraputla, Ashok and Belegundu / Prentice – Hall.
2. The Finite Element Methods in Engineering / SS Rao / Pergamon.

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REFERENCES:

1. Finite Element Method with applications in Engineering / YM Desai, Eldho & Shah /Pearson publishers.
2. An introduction to Finite Element Method / JN Reddy / McGrawHill.
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.
4. Finite Element Analysis: Theory and Application with Ansys, Saeed Moaveniu, Pearson Education.

Course outcomes:

Upon successful completion of this course you should be able to:

1. Understand the concepts behind variational methods and weighted residual methods in FEM.
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element.
3. Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
4. Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
5. Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

AUTOMOTIVE POLLUTION AND CONTROL - 14170765a
(OPEN ELECTIVE)

Course objective: The students are exposed to pollution control laws, causes of pollution and measures to be taken to reduce the exhaust gas pollutants.

UNIT I

Pollutants from SI engines, Mechanism & formation of HC, CO, NOx, Particluates in SI engines. Engines and operating variables affecting pollution in SI engines.
Pollution for CI engines, Mechanism & formation of HC, CO, NOx, Particluates, and root in CI engines. Factor affecting emissions in CI engines.

UNIT-II

Laws and regulations: Historical background, regulatory test procedures (European cycles), BS I, BS II, BS III, BS IV, BS V And BS VI. Exhaust gas pollutants (European rail road limits), particulate pollutants, European statutory values, inspection of vehicles in circulation (influence of actual traffic conditions and influence of vehicle maintenance) Analysis of pollutants: Carbon and Nitrogen compounds-(CO.CO2 Nox), Ammonia and Amines, Hydrocarbons. Volatile compounds, evaporative losses, analysis of particulates.

UNIT-III

Lean burns & stratified charge engines. Multipoint fuel injection and gasoline direct injection methods. Common rail fuel injection in diesel engines. Post combustion treatments: Introduction, exhaust gas recirculation, exhaust gas composition before treatment, catalytic convertors, oxidation and three way types thermal reactors, installation of catalysts in exhaust lines treatment in diesel engines, particulate traps for diesel engines, particulates trap regeneration, SCR (Selective Catalytic reduction), CCS (Carbon Capture & Storage), Char coal caniser.

UNIT-IV

Economic challenges: Introduction, cost of improvement to SI engines, cost of injection systems, cost of improvement in Diesel engines, economic consequences of introducing the catalyst, additional costs incurred by diesel traps, cost of periodic inspection of pollution control system and evaporative control system.

UNIT-V

Instrumentation for pollution measurements: NDIR- analysers, thermal conductivity and flame ionization detectors, analysers for NOx, gas chromatograph. Orsat apparatus, smoke meters-spot sampling and continuous indication types like Bosch, Hartridge. Particulate measuring systems, dilution tunnels- full and partial flow.

UNIT VI

SI and CI engines fuel requirements. Knock in SI and CI engines. Knock rating of SI and CI Engines fuels. Alternative fuel like Hydrogen, Natural gas, LPG, vegetable oil and biodiesel, their production, properties, storage and performance as engines fuels.

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Course outcome: The students completing this course will be in a position to derive various measures to be taken to reduce the exhaust gas pollutants coming out of automobiles to meet the laws and regulations in practice.

TEXT BOOKS

1. Bosch – Gawline fuel injection – Bosch Publications
2. Bosch – Diesel fuel injection – Bosch Publications
3. IC Engine Combustion & Emissions - B P Pundhir, 1st Vol.

REFERENCES

1. Automobiles and Pollution – PaulDegobert(SAE)
2. Diesel engine operation manual – V.L. Maleev, CBS Pub
3. I.C. Engines – E.F. Obert, Harper & Row
4. Engine emission – Springer and Patterson, Plenum Press
5. Heins Aeisth – Internal Combustion Engines – SAE Publications.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

ADVANCED MATERIALS - 14170765b
(OPEN ELECTIVE)

Course Objectives

The objective for this course is to understand the mechanics of different materials. This understanding will include concepts such as anisotropic material behavior, constituent properties and manufacturing processes of different composites. Suitability of smart and nano materials for engineering applications.

UNIT-I

INTRODUCTION TO COMPOSITE MATERIALS: Introduction, classification: polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon–carbon composites, fiber- reinforced composites and nature-made composites, and applications .
REINFORCEMENTS: Fibres- glass, silica, kevlar, carbon, boron, silicon carbide, and born carbide fibres.

UNIT-II

polymer composites, thermoplastics, thermosetting plastics, manufacturing of PMC, MMC & CCC and their applications.

UNIT-III

MANUFACTURING METHODS: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT-IV

MACROMECHANICAL ANALYSIS OF A LAMINA: Introduction, generalized hooke's law, reduction of hooke's law in three dimensions to two dimensions, relationship of compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina, laminate-laminate code.

UNIT-V

FUNCTIONALLY GRADED MATERIALS: Types of functionally graded materials, classification-different systems-preparation-properties and applications of functionally graded materials.
SHAPE MEMORY ALLOYS: Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys.

UNIT-VI

NANO MATERIALS: Introduction-properties at nano scales-advantages & disadvantages, applications
in comparison with bulk materials (nano – structure, wires, tubes, composites). state of art nano advanced- topic delivered by student.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

Course outcomes

Students who successfully complete this course will demonstrate the following:

- Properties of constituents, classification of composites and their suitability for the structural applications
- Manufacturing processes
- Smart materials and their applications
- Nano materials in comparison with bulk materials

TEXT BOOKS:

1. Nano material by A.K. Bandyopadyay, New age Publishers
2. Material science and Technology- Cahan
3. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press

REFERENCES:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.
2. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold.
3. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980
4. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), Autar K.Kaw, Publisher: CRC

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

INDUSTRIAL HYDRAULICS & PNEUMATICS - 14170765c
(OPEN ELECTIVE)

Course objective

1. Understand the underlying principles of Industrial Hydraulics & Pneumatic System
2. Analyze circuits and Enumerate the functions & characteristics of circuit elements
3. Attend to troubleshooting in fluid power systems
4. Identify and describe the basic operation of Hydraulic / Pneumatic systems, the various Equipment used in their operation.

UNIT – I

Fundamentals of Fluid Power Systems-Introduction-types advantages, disadvantages & applicationsfluid
characteristics-terminologies used in fluid power-hydraulic symbols-hydraulic systems and components-sources-pumping theory-gear, vane & piston pumps.

UNIT-II

Fluid Power Actuators: Introduction-hydraulic actuators-hydraulic cylinders-types, construction, specifications and special types. hydraulic motors- working principle-selection criteria for various types-hydraulic motors in circuits- formulae-numerical problems

UNIT-III

Hydraulic elements in the design of circuits- Introduction-control elements-direction control valvecheck
valve-pressure control valve-relief valve-throttle valve-temperature & pressure compensationlocations of flow control valve

UNIT-IV

Accumulators & intensifiers-types, size &function of accumulators-application & circuits of accumulators- intensifiers-circuit & applications.
Design & drawing of hydraulic circuits-Introduction-case study & specifications-method of drawing a hydraulic circuit-hydraulic cylinder-quick return of a hydraulic cylinder

UNIT-V

Pneumatic systems-Introduction-symbols used-concepts & components- comparision-types & specifications of compressors-arrangement of a complete pneumatic system-compressed air behaviour-understanding pneumatic circuits-direction control valves Electro pneumatics- Introduction-Pilot operated solenoid valve-electrical connections to solenoids electro pneumatic circuit switches-relays-solenoids-P.E converter-concept of latching.

UNIT-VI

Applications-servo systems-introduction-closed loop, hydro-mechanical and electro hydraulic – conventional and proportional valves-characteristics of proportional and servo valves- PLC applications in fluid power – selected pneumatic / electro pneumatic circuit problems – failure and trouble shooting in fluid power systems.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

Course outcome:

Upon successful completion of this course student should be able to:

1. understand the general concepts associated with Hydraulic and Pneumatic equipment as found in industry today.
2. The course describes the various types of Hydraulic / Pneumatic equipment as well as the different types of Seals used in such equipment
3. Understand advantage of fluid power, it provides examples of applications
4. Understand the operation of hydraulics & pnuematics circuits and components typically used in industry

TEXT BOOKS:

1. Introduction to Hydraulics and Pneumatics by S. Ilango and V. Soundararajan, PHI , New Delhi
2. Applied hydraulics and pneumatics-T. Sunder Selwyn & R. Jayendiran, Anuradha Publications.

REFERENCE BOOKS:

1. Oil Hydraulic Systems, S.R .Majumdar, McGrawHill Companies
2. Pneumatic Systems: Principles and Maintenance, Majumdar, McGrawHill

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

AUTOMOTIVE CHASSIS & SUSPENSION - 14170706

Course objective: To impart the necessity, requirements and construction of chassis and frames and other automobile components like bakes, breaking systems, suspensions systems.

Unit-I

Introduction to Chassis System: Introduction: Requirements of an automobile with types of automobiles, layout of an automobile with reference to power plant, power required for propulsion, various resistances to motion of the automobile.

Frames: Types of frames-Ladder, Rigid, Monocope, semi monocope, Joggled, Sliced etc. Frame materials, calculation of stresses on sections, constructional details, loading points, testing of frames. Wheels and tyres: Types of wheels, construction. Structure and function of tyres.

UNTI-II

Steering systems: types of steering gears, front axle. Under steer and over steer, wheel alignment, power steering, steering geometry, wheel balancing, centre point steering, steerability.

Unit-III

Brakes: Necessity of brake, stopping distance and time. Brake efficiency, weight transfer, brake shoe theory, determination of braking torque, braking systems -mechanical, hydraulic, air (Pneumatic) brakes, brake disc, parking and emergency brakes, servo and electrical brakes, ABS, details of hydraulic system, mechanical system and components. Types of master cylinders, factors influencing operation of brakes such as operating temperature, lining, types of brake lining, brake clearance, pedal pressure, linkages etc.

Unit-IV

Suspension: Types of suspension, leaf springs and their types, materials, independent suspension, torsion bar, air bellows or pneumatic, suspension, hydraulic suspension, constructional details of telescopic shock absorbers, types, vibrations and riding comfort, role axis of spring suspension.

UNIT-V

Front Wheel Mounting, Rear Wheel Mounting, engine mounting, various types of springs used in suspension system. Requirements and various types, Material, Tyres, types of tyres, Types of wheel rims.

Testing: Testing procedures, types of tests and chassis components, equipment for lab and road tests, preparation of test reports.

UNIT-VI

Two and three wheelers: Classification of two and three wheelers, construction details, construction details of frames and forks, suspension systems and shock absorbers, different arrangement of cylinders. Carburetion system and operation.

Course outcome: The students completing the course will be able to understand various automobile components and their construction details. And preventive and remedial measures can be attended by the student with enough knowledge.

TEXTBOOKS

1. Automotive chassis and body -P. L. Kohli, TMH
2. Automobile engineering – Sudhir kumar – university science press

REFERENCES

1. Introduction to automobile engineering -N.R. Khatawate. Khanna pub.
2. Automotive mechanics -Joseph I heintner. Affiliated East West Press
3. Problems in Automobile Engineering -N.K.Giri, Khanna Pub
4. Automotive Chassis -P.M. Heldt, Chilton & Co.
5. Automobile Engineering -T.R. Banga & Nathu Singh, Khanna

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

AUTOMOBILE ENGINEERING LAB-III & INSTRUMENTATION LAB - 14170711

Objective: To impart practical knowledge on automobile working, Servicing and maintenance of selected components, and to calibrate the measuring devices.

Note: Any six experiments from each section

Section-I AUTOMOBILE ENGINEERING LAB

1. Dismantling and assembly of LMV components as following :
a) Gear box b) clutch assembly c) Propeller shaft d) differential gear box
e) rear axle t) suspension system g) steering mechanism.
2. Dismantling and assembly of door frames, door locks and window locks
3. Study of driver's seat layout in anyone LMV and anyone HMV.
4. Testing, servicing and charging of batteries
5. Servicing of generator, alternator and starter motor with dismantling, testing, inspection and assembly.
6.Servicing of ignition systems
7.Drawing of general electrical wiring diagrams of various vehicles { two and four wheelers)
8. Calibration of micrometer, measurement of plain plug, measurement of plain ring gauge, taper gauge
9.Measurement of taper using sine bar and other instruments.
10. Measurement of base circle diameter and tooth thickness of spur and helical gears
11.Use of slip gauges, measurement of screw threads using screw thread micrometer, use of comparators,
experiments involving profile projectors.
12. Overhauling &testing of fuel injection pumps on test bench.
13. Overhauling & testing of air brake components in the brake system on test bench.

Note: Driving practice of a geared two wheeler and anyone LMV for a minimum of 10 hours duration need to be provided.

Section-II INSTRUMENTATION LAB

1. Calibration of Pressure Gauges
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotometer for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of Mcleod gauge for low pressure.

Course outcome: After completing the course the learner will be in a position to servicing the generators and batteries and ignition systems and is expected to wellverse with various calibrated the devices.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

CAD/CAM Lab - 14170712

Course Objectives:

1. To impart the fundamental knowledge on using various analytical tools like ANSYS, FLUENT, etc., for Engineering Simulation.
2. To know various fields of engineering where these tools can be effectively used to improve the output of a product.
3. To impart knowledge on how these tools are ued in Industries by solving some real time problems using these tools..

1. **DRAFTING :** Development of part drawings for various components in the form of orthographic andisometric. representation of dimensioning and tolerances scanning and plotting. study of script, DXE and IGES files.

2**. PART MODELING :** Generation of various 3D models through protrusion, revolve, shell sweep. creation of various features. study of parent child relation. feature based and boolean based modeling surface and assembly modeling. study of various standard translators. design simple components.

3. a) Determination of deflection and stresses in 2D and 3D trusses and beams.
b) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
c) Determination of stresses in 3D and shell structures (at least one example in each case)
d) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
e) Steady state heat transfer Analysis of plane and Axisymmetric components.

4. a) Development of process sheets for various components based on tooling Machines.
b) Development of manufacturing and tool management systems.
c) Study of various post processors used in NC Machines.
d) Development of NC code for free form and sculptured surfaces using CAM packages
e) Machining of simple components on NC lathe and Mill by transferring NC Code / from a CAM package. Through RS 232.
f) Quality Control and inspection.

Packages to be provided to cater to drafting, modeling & analysis from the following:
Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

Course outcomes:

Upon successful completion of this course student should be able to:

1. The student will be able to appreciate the utility of the tools like ANSYS or FLUENT in solving real time problems and day to day problems.
2. Use of these tools for any engineering and real time applications.
3. Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their employment.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – I Sem.

SUMMER INTERNSHIP - 14170731

Student should carry Summer Internship during summer vacation after III B.Tech., II Sem. and it will be evaluated during IV B.Tech., I Sem

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

AUTOMOTIVE CONTROL SYSTEMS - 14170801

Course objectives: The objective of the course is to impart necessary skills required to model an engine and control systems. To make the learner understand over all diagnosis of automotive engines, vehicle, road and driver modelling

UNIT-I

Engine management systems: effective work, inflammation of A/F mixtures, flame propagation, energy conversion, emissions of I/C engines, fuel management, injection time calculation, air mass per cycle, intake manifold dynamics.

UNIT-II

Diesel engine modelling: four stroke cycle diesel engine, charge exchange, air fuel raito, mass balance, fuel injection, fuel evaporation, cylinder dynamics, fitting of model parameters.

UNIT-III

Engine control systems: Lambda control, stoichiometric operation of SI engines, engine model for lambda control, lambda control circuit, adaptive lambda control, idle speed control, knocking at SI engines, knock sensors, adaptive knock control, cylinder balancing.

UNIT-IV

Diagnosis of automotive engines: introduction to diagnosis, faults modelling, principles of model based diagnosis, modelling the air intake system, model identification, the diagnosis system, residual generation, residual, evaluation, implementation, validation of the diagnosis system, misfire detection.

UNIT-V

Vehicle modelling: introduction, co-ordinate system, vehicle body side slip angle observer, determination of the road gradient, vehicle control system: ABS control systems. Road and driver models: road models, requirements of the road models, definitions of the course path, road surfaces and wind strength, PID driver model, Hybrid driver model.

UNIT VI

Introduction to mechatronics: Sensors – elements of mechatronics systems-displacement sensors, position sensors, proximity sensors, velocity sensors, motion sensors, torque sensors, acceleration sensors, temperature sensors. Hydraulic and pneumatic actuating systems-design of mechatronics systems.

Course outcomes: After completing the course the student will be in a position to understand various control systems involved in vehicle modelling.

TEXT BOOKS

1. Automotive control systems, Uwe Kiencle, Lars Nielsen, Springer,2005
2. Automotive Control systems, A, galip Ulsoy, Huei Peng, Melih Cakmakci, Cambridge University press, 2012.
3. Mechatroincs, integrated mechanical electronics systems,K.P.Ramachandran,et,al;WILEY India private limited.
4. Electronic Engine controls, Steve V.Hatch-Cengage Learning

REFERENCES

1. Mechatronics principles and applications, Onwubolu, ELSEVIER
2. Modern automotive technology, James E. Duffy, Goodheart – willcox Publ, 2003.
3. SI Engine system simulation - Dr. V.Ganeshan, Tata McGraw hill

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

VEHICLE MAINTENANCE - 14170802

Course objectives: The students are exposed to maintain records and schedules, overhauling of engine components and various systems of a vehicle.

UNIT-I

Maintenance records and schedule: Importance of maintenance, various types of maintenance, scheduled and unscheduled maintenance. Preparation of check lists, Chassis lubrication. Cost effectiveness. Pre- trip. Inspection forms, log books, trip sheets, other maintenance record form.

UNIT-II

Maintenance, Repair: Dismantling of engine components, cleaning methods, Visual inspection and dimensional check of various engine components.

Overhauling of engines: Minor and major tune up reconditioning, repairing methods of engine components, assembly procedure. Special tools used for maintenance, repair and overhauling. Standard operating procedures for overhauling of engines.

UNIT-III

Maintenance, repair and overhauling of chassis drive line components and suspensions systems: clutch – mechanical, automatic type gear box. Final reduction , Propeller shaft. Suspension systems: front and rear suspension systems, Rigid and independent types, Brakes system – hydraulic, servo, pneumatic operated brakes. Air bleeding, Steering system, wheel alignment – tyres.

UNIT-IV

Maintenance, repair and servicing of electrical systems: Battery – testing methods. Starter motor. Charging system- DC generator, AC generator, Regulator, Ignition systems- coil ignition, transistor assisted ignition, capacitor discharge ignition. Electric horn, wiper, Flasher, electric fuel pump, gauges. Lighting system, head lights focussing. Wiring system, Multiplex wiring (EEA)

UNIT-V

Maintenance, Air intake system, Exhaust system, repair and servicing of cooling system, lubrication system: cooling system, types of coolants – types, water pumps, radiator, and thermostat valve, anti-corrosion and anti-freezing solutions.

Lubricating system – Types of lubricating oils, Oil analysis, oil topping up, oil change, oil filters, oil relief valve.

UNIT-VI

Maintenance, repair and servicing of fuel system and body: Manufacturers maintenance schedule, fuel system-petrol, diesel fuel feed system components. Body repair tools, minor body panel beating, tinkering, soldering, polishing, painting. Door locks mechanism. Window glass actuating mechanism.

Course outcome: the students completing this course are expected to maintain various records and scheduled and unscheduled maintenance. They are also expected to maintain, repair and service of various systems of a vehicle.

TEXT BOOKS

1. JOHN Doke, "Fleet management", McGraw Hill Co, 1984.
2. An Introductory Guide to Motor Vehicle Maintenance: Light Vehicles by Phil Knott, Adam Roylance; EMS Publishing, London.

REFERENCES

1. APRACTICAL Approach to Motor Vehicle Engineering and Maintenance by Allan Bonnick, Derek Newbold, Elsevier Ltd.

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2. Vehicle Maintenance: Vehicle fitting Units Levels 1 & 2: Vehicle Fitting Units 1&2 (Vehicle Maintenance and Repair Series) Roy Brooks, Jack Hrist, John Whipp, Thomson, Singapore.2001
3. John. W.Vale.J.R."Modern Auto Body and finder repair".
4. Venk.Spicer."Automotive Maintenance and Troubleshooting".

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

AUTOMOTIVE SAFETY - 14170863a
(DEPARTMENTAL ELECTIVE-III)

Course objective: To impart the knowledge of the safety concepts, comfort and convenience system, driver assistance system and other requirements of automotive safety.

UNIT-I

INTRODUTION:

Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction.

UNIT-II

SAFETY AND FATIGUE ASPECTS

Design of body, forces in roll over, head on impact, plastics collapse and analysis, fatigue and vibration, test on box sections, structural vibration.

UNIT-III

SAFETY CONCEPT

Active safety: driving safety, conditional safety, perceptibility safety, operating safety- crash safety passive safety: exterior safety, interior, safety, deformation behaviour of vehicle body, speed and acceleration characteristics of passenger compartment on impact.

Safety equipment: Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumpers design for safety. FDSS (Fire Detection & Suppression System).

UNIT-IV

COLLISION WARNING AND AVOIDANCE

Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system object detection system with braking system interactions.

UNIT-V

COMFORT AND CONVENIENCE SYSTEM

Steering and mirror adjustment, central locking system, garage door opening system, tyre pressure control system, rain sensor system, environment information system.

UNIT-VI

DRIVER ASSISTANCE SYSTEMS:

Introduction, driver support systems- driver information, vehicle support system, - vehicle status monitoring.

TELEMATICS: Manufacturers toll free numbers, Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition, driver assistance system.

Course Outcome: After completing the course the student will be in a position to understand the various safety measures to be taken while designing an automobile.

TEXT BOOKS

1. Bosch – "Automotive Handbook" – 5th edition – SAE publication – 2000.
2. Junsz Pawlowski, "Vehicle Body Engineering", Business book limited, 1989.
3. Ronald K Jurgen, "Navigation and Intelligent Transportation Systems – Progress in Technology", Automotive Electronics Series, SAE. USA,1998.

REFERENCES

1. Rudolf Limpert, "Brake Design and Safety", SAE International, Second Edition, 1999.
2. Ronald.K.Jurgen – "Automotive Electronics Handbook" – Second edition – Mc Graw – Hill Inc.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

AUTOMOTIVE MANUFACTURING - 14170863b
(DEPARTMENTAL ELECTIVE – III)

Course Objectives: To impart the knowledge of latest trends in manufacturing, automated flow lines, material handling systems and Flexible assemble lines.

UNIT-I

INTRODUCTION: Types and strategies of automation, pneumatic and hydraulic components, circuits, automation in machine tools, mechanical feeding and tool changing and machine tool control.

UNIT – II

AUTOMATED FLOW LINES: Methods of part transport, transfer mechanism, AGV, buffer storage, control function, design and fabrication considerations.

UNIT – III

ANALYSIS OF AUTOMATED FLOW LINES: General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

ASSEMBLY SYSTEM AND LINE BALANCING: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – IV

AUTOMATED MATERIAL HANDLING: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems.

AUTOMATED STORAGE SYSTEMS: Automated storage and retrieval systems; Kanban system, JIT, work in process storage, interfacing handling and storage with manufacturing.

UNIT – V

ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, adaptive control with constraints, application of a.c. in machining operations. Use of various parameters such as cutting force, temperatures, vibration and acoustic emission.

UNIT – VI

Automated inspection: Fundamentals, types of inspection methods and equipment, CMM, machine vision.

Course outcome: After completing the course the student will be able to know about the automated flow lines, automated assembly and other automated that are being used in automobile manufacturing industries.

TEXT BOOKS

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./ PE/PHI
2. Manufacturing process and systems : Ostwals Munoz

REFERENCES

1. Computer Control of Manufacturing Systems by Yoram Coren.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.
4. Mechanical assemblies – Daniek E. Whitney

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

AUTOMOBILE AIR CONTIDITIONING -14170863c
(DEPARTMENTAL ELECTIVE-III)

Course objective: To impart the knowledge of the auto air conditioning concepts and various systems and also load analysis, air distribution calculations.

UNIT I

AIR CONDITIONING FUNDAMENTALS: Basic air conditioning system, Air conditioning principles, air conditioning types, temperature and pressure fundamentals, types of compressors and refrigerants, psychrometry terms, DBT, WBT, humidity, humidity ratio, Psychrometry charts.

UNIT II

AIR CONDITIONING SYSTEMS: Classification, layouts, central unitary air conditioning systems, components like compressors, evaporators, condensers, expansions devices, fan blowers. Location of these components, Heating systems, automotive heaters, types, heater systems, air conditioning protection, engine protection.

UNIT-III

LOAD ANALYSIS: Outside & inside design consideration, factors forming the load on refrigeration & air conditioning systems, cooling & heating loads calculations, load calculations for automobiles, effect of air conditioning load on engines performance.

UNIT –IV

AIR DISTRIBUTION SYSTEMS: Distribution duct system, supply return ducts, type of grills, diffusers, ventilation, air noise level, layout of duct systems for automobiles and their impact on load calculations.

Air routing & temperature control-Objectives, evaporator air flow, through the re-circulating unit, automatic temperature control, duct system, controlling flow, vacuum reserve, testing the air control of air handling systems.

UNIT-V

AIR CONDITIONING SERVICES: Air conditioner maintenance & service- causes of air conditioner failure, leak testing guide, discharging the system, evacuating the system, charging the system, servicing heater system, removing & replacing components, trouble shooting of air conditioning system, compressor service, methods of dehydration, charging & testing. Air conditioning control: Common control such as thermostats, humidistat, control dampers, pressure cut outs, relays.

UNIT-VI

Refrigerants: Classification of refrigerants, properties, requirements, selection criteria, commonly used refrigerants, refrigerants used in automobiles.

Course outcome: After completing the course, student will be in a position to understand various systems fault diagnosis and troubleshooting of auto air conditioning.

TEXT BOOKS

1. Mark Schnubel, "Automotive Heating & Air Conditioning", Thomson Delmar Learning, 3rd edition, NY.
2. William H. Crouse & Donald L. Anglin, "Automotive Air Conditioning, Mc GrawHill. Inc., 1990.
3. ASHRAE Handbook – 1985 Fundamentals.

REFERENCES

1. Boyace H. Dwuggins, "Automotive Air – Conditioning".
2. SamSungarman, "HVAC Fundamentals, Fairmont Press, ISBNO-88173-489.
3. Paul Weisler, "Automotive Air Conditioning, Reston PublishingCo.Inc.1990.
4. Paul Lung, "Automotive Air Conditioning, C.B, S. Publisher & Distributor, Delhi.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

HYBRID, ELECTRIC & FUEL CELL VEHICLES - 14170863d
(DEPARTMENTAL ELECTIVE-III)

INSTRUCTIONAL OBJECTIVES

1. Understanding various aspects of hybrid and electric drive trains such as their configuration, types of electric machines that can be used, energy storage devices, etc.
2. Get exposed to research and development challenges involved in various types of fuel cells.

UNIT I - FUELCELL TECHNOLOGY

Structures, Operations and properties of Fuel cells – (Phosphoric Acid Fuel cell, Proton Exchange membrane Fuel cell, Direct Methanol fuel cell Alkaline Fuel Cells, Solid Oxide Fuel Cell, Molten Carbonate Fuel Cell) -Characteristics. Electrochemical energy conversion – Theoretical efficiency – Factors affecting electrochemical energy conversion- Helmholtz double layer model

UNIT II - FUEL CELL BASED VEHICLES STRUCTURE

PEMFC: Operating principle (membranes, electrodes and electrolysis, optimization of membrane and electrode assembly, impurities) – Technology development (single cell and stacks, composite plates) – Fuel processing – Modeling studies (membrane, electrode, membrane-electrode assembly, fuel cell, stack and system) – Technology development and applications. DMFC: Operating principle – Noble metal issue – Electro-oxidation of methanol (Catalysts, oxygen electroreduction, electrolyte, non-catalytic aspects) - Methanol crossover.

UNIT III - HYBRID ELECTRIC TECHNOLOGY

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT IV - ELECTRIC DRIVETRAINS

Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT V - HYBRID ELECTRIC VEHICLES

Principles of Hybrid Electric Drivetrains, Architectures – Electrical distribution, Hybrid control Strategies – Parallel Hybrid, Series Hybrid - (Charge Sustaining, Charge Depleting), Practical Models – Toyota Prius, Honda Insight. Hybridization Effects. 42 V System for Traction Applications - Lightly Hybridized vehicles, Low –Voltage Storage System, Low –Voltage main system with High voltage bus for propulsion. Heavy Vehicles Hybrid Electric Heavy Duty Vehicles, Fuel cell Heavy duty vehicles.

UNIT VI - HYBRID VEHICLE TECHNOLOGY

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology,

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Communications, supporting subsystems. Energy Management Strategies in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies. Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

TEXT BOOKS

1. Basu .S, *"Recent Trends in Fuel cell Science and Technology",* Anamaya Publishers, New Delhi.,2007.
2. Viswanathan, B. and Aulice Scibioh, M., *"Fuel Cells Principles and Applications*", Universities Press (India) Pvt. Ltd., Hyderabad, 2006.
3. Hoogers, G., Edr. *"Fuel Cell Technology Handbook*", CRC Press, Washington D. C., 2003.

REFERENCES

1. Larminie, J. and Dicks, A., "*Fuel Cell Systems Explained"* John Wiley & Sons, Ltd., New York, 2001.
2. Ali Emadi, Mehrdad Ehsani, John M. Muller, "*Vehicular Electric Power Systems"*, Marcel Dekker, Inc., 2004.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

MANAGEMENT SCIENCE - 14179864a
(DEPARTMENTAL ELECTIVE-IV)

Unit I:

(The learning objective of this unit is to understand the concept and nature of Management, Evolution of Management theories, Motivation and leadership styles)

Introduction to Management: Concepts of Management and organization- Nature and Importance of Management, Functions and Evolution of Management, Motivation theories-Leadership styles-Decision making process – designing organization structure- Principles and types of organization.

(The leader is able to understand the concept and functions of Management and theories of motivation, styles of leadership)

Unit II:

(The Learning objective of this unit is to equip with the concepts of operations and inventory control)

Operations Management: Principles and Types of Management- Work study – Statistical quality control- control charts (P-Charts, R-Charts, and C-Charts) simple problems.

Material Management: Need for inventory control- EOQ, ABC analysis (Simple problems) and Types of ABC analysis (HML, SDE and FSN analysis)

(The learner is able to understand the main idea of inspection and scrutinize the different methods of inspection, the concept of inventory management and control of inventory pricing)

Unit III:

(The objective of this unit is to understand the main functional areas of organization i.e., Financial Management, Production management, marketing management and human resource management and production life cycle and channels of distribution.)

Functional Management: Concept and functions of finance, HR, Production and Marketing, Functions of HR Management – Wage payment plans (Simple problems)-Job evaluation and Merit rating – Marketing strategies based on product life cycle, channels of distributions.

(At the end of this chapter the learner is able to understand the different functional areas in an organization and their responsibilities – Product life cycles of distribution)

Unit IV:

(The learning objective of this unit is to understand drawing the net work diagram and crashing the projects)

Project Management: (PERT/CPM) Concept, Development of Network – Difference between PERT and CPM – Identification of critical path – Probability crashing (Simple problems).

(The learner is able to understand PERT and Identifying Critical Path and reduce the project duration with crashing)

Unit V:

(The objective of this unit is to equip with the concept and practical issues relating to Strategic Management)

Strategic Management: Vision, Mission, Goals, Strategy- Elements of Corporate Planning Process-Environmental Scanning – SWOT analysis – Steps in strategy formulation and implementation, Genetic Strategy alternatives.

(The learner is able to familiar with the meaning of Vision, Mission, Goals and Strategies of the Organization and to implement successfully)

Unit VI:

(The learning objective of this unit is to equip with the contemporary management practices, i.e., MIS, MRP, JIP and ERP etc.,)

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Contemporary Management Practices: Basic concepts of MIS, MRP, Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levies, Supply chain management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.
(The learner is able to understand the various contemporary issues in Management practices like TQM and BPO etc.,)

TEXT BOOK

1. Dr. P. Vijay Kumar & Dr N. AppaRao, 'Introduction to Management Science' Cengage, Delhi
2. Dr A R Aryasri: *Management Science*, TMH, New Delhi 2011.

REFERENCES

1. Koontz & Weihrich: *Essentials of Management*, TMH, 2011
2. Seth & Rastogi : Global Management System, Cengage Learning, Delhi, 2011.
3. Robbins: Organizational behaviour, Person pub, 2011
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2011.
5. Philip Kotler & Armstrong; Principles of marketing, Person pub.
6. Biswajit Patnaik: Human resource management, PHI, 2011
7. Management shapers, Universities press
8. Dr P V V Satya : Strategic Human Resources Management, Discovery pub, new delhi

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

PRINCIPLES OF ENTERPRENUERSHIP - 14179864b
(DEPARTMENTAL ELECTIVE-IV)

Course objectives: The objective is to expose the students to the concepts of entrepreneurship and role of entrepreneurship in economic development. Further the student will be given enough exposure to the managerial practices to increase the overall productivity.

Unit-I

Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Entrepreneur. The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur.

Unit- II

Creating and Starting the Venture Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and development process.

The Business Plan: Nature and scope of Business plan , Writing Business Plan, Evaluating Business plans, Using and implementing business plans. Marketing plan, financial plan and the organizational plan, Launching formalities.

Unit- III

Financing and Managing the new venture Sources of capital, Record keeping, recruitment, motivating and leading teams, financial controls . Marketing and sales controls. E-commerce and Entrepreneurship, Internet advertising.

Unit- IV

New venture Expansion Strategies and Issues Features and evaluation of joint ventures, acquisitions, merges, franchising. Public issues, rights issues, bonus issues and stock splits. Institutional support to Entrepreneurship. Role of Directorate of Industries.

Unit- V

Production and Marketing Management Thrust of production management, Selection of production Techniques, plant utilization and maintenance, Designing the work place, Inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing.

Unit -VI

Recruitment – motivation and leading teams, Insights of Industrial Relations – Labour legislation, Salient Provision under Indian factories act, Industrial disputes act, Employee state insurance act., Workmen's compensation act and payment of bonus act.

Course outcome: After completing the course, the learner will be in a position to manage an enterprise right from starting the venture to implementation of strategic managerial practices to increase the productivity.

TEXT BOOKS:

1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 5th Edition.
2. Dollinger: Entrepreneurship,4/e, Pearson, 2004.

REFERENCE BOOKS:

1. Vasant Desal: Dynamics of Entrepreneurial Development and management, Himalaya Publishing House, 2004.
2. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
3. Robert J.Calvin: Entrepreneurial Management, TMH, 2004.
4. Gurmeet Naroola: The Entrepreneurial Connection, TMH, 2001.

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5. Bolton & Thompson : Entrepeneurs- Talent, Temperament, Technique, Butterworth Heinemann, 2001.
6. Agarwal :Indian Economy , Wishwa Prakashan 2005.
7. Dutt & Sundaram : Indian Economy. S. Chand, 2005.
8. Srivastava: Industrial Relations & Labour Laws, Vikas, 2005.
9. Aruna Kaulgud: Entrepreneurship Management by. Vikas publishing house, 2003.
10. Thomas W. Zimmerer & Norman M. Scarborough: Essential of Entrepreneurship and small business management, PHI, 4/e, 2005.
11. Mary Coulter: Entrepreneurship in Action, PHI, 2/e, 2005.
12. Kaplan: Patterns of Entrepreneurship, Willey, 2005.
13. ND Kapoor: Industrial Law, Sultan Chand & Sons, 2005.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

SIMULATION OF SI & CI ENGINES - 14170864c
(DEPARTMENTAL ELECTIVE-IV)

Course objective: The students are exposed to principals of simulation using computers and validation of models with more emphasis on SI engine and CI engine process.

UNIT-I

INTRODUCTION: Simulation principles – simulation exercises using computers, validation of models.

COMBUSTION PROCESS: Reactive process, heat of reaction, adiabatic flame temperature, isentropic changes of stage, temperature change due to fuel vaporization.

UNIT-II

SIMULATION OF SI ENGINE PROCESSES:

SI engine simulation with air as working medium: Ideal otto cycle, deviation with ideal and actual cycle.

SI engine simulation with adiabatic combustion: Temperature drop due to fuel vaporization, full throttle, part throttle and supercharged operations, problems.

UNIT-III

SI engines simulation with progressive combustion, gas exchange process, evaluation of performance parameters.

Simulation of two strokes SI engine processes.

UNIT-IV

SIMULATION OF CI ENGINE PROCESS:

CI engines simulation with air as working medium: deviation with ideal and actual cycle.

CI engines simulation with adiabatic combustion : Naturally aspirated and super charged operations, problems.

UNIT-V

CI engines simulation with progressive combustion, combustion modelling, zero dimensional combustion models, heat release and heat transfer models.

CI engines simulation with gas exchange process. Evaluation of performance parameters.

UNIT-VI

Introduction to CFD simulation of IC engine flow mixture formation and combustion

Course outcome: students completing this course are expected to understand the principals involved in simulation and adopt the same to simulate an IC engine with different working media.

TEXT BOOKS

1. Computer simulation of SI engine process, V.Ganesan, Orient Longman Ltd.,
2. Computer simulation of CI engine process, V.Ganesan, Orient Longman Ltd.,

REFERENCES

1. Introduction to modelling and control of Internal Combustion Engine Systems, Lino Guzzella, Christopher H.Onder,Springer,2010.
2. Computer Optimization of Internal Combustion Engines, Y.Shi,et,al;Springer,2011.
3. 3D – CFD Simulation of IC Engine Flow, Mixture Formation and Combustion with AVL FIRE, Gunter P.Merker,Springer,2010.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

MODERN VEHICLE TECHNOLOGY - 14170864d
(DEPARTMENTAL ELECTIVE-IV)

Course objectives: The students are exposed to modern trends in automobile industry and the use of combination of various energy sources. Further the students are exposed to latest trends in suspension system, emission and noise control systems.

UNIT-I

Trends in Automotive Power Plants: Hybrid Vehicles - Stratified charged / lean burn engines - Hydrogen Engines-Electric vehicles-Magnetic track vehicles solar powered vehicle Combined power source vehicle, types of hybrid drives, Toyota hybrid system.

UNIT-II

Suspension: Interconnected air and liquid suspensions, Hydrolastic suspension system, Hydragas suspension.

UNIT-III

Braking systems and safety: Modern rear wheel brake, indirect floating calliper disc brake, self energising disc brake, brake limiting device, anti-slide system, Ford Escort and Orion anti lock system. Closed loop suspension; Regenerative braking; Passenger comfort.

UNIT-IV

Emission and Noise Pollution Control: Introduction, Engine emissions, types of catalytic conversion, open loop and closed loop operation to the oxidizing catalytic converter, Evaporative emissions, Internal and External Noise, Identification of Noise sources, Noise Control Techniques.

UNIT-V

Vehicle Operation and Control: Fundamentals of Automotive Electronics - sensors, actuators, Processors, Computer Control for pollution, noise and for fuel economy - Electronic Fuel Injection and Ignition system.

UNIT-VI

Fuel Injection Systems: SPFI, MPFI, DI, Pilot Injection, Unit Injection. CRDI; Two Wheeler Technology: DTS- i, DTS - Fi, DTS - Si; Four Wheeler Technology: WT, Camless Engine, GDI.

Course outcome: The students completing the course are expected to make use of the latest technologies to develop more efficient vehicles to meet the customer demands.

REFERENCES

1. K.K. Ramalingam, "Automobile Engineering", Scitech Publications Pvt. Ltd., 2005
2. Dr. N.K. Giri, "Automobile Mechanic", Khanna Publishers, 2006
3. Crouse/Anglin "Automotive Mechanics"
4. K.Newton, W.Steeds "The Motor Vechicle"
5. Heinz Heisler " Advanced Vehicle Technology" ELSEVIER

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year B.Tech. (AME) – II Sem.

PROJECT WORK - 14170841

Objectives:
The aim of the course is to make the student perform a comprehensive project work that involves either or all of the following: optimum design of a mechanical component or an assembly, thermal analysis, computer aided design & analysis, cost effective manufacturing process, material selection, testing procedures or fabrication of components and prepare a detailed technical thesis report. The completed task should also take into account the significance of real time applications, energy management and the environmental affects.

Outcomes:
After completing the project work the student should learn the technical procedure of planning, scheduling and realizing an engineering product and further acquire the skills of technical report writing and data collection.

Course content:
The student should work in groups to achieve the aforementioned objectives and the outcomes.

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B.Tech., Automobile Engineering **With effective from 2014-15 Batch**

IV Year –II SEMESTER

IPR & PATENTS - 14179895

Unit I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

Unit III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

Unit VI

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

REFERENCE BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw –Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. Dr. S.R.Mynani, Law & IP, Asian Law House, Hyderabad.
7. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
8. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right", Serials Pub.