

SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

For

Diploma in Automobile

FACULTY OF ENGINEERING & TECHNOLOGY

Diploma in Automobile (Semester –I)

SEMESTER -I						
Code No.	Paper	L/T	P	End Semester Exam	Internal Marks	Total Marks
THEORY PAPERS						
DAM101	COMMUNICATION SKILLS – I	3	2	70	30	100
DAM102	APPLIED MATHEMATICS-I	4		70	30	100
DAM103	APPLIED PHYSICS -I	3		70	30	100
DAM104	APPLIED CHEMISTRY - I	3		70	30	100
DAM105	ENGINEERING DRAWING -I	2		70	30	100
DAM106	COMPUTER FUNDAMENTALS AND ITS APPLICATIONS	3		70	30	100
PRACTICAL/VIVA VOCE						
DAM103-P	APPLIED PHYSICS LAB-I		2	30	20	50
DAM104-P	APPLIED CHEMISTRY LAB-I		2	30	20	50
DAM105-P	ENGINEERING DRAWING LAB -I		2	30	20	50
DAM106-P	COMPUTER FUNDAMENTALS AND ITS APPLICATIONS LAB		2	30	20	50
DAM111-P	WORKSHOP PRACTICE -I		4	30	20	50
	Total	18	14	570	280	850

SEMESTER -II						
Code No.	Paper	L/T	P	End Semester Exam	Internal Marks	Total Marks
THEORY PAPERS						
DAM201	COMMUNICATION SKILLS – II	3	2	70	30	100
DAM202	APPLIED MATHS-II	4		70	30	100
DAM203	APPLIED PHYSICS –II	3		70	30	100
DAM204	APPLIED CHEMISTRY –II	3		70	30	100
DAM205	APPLIED MECHANICS	2		70	30	100
DAM206	ENGINEERING DRAWING – II	1		70	30	100
PRACTICAL/VIVA VOCE						
DAM203-P	APPLIED PHYSICS LAB-II		2	30	20	50
DAM204-P	APPLIED CHEMISTRY LAB-II		2	30	20	50
DAM205-P	APPLIED MECHANICS LAB		2	30	20	50
DAM206-P	ENGINEERING DRAWING LAB –II		2	30	20	50
	Total	16	10	540	260	800

SEMESTER -III						
Code No.	Paper	L/T	P	End Semester Exam	Internal Marks	Total Marks
THEORY PAPERS						
DAM301	AUTOMOTIVE INSTRUMENTATION AND CONTROL	4		70	30	100
DAM302	AUTOMOTIVE SYSTEM DESIGN	4		70	30	100
DAM303	VEHICLE BODY ENGINEERING	4		70	30	100
DAM304	VEHICLE PERFORMANCE	3		70	30	100
DAM305	HEALTH, SAFETY AND ENVIRONMENT			70	30	100
PRACTICAL/VIVA VOCE						
DAM302-P	AUTOMOTIVE SYSTEM DESIGN-LAB		3	30	20	50
DAM304-P	VEHICLE PERFORMANCE-LAB		2	30	20	50
DAM308-P	MACHINE DRAWING - LAB		2	30	20	50
DAM309-P	WORKSHOP PRACTICE-I		2	30	20	50

	Total	15	11	430	220	700
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SEMESTER -IV						
Code No.	Paper	L/T	P	End Semester Exam	Internal Marks	Total Marks
THEORY PAPERS						
DAM401	Manufacturing Process of Auto Components	4		70	30	100
DAM402	Automotive Electronics	3		70	30	100
DAM403	Vehicle Dynamics and Automotive Aerodynamics	3		70	30	100
DAM404	Refrigeration and Air Conditioning	2		70	30	100
DAM405	Modern Vehicle Technology	2		70	30	100
DAM406	Quality Control and Reliability Engineering			70	30	100
PRACTICAL/VIVA VOCE						
DAM402-P	AUTOMOTIVE ELECTRONICS-LAB		2	30	20	50
DAM404-P	REFRIGERATION AND AIR CONDITIONING-LAB		2	30	20	50
DAM409-P-	COMPUTER APPLICATIONS IN AUTOMOBILE ENGG-LAB		2	30	20	50
DAM410-P	INDUSTRIAL TRAINING*			30	20	50
	Total	14	12	560	290	800

SEMESTER -V						
Code No.	Paper	L/T	P	End Semester Exam	Internal Marks	Total Marks
THEORY PAPERS						
DAM501	MICROPROCESSOR APPLICATIONS IN AUTOMOBILE	4		70	30	100
DAM502	INDUSTRIAL PRODUCT DESIGN	3		70	30	100
DAM503	AUTOMOTIVE PETROL AND DIESEL ENGINES	4		70	30	100
DAM504	COMPUTER INTEGRATED MANUFACTURING SYSTEM	2		70	30	100

DAM505	SIMULATION OF IC ENGINE PROCESSES	4		70	30	100
PRACTICAL/VIVA VOCE						
DAM502-P	INDUSTRIAL PRODUCT DESIGN-LAB		2	30	20	50
DAM503-P	AUTOMOTIVE PETROL AND DIESEL ENGINES-LAB		2	30	20	50
DAM504-P	COMPUTER INTEGRATED MANUFACTURING SYSTEM-LAB		2	30	20	50
	Total	18	6	510	240	650
SEMESTER -VI						
Code No.	Paper	L/T	P	End Semester Exam	Internal Marks	Total Marks
THEORY PAPERS						
DAM601	Alternate Fuels	3		70	30	100
DAM602	Energy Engineering	3		70	30	100
DAM603	Industrial Engineering and Management	4		70	30	100
DAM604	Noise and Vibration	3		70	30	100
DAM605	Metrology and Quality Control	3		70	30	100
PRACTICAL/VIVA VOCE						
DAM602-P	ENERGY ENGINEERING-LAB		2	30	20	50
DAM604-P	NOISE AND VIBRATION-LAB		2	30	20	50
DAM605-P	METROLOGY AND QUALITY CONTROL-LAB		2	30	20	50
DAM609-P	PROJECT WORK			70	30	100
	Total	16	6	510	240	750

SEM-1

COMMUNICATION SKILL-I

UNIT-I

Passage for Comprehension:-

- (1) Language of Science
- (2) Robotic Revolution
- (3) Designing a Car
- (4) New Wonders of camera
- (5) Non-conventional sources of Energy
- (6) Our Environment
- (7) Entrepreneurship
- (8) Safety practices

UNIT-II

Short-Stories :-

- (1) Selfish Giant-Oscar Wilde
- (2) A Letter to God-Gregario Lapex Y-Fuentes An astrologer's Day –R.K. Naragyan

UNIT-III

Applied Grammar :-

- (1) Determiners
- (2) Auxiliaries
- (3) Tenses
- (4) Conditional
- (5) Passive
- (6) Prepositions
- (7) Subject-verb Agreement
- (8) Clauses & Connectors

UNIT-IV

Letter Writing:-

- (1) Application (For Job/Leave)
- (2) Letter of Enquiry and replies
- (3) Letter for Order Placement
- (4) Letter of Complaints (To Editor/ Appropriate Authorities)

UNIT-V

Report Writing :-

- (1) Writing Progress – Report of a job
- (2) General outline for preparing A Project Report.

Reference Books

1. Communication Skill for Teaching Students Book-I. M/s Somalia Publications. Pvt. Ltd., Bhopal.
2. Living English Structure –W.S. Allen
3. Practical English Grammar (Exercises I by Thomson & Martinet)
4. English conversation practice by Grant Taylor.

UNIT-I

Algebra-

Determinants and Matrices-expansion

Determinants and Matrices-expansion of determinants (upto third order) using sarrus rule, expansion method and pivotal condensation method. Properties of determinants, solutions of equations (up to 3 unknowns) by Cramers's rule. Definition of matrix, addition, subtraction and multiplication of matrices (up to third order). Inverse of a matrix by Adjoint method and elementary row transformations. Solution of equations (up to 3 unknowns) by Matrix method

UNIT-II

Logarithm

general properties of logarithms

Partial fractions

(linear factors, repeated linear factors, non reducible quadratic factors)

To resolve proper fraction into partial fraction with denominator containing non repeated linear factors to resolve improper fraction into partial fraction

UNIT-III

Trigonometry

Trigonometric ratios of any angle relation between degree and radian

Fundamental identities examples based on fundamental identities factorization

And defactorization formulae inverse trigonometric ratios value of inverse trigonometric ratios

UNIT-IV

Vectors

Definition of vector and scalar quantities. addition and subtraction of vectors. Dot product and cross product of two vectors. Thumb rule, Angle between two vectors, application of dot and cross product in engineering problems

Circle

Equation of circle in standard form centre radius form diameter form

General equation of circle

UNIT-V

Complex Numbers

Definition, Real and Imaginary parts of a complex number, polar and Cartesian representation of a complex number and conversion from one to the other, conjugate of a complex number, modulus and argument of a complex number.

Reference Books:-

- Mathematics for Polytechnic Volume I, TTTI Publication
- Applied Mathematics, EEB Publication, Bhopal
- Differential Calculus, By Gorakh Prasad
- Integral Calculus, By Gorakh Prasad

DAM103

APPLIED PHYSICS-I

UNIT-I Units and Dimensions: Physical quantities, Fundamental and derived units, Systems of units (FPS, CGS, MKS and SI units), Dimensions and Dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity and strain) Principle of homogeneity, Dimensional equations and their

applications, conversion from one unit to another unit for density, force, pressure, work, power, energy, velocity, acceleration, Limitations of Dimensional analysis

UNIT-II

Force and Motion: Scalar and vector quantities – examples, addition and multiplication (scalar product and vector product) of vectors. Force, resolution and composition of forces – resultant, parallelogram law of forces. Equilibrium of forces, Lami's theorem. Newton's Laws of motion – concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion conversion of momentum, impulse and impulsive forces, simple numerical problems based on third law. Projectile, horizontal and oblique projections and equation of trajectory. Derivation of time of flight, maximum height and horizontal range, Circular motion, Relation between linear and angular velocity and linear acceleration and angular acceleration, Centripetal force (derivation) and centrifugal force, Banking of roads

UNIT-III

Work, Power and Energy: Work: definitions and its SI units, Work done in moving an object on horizontal and inclined plane (incorporating frictional forces). Power: definitions and its SI units, calculation of power in simple cases. Energy: Definitions and its SI units: Types: Kinetic energy and Potential energy, with examples and their derivation, Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another

Properties of Matter: Elasticity, definition of stress and strain, Different types of modulus of elasticity. Explanation of stress – strain diagram. Pressure – its units, gauge pressure, absolute pressure, atmospheric pressure, Bourdon's pressure, manometers and barometer gauges. Surface tension – its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension. Fluid motion, stream line and turbulent flow, Reynolds number. Viscosity and coefficient of viscosity; derivation of terminal velocity; effect of temperature on viscosity.

UNIT-IV

Waves and vibrations: Generation of waves by vibrating particles, Wave motion with examples, Types of wave motion, transverse and longitudinal wave motion with examples. Velocity, frequency and wave length of a wave (relationship $v = \eta\lambda$). Sound and Light waves. Simple harmonic motion: definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Vibration of cantilever and beam, determination of time period of a cantilever. Free, forced and resonant vibrations with examples

Rotational Motion: Definitions of torque, moment of inertia, radius of gyration, Derivation of rotational kinetic energy and angular momentum, Conservation of angular momentum (qualitative). Theorems of parallel and perpendicular axes

Gravitation and satellites: Kepler's law of planetary motion, Newton's law of gravitation, Escape velocity (derivation), Satellites, Geo-stationary satellite

UNIT-V

Temperature and its measurement: Principles of measurement of temperature and different scales of temperature, Difference between heat and temperature on the basis of K.E. of molecules, Bimetallic and Platinum resistance thermometer: their merits and demerits, Pyrometers – Disappearing filament optical pyrometer

Transfer of Heat: Modes of transfer of heat (conduction, convection and radiation with examples) Coefficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method), Properties of heat radiation, Stefan's law, Kirchhoff's law, Wien's law, Planck's black body radiation law, Prevost's theory of heat exchange

RECOMMENDED BOOKS

1. Applied Physics Vol. I, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi
11. Applied Physics Vol. I&II H.C. Saxena & Prabhakar Singh
12. Applied Physics Vol. I&II D.Halliday & R.Rasnick
13. Engineering Physics – BVN Rao
14. Principles of Physics – K.K. Mohindroo
15. Basic Principles of Physics – Brij Lal Subramanyam .

DAM104

APPLIED CHEMISTRY-I

UNIT-I

Language of Chemistry: Definition of symbol, formula, valency and chemical equation. Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound, Essentials of a chemical equation, balancing of a chemical equation by Hit and Trial method.

UNIT-II

Chemical Bonding: Electronic concept of valency, Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency with the help of suitable examples to each

UNIT-III

Water: Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam generation. Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange process. Simple numerical problems related to soda lime process. Definition of degree of hardness of water and the systems to

express the degree of hardness of water. Simple numerical problems related to finding the degree of hardness on different scales. Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply

UNIT-IV

Solutions: Concept of homogenous solution, brief introduction of the terms (i) Ionization (ii) Acidity (iii) Basicity (iv) equivalent weight and gram equivalent weight with suitable examples Strength of a solution (i) Normality (ii) Molarity (iii) Molarity as applied in relation to a solution. Simple numerical problems related to volumetric analysis, Definition of pH, and different industrial applications of pH

UNIT-V

Electrolysis: Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples. Faraday's Laws of Electrolysis. Simple numerical problems based upon the laws of electrolysis, Different industrial applications of 'Electrolysis'. Elementary account of (i) lead acid battery and (ii) Ni-Cd battery with special reference to their reaction mechanisms.

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. "A Text Book of Applied Chemistry-I" by SS Kumar; Tata McGraw Hill, Delhi
4. "A Text Book of Applied Chemistry-I" by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar
9. Engineering Chemistry by O. P. Agrawal.

DAM105

ENGINEERING DRAWING-I

UNIT-I

1. Introduction

- Introduction to drawing equipments, instruments and their uses
- Planning of drawing sheet as per I.S. 696 – 1972
- Indian standard practices of laying out and folding of drawing
- Different types of lines used in engineering drawing
- Standard practice for writing single stroke vertical and inclined capital and lower cases letters (practice to be done on sketch book)
- Standard practice of writing numerals (practice to be done on sketch book)

2. Dimensioning techniques and standard conventions

- Identification and representation of various symbols used in Mechanical and Electrical Drawing
- Drawing Identification and representation of various symbols of building elements, materials and sanitary fittings
- Principles, system and arrangement of Dimensioning
- Practice problems of current method of Dimensioning
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UNIT-II

1. Form associated with engineering curves

- Types of engineering curves
- Method of construction of Engineering Curves
- Practice problems of drawing various Engineering Curves.
- Importance of scale in Engineering drawing
- Types of scales- plain, diagonal etc.
- Practical problems for constructing various types of scale.

2. Orthographic projection of points, lines and planes

- Definitions of various terms associated with orthographic projections.
- Planes of projections
- Concept of Quadrants
- First and third angle method of projection
- Projection of line in different positions with respects to H.P. V.P. and X-Y line
- Projection of planes in different position with respect to reference planes
- Practice problems on projection of points, lines and planes.

UNIT-III

1. Projections of simple machine parts and components

- Procedure for drawing projections and sectional views of simple machine components
- Practice problems of sketching and drawing the projections and sections of simple machine components.

2. Projections of solids

- Types of solids and associated terminology
- Position of solid with respect to reference planes
- Drawing projections of solid in different position with respect to reference planes
- Practice problems to draw projections of solid in different positions.

UNIT-IV

1. Section of solids

- Concept of sectioning planes
- Auxiliary planes and true shape of section
- Practice problems for drawing projections and section of solids.

2. Development of surfaces

- Concept and importance of surface development in engineering field
- Development of surfaces for the following
- Cube
- Cylinder
- Prism
- Cone and Frustum cone
- Practice problems.

UNIT-V

1. Isometric projections 8

- Limitations of orthographic projections
- Definitions of the terms axonometric, oblique, Isometric and diametric projections
- Procedure for preparing isometric oblique
- Isometric view of geometrical solids and simple machine parts
- Practice problems.

2. Basics of CAD

- Computer hardware and software requirement for CAD
- Co-ordinate systems
- Set up for a CAD drawing
- Drawing objects like- Line, Circle, Arc, Ellipse, Regular Polygons, Polylines, Donuts etc.
- Editing Commands like- Move, Copy, Rotate, Scale, Fillet, Chamfer, Trim, Extend, Array, Mirror etc.
- Basic Dimensioning, geometric Dimensioning and tolerance
- Use CAD commands for simple orthographic and isometric drawings

Instructional Strategies

- Lecture Method
- Demonstration and use of instrument used in drawing.
- Classroom practices for different typical exercises.
- Use of computer for developing drawing
- OHP Transparencies for complicated drawing objects

Reference Books

1. I.S. 696. (Latest revision), BIS, India
2. Engineering Drawing, N.D. Bhatt, Charoter Publisher, Anand
3. Engineering Drawing & Machine Drawing, R. K. Dhawan, Kumar
4. Engineering Drawing , R.B. Gupta, Satya Prakashan, Delhi
5. Geometrical Drawing , P.S. Gill , ketson & Sons

DAM106

Computer Fundamentals and Its Application

UNIT-I

1. INTRODUCTION TO COMPUTERS

Generations Of Computer-

-First, Second, Third and Fourth generation.

Classification & applications of computers-

- Micro, Mini, Mainframes and Super-Computers.
- Applications of computers.

2. MICROCOMPUTER

Structure & Working Of Micro Computers

- Central Processing Unit.
- Memory Unit.
- Input & Output Devices.

Evolution Of Micro-Computers

- Comparative study w.r.t. Micro-processor, clock speed, data bus, Register size, storage capacity, peripheral interface of PC to Pentium-IV computer systems.

UNIT-II

1. DATA REPRESENTATION

Data Representation

-Bit, byte, Nibble, Word, Double word Codes: ASCII, Binary Coded Decimal (BCD) EBCDIC, GREY and EXCESS 3 code

.Number Systems

-Types of number systems-Binary, Octal, Decimal, Hexadecimal.

Conversions Of Number Systems And Its Operations

- Binary addition, subtraction
- .-BCD addition, subtraction.
- 1's complement and 2's complement methods of subtraction Floating point arithmetic.

UNIT-III

1. COMPUTER LANGUAGES

Classification And Characteristics Of Languages

- Machine language.
- Assembly language.
- High level language.
- Hardware, Software And Firmware Computer Hardware Classification Of Software

2. INTRODUCTION TO DOS OPERATING SYSTEMS

- **Micro-Soft Disk Operating System (Ms-Dos)**
 - System files: BIOS, COMMAND.COM, CONFIG.SYS, Autoexec.bat file.
- **MS-DOS Commands**
 - Internal Commands – dir, cd, md, rd, del, ren, date, time, vol.
 - And copy External commands– attrib, format, edit, find, diskcopy, backup & restore.

UNIT-IV

1. INTRODUCTION TO WINDOWS OPERATING SYSTEMS

Windows Operating System

- Concept of Windows-Arranging, Moving, Resizing, Opening, and Closing of windows
- .-Folder/File Management-Search, copy, delete and rename files and folders Windows Accessories: Notepad, Word Pad, Pad.

2. COMPUTER APPLICATIONS SOFTWARE.

- **Word Processing Software**
MS Word
- **Data Analysis Software**
MS Excel Introduction to Electronic Spreadsheet.
- **Presentation Software**
MS Power Point

UNIT-V

1. INTERNET APPLICATIONS

Introduction To Internet -Different Services Of Internet

- www
- Email
- Chat (textual/voice)
- Bulletin Boards
- Video conferencing
- FTP (uploading and downloading files)

WEB-SITE ACCESS AND INFORMATION SEARCH

- Browsers and search engines.

2. INTERNET CONNECTIVITY

Internet Connectivity

- Internet Service Provider (ISP)
- Internet accounts : Shell account, TCP/IP ISDN and Leased Line
- Account and its features.

Hardware Required

- MODEM and Terminal Adapters.
- System software: O.S. Loader, Linker, Interpreter, Compiler and Assembler Application Software.

Reference Books

1. Introduction to Computers, Iind Edition 1998 , Peter Norton's Tata McGraw Hills Publishing
2. The ABCs of Ms-Office 97 , Ist Edition, Gay Hart Davis
3. Computer Organization and architecture, IVth – Edition 1996 , William Stalling

4. Structured computer Organization , III rd – Edition 1997 , Andrews Tanenbaum Prentice Hall of India Pvt. Ltd, N. Delhi
5. Teach yourself..... windows 95, I st – Edition 1995 , A L Stevens Comer BPB Publication, N. Delhi
6. The Internet Book , II – Edition 200, Douglas E. Prentice Hall of India Pvt. Ltd, N. Delhi

SEM-2

COMMUNICATION SKILLS - II

RATIONALE

Language is the most commonly used and effective medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and be able to pursue the present course of study and handle the future jobs in industry. The objective of this course is to assist the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension, improve vocabulary, develop grammatical ability, enhance writing skills, correspond with others, enhance skills in spoken English.

DETAILED CONTENTS

Unit- I

Prose Text Book

The following six chapters of A Book of English for Polytechnics – Prose Selection, Published by MacMillan India Ltd.

- a) Uncle Podger Hangs a Picture
- b) Subash Chandra Bose
- c) A Pair of Mustachios
- d) Guru Gobind Singh
- e) With The Photographer
- f) Sir Jagdish Chandra Bose

There will be one general question from one of these six chapters.

Precise writing (selected from the prescribed 6 chapters of Prose Text Book)

Grammar: Antonyms change of words into different parts of speech

Unit-II

Correspondence

Business letters such as:

- Registration as supplier
- Floating quotations and tenders
- Quarry for product specification, price and other details etc from a firm/Company
- Covering letter for quoting prices against a quotation/tender Placing supply order

Personal letters such as:

- Application for leave and extension of leave
- Application for seeking a job/employment
- Conveying congratulation messages to a relative/friend/colleague on different occasions
- Conveying condolence message to a relative/friend/colleague
- Request letter to guardian for sending money for excursion/study tour
- Letter to your brother/sister/friend describing your first day experience in the polytechnic

Official Letters such as:

- Letter to editor for placing an advertisement in the newspaper for purchase/selling of goods
- Letter to Municipal Commissioner for improving water supply/ sanitation system in your locality
- Letter to General Manager, Telephone Department for restoring a dead telephone/shifting a telephone
- Letter to State Electricity Board for repair of street lighting/ correction of bills etc.
- Letter to the supplier for rectifying or replacing a defective machinery/item of purchase
- Letter to Registrar, State Board of Technical Education for allowing to improve grades/marks in

diploma examination

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Unit III

Report Writing

- Drafting a technical report of a visit to a factory, construction site, modern office, etc.
- Report writing on current general themes/topics related to economy, industry, social issues
- Elements of periodical progress report

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Inspection Note

- Write an inspection note after inspecting technical/industrial goods
- Write an inspection note after visiting a construction site or production shop

Writing “Preface” and “acknowledgement” of a project report

Unit IV

A paragraph on current topics/themes

- Technology,
- Science
- Economy
- Politics
- Social
- General

Vocabulary:

- words, idioms, phrases, antonyms and synonyms,
- Translation of 100 most popular administrative terms from English to Hindi and from Hindi to English

Drafting

- Press notes
- Memos/circulars
- Notices (lost and found: obituary/auction, etc)
- Telegrams
- Press releases
- Agenda and minutes of the meeting
- Personal resume/curriculum vitae

Unit V

Communication Techniques

- Importance of communication
- Types of communication – verbal and non-verbal
- One way and two way communication
- Process of communication – horizontal, vertical, upward, downward
- Essentials of good communication
- Level of communication – inter and intra personal, group to person, group to group
- Methods of effective oral, written and non-verbal communication, Horizons – tone, frequency, rate, volume, depth
- Barrier to communication and overcoming barriers
- Listening skill
- Use of audio visual aids for effective communication

Reference Books

1. Essentials of Business Communication by Pal and Roruaing; Sultan Chand and Sons
2. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
3. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
4. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,

5. A Practical English Grammar by Thomson and Marlinet
6. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
7. English Conversation Practice by Grount Taylor; Tata McGraw Hill
8. Developing Communication Skills by Krishna Mohan and MeeraBanerji; MacMillan India Ltd., Delhi
9. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
10. Communication Skills by Ms. R Datta Roy and KK Dhir, Vishal Publication, Jalandhar

APPLIED MATHEMATICS – II

UNIT-I

Function and limit

Function –definition of variable constant interval such as open closed semi open etc

Definition of function value of a function and types of functions

Limit –definition of limit limits of algebraic trigonometric exponential and logarithmic function

UNIT-II

Differentiation

Definition of differentiation

Differentiation by first principle of x^n , $(ax + b)^n$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\operatorname{cosec} x$ and $\cot x$, e^x , a^x , $\log x$. Differentiation of a function of a function and explicit and implicit functions

Differentiation of sum, product and quotient of different functions

UNIT-III

Integral Calculus

Integration as inverse operation of differentiation

Simple integration by substitution, by parts and by partial fractions

Evaluation of definite integrals (simple problems) by explaining the general properties of definite integrals

UNIT-IV

Statistics

measures of central tendency. Mean, median, Mode

Measures of Dispersion mean Standard deviation

Mean deviation variance and coefficient of variation comparison of Two sets

UNIT-V

Differential Equation

Definition of differential equation

Order of differential equation

Explanation of order and degree

Solution of differential equation of first order and first degree

Reference Books:

1. Higher Engineering Mathematics by BS Grewal
2. Engineering Mathematics by BS Grewal
3. Engineering Mathematics vol. II by S Kohli and Others, IPH, Jalandhar
4. Engineering Mathematics by Ishan Publication
5. Applied Mathematics Vol. II by SS Sabharwal and Others; Eagle Parkashan, Jalandhar
6. Engineering Mathematics by IB Prasad
7. Applied Mathematics Vol. II by Dr RD Sharma
8. Advanced Engineering Mathematics by AB Mathur and VP Jagi; Khanna Publishers, Delhi
9. Higher Engineering Mathematics by BS Grewal; Khanna Publishers, Delhi
10. Engineering Mathematics by C Dass Chawla; Asian Publishers, New Delhi

RATIONALE

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

DETAILED CONTENTS**Unit-I****Applications of sound waves**

- Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time
- Ultrasonics – production (magnetostriction and piezoelectric) and their engineering applications

Unit-II**Principle of optics**

- Introduction: reflection of light, image formation in mirrors (convex and concave), refraction and refractive index, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection.
- Defects in image formation by lenses and their correction
- Simple and compound microscope, astronomical and Galileo telescope, magnifying power and its calculation (in each case)
- Overhead projector and slide projector

Unit-III**Electrostatics**

- Coulombs law, unit charge
- Gauss's Law
- Electric field intensity and electric potential
- Electric field of point charge, charged sphere (conducting and non-conducting), straight charged conductor, plane charged sheet
- Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors
- Dielectric and its effect on capacitors, Dielectric constant and Dielectric break down

Unit-IV**Electricity**

- Ohm's law
- Resistance of a conductor, specific resistance, series and parallel combination of resistors, effect of temperature on resistance
- Kirchoff's laws, wheatstone bridge principle and its applications
- Heating effect of current and concept of electric power

Semi conductor physics

- Energy bands, intrinsic and extrinsic semi conductors, p-n junction diode and its characteristics

- Diode as rectifier – half wave and full wave rectifier, semi conductor transistor pnp and npn (concept only)

Unit-V

Modern Physics

- Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, helium – neon and ruby lasers and applications
- Fibre optics: Introduction, optical fiber materials, types, light propagation and applications
- Super conductivity: Phenomenon of super conductivity, effect of magnetic field, critical field, type I and type II super conductors and their applications)
- Energy sources – conventional and non-conventional (wind, water, solar, bio, nuclear energy), only elementary idea.

Reference Books

1. Applied Physics Vol. II, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and BrijLal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

APPLIED CHEMISTRY-II

RATIONALE

The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behaviour when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstration and with the active involvement of students.

DETAILED CONTENTS

Unit-I

Metallurgy

- A brief introduction of the terms: Metallurgy (types), mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting calcination and refining as applied in relation to various metallurgical operations
- Metallurgy of (i) Aluminium (ii) Iron with their physical and chemical properties
- Definition of an alloy, purposes of alloying, composition, properties and uses of alloys-brass, bronze, monel metal, magnalium, duralumin, alnico and invar

Unit-II

Fuels

- Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples
- Definition of Calorific value of a fuel and determination of calorific value of a liquid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorific values
- Brief description of 'Proximate' and 'Ultimate' analysis of a fuel. Importance of conducting the proximate and ultimate analysis of a fuel
- Qualities of a good fuel and merits of gaseous fuels over those of other varieties of fuels
- Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas

Unit-III

Corrosion

- Meaning of the term 'corrosion' and its definition
- Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory
- **Prevention of corrosion by**
 - (a) Alloying
 - (b) Providing metallic coatings

Cathodic protections:

- (a) Sacrificial
- (b) Impressed voltage method

Unit-IV

Lubricants

- Definition of (i) lubricant (ii) lubrication \
- Classification of lubricants
- Principles of lubrication
 - (i) fluid film lubrication
 - (ii) boundary lubrication
 - (iii) extreme pressure lubrication
- Characteristics of a lubricant such as viscosity, viscosity index, volatility oiliness, acidity, emulsification, flash point and fire point and pour point.

Unit-V

Cement and Glass

- Manufacture of Portland Cement
- Manufacture of ordinary glass and lead glass

Classification and Nomenclature of Organic Compounds

Classification of Organic Compounds, functional group, Homologous Series, Nomenclature, Physical and Chemical properties, and industrial use of Organic Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

Reference Books:

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. "A Text Book of Applied Chemistry-I" by SS Kumar; Tata McGraw Hill, Delhi
4. "A Text Book of Applied Chemistry-I" by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

APPLIED MECHANICS

Unit-I

Introduction

- Concept of engineering mechanics, definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields
- Concept of rigid body

Laws of forces

- Different force systems (coplanar and non-coplanar), principle of transmissibility of forces .
- Parallelogram law of forces, triangle law of forces, polygon law of forces (graphically and analytically) resolution of forces, resolving a force into two rectangular components
- Free body diagram
- Equilibrium force and its determination
- Lami's theorem

Unit-II

Moment

- Concept of moment
- Moment of a force and units of moment
- Varignon's theorem (definition only)
- Principle of moment and its applications
- Parallel forces (like and unlike) and calculating their resultant
- Concept of couple, its properties and effects
- General conditions of equilibrium of boDMETs under co-planar forces
- Position of resultant force by moment.

Unit-III

Friction

- Definition and concept of friction, types of friction
- Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction
- Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane, friction in simple screw jack
- Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force:
 - a) acting along the inclined plane
 - b) horizontally
 - c) at some angle with the inclined plane

Unit-IV

Centre of Gravity

- Concept, definition of center of gravity and centroid of plain figure and symmetrical solid body
- Determination of centroid of plain and composite lamina using moment method, centroid of bodies with removed portion
- Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed

Application of the laws of motion

Simple problems on second law of motion, piles, lift, bodies tied with strings

Unit-V

Simple machines

Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machine

- Simple and compound machine
- Definition of ideal machine, reversible and self locking machine
- Effort lost in friction, determination of maximum mechanical advantage and maximum efficiency
- System of pulley (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency
- Working principle and application of wheel and axle, different pulley blocks, simple screw jack, worm and worm wheel, single and double purchase winch crab, expression for their velocity ratio and field of their application

Reference Books:

1. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi
2. Text Book in Applied Mechanics by MM Malhotra, R Subramanian, PS Gahlot and BS Rathore; Wiley Eastern Ltd., New Delhi
3. Engineering Mechanics by SS Bhavikatti, KG Rajashekarappa; Wiley Eastern Ltd., New Delhi
4. Engineering Mechanics and Strength of Materials by S Ramamurtham; Dhanpat Rai Publishing Co.(P) Ltd.
5. Engineering Mechanics by AB Basu; Tata McGraw Hill Publishing Co. Ltd.
6. Engineering Mechanics – Volume I and II by VS Mokashi; Tata McGraw Hill Publishing Co. Ltd.
7. Elements of Strength of Materials by SP Timoshenko, DH Young; East West Press Pvt Ltd.
8. Schaum's Outline Series - Theory and Problems of Strength of Materials by William A Nash, McGraw Hill Book Company
9. A Text Book of Applied Mechanics by NL Arora and RK Dhawan; India Publishing House, Delhi
10. A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi
11. Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House, New Delhi

ENGINEERING DRAWING – II

RATIONALE

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation

- Note:
1. First angle projection is to be followed
 2. Minimum of 15 sheets to be prepared by each student
 3. SP 46 – 1988 should be followed
 4. Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

DETAILED CONTENTS

Unit-I

Detail and Assembly Drawing

- Principle and utility of detail and assembly drawings
- Wooden joints i.e. corner mortice and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenon joint, Corner and Through halving joint, Closed Mortise and Tenon joint

Threads

- Nomenclature of threads, types of threads (metric), single and multiple start threads
- Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads
- Simplified conventions of left hand and right hand threads, both external and internal threads

Unit-II

Locking Devices

- Lock nuts, castle nuts, split pin nuts, sawn nuts, slotted nut

Nuts and Bolts

- Different views of hexagonal and square nuts; Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck bolts with hexagonal and square nuts and washers. Foundations bolts
– Rag bolt and Lewis bolt

Screws, Studs and Washers

- Drawing various types of machine screws
- Drawing various types of studs and set screws

Unit-III

Keys and Cotters

- Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position
- Cotter joints (i) sleeve and cotter joint (ii) gib and cotter joint (iii) knuckle joint (iv) Spigot and socket joint

Rivets and Riveted Joints

- Types of structural and general purpose rivet heads
- Caulking and fullering of riveted joints
- Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting

Unit-IV

Welded Joints

- Various conventions and symbols of welded joints (IS 696)
- Practical applications of welded joints say joints on steel frames, windows, doors and furniture

Couplings

- Muff or Box coupling, half lap muff coupling
- Flange coupling (Protected and non-protected)
- Flexible coupling

Symbols and Conventions

- Civil engineering sanitary fitting symbols
- Electrical fitting symbols for domestic interior installations
- Building plan drawing with electrical and civil engineering symbols

Unit-V

Development of Surfaces

- Construction of geometrical figures such as square, pentagon, hexagon
- Development of surfaces of cylinder, square, pentagonal and hexagonal, Prism, Cone and Pyramid, Sequence pentagonal and hexa pyramid

Interpenetration of

- Cylinder to cylinder
- Cylinder to cone

AUTO CAD

- Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode
- Drawing commands – point, line, arc, circle, ellipse
- Editing commands – scale, erase, copy, stretch, lengthen and explode
- Dimensioning and placing text in drawing area
- Sectioning and hatching
- Inquiry for different parameters of drawing entity

Reference Books: -

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House
2. A Text Book of Engineering Drawing by Surjit Singh Published by Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill; published by SK kataria and Sons, New Delhi

SEM-3

DMET301

AUTOMOTIVE INSTRUMENTATION AND CONTROL

Unit-I

MEASUREMENT OF FORCE, TORQUE AND VELOCITY

Electric balance – different types of load cells – magnets – elastics load cell – strain gauge load cell – different methods of torque measurement Strain gauge, relative regular twist- speed measurement – evolution counter – capacitive tacho – drag up type tacho – D.C and A.C. tacho generators – stroboscope.

Unit-II

MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY

Accelerometers – LVDT, piezo-electric, strain gauge and variable reluctance type accelerometers – mechanical type vibration instruments seismic instruments as an accelerometer and vibrometer – calibration of vibration pick ups – units of density, specific gravity and viscosity used in industries – pressure head type densitometer – float type densitometer – ultrasonic densitometer

Unit-III

MEASUREMENT OF PRESSURE & TEMPERATURE

Units of pressure –manometers – different types – elastic type pressure gauges – Bourdon tube bellows – diaphragms – Electrical methods – elastic elements with LVDT and strain gauges – measurement of vacuum – different types- McLeod gauge – testing and calibration of pressure gauges – dead weight tester. Bimetallic thermometers – electrical methods of temperature measurement – RTDs and their - Thermocouples, pyrometers – optical pyrometers – two colour radiation pyrometer.

Unit-IV

TRANSFER FUNCTIONS

Definitions, Transfer function – Mathematical modeling of mechanical (translation and rotational), Electrical systems- mechanical-electrical analogies– Block Diagram reduction technique and Signal flow graphs.

Unit-V

RESPONSE AND STABILITY ANALYSIS

Time response of First order & second order systems-concept of stability, necessary condition stability- Routh Stability criterion Polar and Bode plots –Simple Problems.

TEXT BOOKS

1. Ernest O.Doebelin, Measurement systems Application and Design, International Student Edition, IV Edition, McGraw-Hill Book Company, 1998.
2. R.K.Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.
3. Katsuhiko Ogata, Modern Control Engineering, 2nd edition, Prentice Hall of India Private Ltd, New Delhi, 1995

AUTOMOTIVE SYSTEM DESIGN

Unit-I

Statistical Considerations in Design: Statistics in design, design for natural tolerances, statistical analysis, mechanical reliability.

Design of Clutches: Design requirements of friction clutches, selection criterion, torque transmission capacity, lining materials, Design of single plate clutch, multi-plate clutch and centrifugal clutch

Unit-II

Design of Gearbox: Selection of gear ratios & final drive ratio, Design of gears, shafts, splines and housing, selection of bearings

Final Drive Design: Design of final drive & differential gearing, Selection of wheels and tyres.

Brake Systems: Design of Hydraulic Braking System, Internal Expanding Shoe Brake and Disc Brake.

Unit-III

Design of Axles & Propeller Shafts: Design of front & rear axles, Design of Propeller shafts for bending, torsion & rigidity, Design of universal joints and slip joints.

Design of Suspension System: General design considerations of suspension system, Design of leaf springs for automobile suspension system, Design considerations of Belleville springs, Elastomeric springs, Air (Pneumatic) springs.

Unit-IV

Optimization:

Introduction to design optimization of mechanical elements, adequate & optimum design, methods of optimization, Johnson's method of optimum design-Simple problems in optimum design like axially loaded members, shaft subjected to torsional and bending moments and other machine elements.

Reference Books:

1. Joseph E. Shigley & Larry D. Mitchell, 'Mechanical Engineering Design', Fourth Edition, McGraw-Hill International Book Company.
2. Patil S.P., 'Mechanical System Design', 2nd edition, Jaico Publishers
3. M. F. Spotts & T.E. Shoup, 'Design of machine Elements', Seventh Edition, Pearson Education.
4. Bhandari V. B., 'Design of Machine Elements', Tata McGraw-Hill Publishing Company Ltd., New Delhi.
5. Julian Happian – Smith, 'An Introduction to Modern Vehicle Design', Butterworth Heinemann

VEHICLE BODY ENGINEERING

Unit-I

CAR BODY

Types: Saloon, Convertibles, Limousine, Estate Van, racing and sports car - Driver's seat, Body Mechanisms - window winding, Door lock, seat adjustment. Driver's visibility and tests for visibility. Minimum space requirements and methods of improving space in cars. Safety - safety design, safety equipments. Car body construction.

Unit-II

VEHICLE AERODYNAMICS

Objectives -Vehicle drag and types - various types of forces and moments -Effects of forces and moments – Side wind effects -Various body optimization techniques for minimum drag –Wind tunnel testing: Flow visualization techniques, Scale model testing, Component balance to measure forces and moments.Simple problems.

Unit-III

BUS BODY

Types: Mini bus, single and double decker, two level, split level and articulated bus. Bus body layout – Floor height - Engine location - Entrance and exit location - Seating dimensions. Constructional details: Frame construction, Double skin construction -Types of metal section used - Regulations -Conventional and integral type construction.

Unit-IV

COMMERCIAL VEHICLE

Types: Flat platform, drop side, fixed side, tipper body, tanker body. LCV body types: pickup, van. Dimensions of driver's seat in relation to controls and steering angle -Driver cab design.

Unit-V

BODY MATERIALS, TRIM AND MECHANISMS

Aluminium alloy sheet, extrusion and casting, stainless steels, alloy steels, Metal Matrix Composites. Structural timbers -properties. Designing in GRP and high strength composites, Thermo plastics, Load bearing plastics, semi-rigid PUR foams and sandwich panel construction. Corrosion, Anticorrosion methods. Selection of paint and painting process -Body trim items.

TEXT BOOK

1. Powloski. J., Vehicle Body Engineering, Business Boob Ltd., 1989

REFERENCE BOOKS:

1. Giles. J. C., Body construction and design, Iliffe Boob Butterworth & Co., 1971.
2. John Fenton., Vehicle Body layout and analysis, Mechanical Engg Publication Ltd., London, 1982.
3. Braithwaite. J. B., Vehicle Body building and drafting, Heinemann Educational Book-I Ltd., London,1977

VEHICLE PERFORMANCE

Unit-I

Need and importance of vehicle testing, Vehicle Performance parameters: Fuel economy, acceleration, deceleration, gradability, top speed, handling, comfort, life durability, safety.

Unit-II

Vehicular transmission performance: Characteristics and comparison of automotive clutches, Geared transmission, Epicyclic transmission, Torque converter, Testing of clutch, gear box, final drive and differential. Test procedure

Unit-III

Vehicular system performance: Suspension, steering, Brakes & carriage unit testing, test procedure, Tyre Testing – Tyre wear pattern identification and causes, Endurance test, Strength test, High speed performance test

Unit-IV

Safety: Motor vehicle safety standards, active safety, passive safety, bio-mechanics Structural safety, energy absorption, ergonomic consideration in safety, Occupants safety systems – seat belts, head retrain, air bags, roll-over protection system, Electronic stability program.

Unit-V

Crash testing: Human testing, Dummies, crashworthiness, pole crash testing, rear crash testing, vehicle to vehicle impact, side impact testing, crash test sensors, sensor mounting, crash test data acquisition.

Noise & vibration: Mechanism of noise generation, engine noise & vibration, causes and remedies, road shocks, wind & vehicle noise measurement, Pass by noise, In cab noise, floor vibrations.

Reference Books:

1. J. Y. Wong , Theory of Ground Vehicles, A wiley Interscience Publications
2. Hans Herman Braess, Ulrich Seiffert, Handbook of Automotive Engineering, SAE Publications
3. Rao V. Dukkipati, Jian Pang, Road Vehicle Dynamics, SAE Publications
4. Wolt, Heinrich Hucho, Aerodynamics of road vehicles, SAE Publications
5. Bosch, Automotive Handbook, SAE Publications
6. George Pieters Barbara Pieters, Automotive Vehicle Safety

HEALTH, SAFETY AND ENVIRONMENT

Unit-I

ACCIDENT PREVENTION

Definitions and theories.- Accident – Injury –unsafe act – unsafe condition – Dangerous occurrence – Theories and principles of accident causation – Cost of accidents – Accident reporting and investigations – Safety committees – need – types – advantages. Safety Education and training- Importance - various training methods Accident prevention – Motivating factors – Safety suggestion schemes. Safety performance – Definitions connected with measuring safety performance as per Indian and International standards .

Unit-II

SAFETY IN MATERIAL HANDLING

General safety consideration in material handling - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears – Prime movers. Ergonomic consideration in material handling, design, installation, operation and maintenance of Conveying equipments, hoisting, traveling and slewing mechanisms. Selection, operation and maintenance of Industrial Trucks – Mobile Cranes – Tower crane.

Unit-III

ENVIRONMENTAL IMPACT ASSESSMENT

Evolution of EIA – Concepts – Methodologies – Screening – Scoping — Checklist. Rapid and Comprehensive EIA – Legislative and Environmental Clearance procedure in India – Prediction tools for EIA. Assessment of Impact – Air – Water – Soil – Noise- Biological. Socio cultural environment – Public participation –Resettlement and Rehabilitation. Documentation of EIA .

Unit-IV

REGULATIONS FOR HEALTH, SAFETY AND ENVIRONMENT

Factories act and rules; Indian explosive act - Gas cylinder rules. Environmental pollution act - Indian petroleum act and rules. Oil industry safety directorate (OISD) - Indian Electricity act and rules. Mines act and rules -Indian motor vehicles act and rules. Solid Waste Management: Causes, Effects and Control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies. Disaster management: Floods, Earthquake, Cyclone and landslides.

TEXT BOOKS

1. Handlin, W., Industrial Hand Book, McGraw-Hill, 2000.
2. Anton, T. J., Occupational safety and health management, (2nd ed.). New York, NY: McGraw Hill, Inc, 1989.

REFERENCE BOOKS

1. Heinrich, H.W., Industrial Accident Prevention, McGraw-Hill, 1980
2. Rudenko, N., Material Handling Equipments, Mir Publishers, Moscow, 1981.
3. Lees, F.P., Loss Prevention in Process Industries, Butterworth's, New Delhi, 1986.
4. Canter, R. L., Environmental Impact Assessment, McGraw Hill.

SEM-4

DAM401

MANUFACTURING PROCESS OF AUTO COMPONENTS

Unit-I

POWDER METALLURGY

Process flow chart – Production of metal powders and their raw materials – Manufacture of friction lining materials for clutches and brakes – Testing and inspection of PM parts.

Unit-II

FORMING PROCESS

Forging – process flow chart, forging of valves, connecting rod, crank shaft, cam shaft, propeller shaft, transmission gear blanks, foot brake linkage, steering knuckles. Extrusions: Basic process steps, extrusion of transmission shaft, steering worm blanks, brake anchor pins, rear axle drive shaft, axle housing spindles, piston pin and valve tappets. Hydro forming: Process, hydro forming of manifold and comparison with conventional methods – Hydro forming of tail lamp housing. Stretch forming – Process, stretch forming of auto body panels – Super plastic alloys for auto body panels.

Unit-III

CASTING AND MACHINING

Sand casting of cylinder block and liners – Centrifugal casting of flywheel, piston rings, bearing bushes and liners, permanent mould casting of piston, pressure die casting of carburetor and other small auto parts. Machining of connecting rods – crank shafts – cam shafts – pistons – piston pins – piston rings – valves – front and rear axle housings – flywheel – Honing of cylinder bores – copy turning and profile grinding machines.

Unit-IV

GEAR MANUFACTURING

Gear milling, Hobbing and shaping – Gear finishing and inspection. RECENT

Unit-V

TRENDS IN MANUFACTURING OF AUTO COMPONENTS

Powder injection moulding – Shot peen hardening of gears – Production of aluminum MMC liners for engine blocks – Plasma spray coated engine blocks and valves – Recent developments in auto body panel forming – Squeeze casting of pistons – aluminum composite brake rotors.

TEXT BOOK

1. Heldt.P.M., High Speed Combustion Engines, Oxford publishing co., New York, 1990.

REFERENCES

1. Haslehurst.S.E., Manufacturing Technology, ELBS, London, 1990.
2. Rusinoff., Forging and forming of metals, D.B, Taraporevla Son & co Pvt ltd, Mumbai, 1995.
3. Sabroff.A.M. & Others, Forging Materials & Processes, Reinhold Book Corporation, New York, 1988.
- 4.Upton, Pressure Die Casting, Pergamon Press, 1985.

DAM402

AUTOMOTIVE ELECTRONICS

Unit-I

Introduction to automotive electrical systems : Automotive generation, storage & distribution systems, wiring harness, circuit diagrams and symbols, 12/24/42 volt system, positive earth and negative earth, earth return and insulated return systems, Multiplexed wiring systems, Electromagnetic compatibility, Electromagnetic interference, Controlled Area Networks (CAN)

Unit-II

Battery : Types, Principle of lead acid battery, Constructional details, Recharging the battery, Battery ratings, Battery Performance, Battery capacities, Battery efficiency, Battery tests, Battery failures, Alkaline battery, maintenance free batteries, hybrid batteries

Charging Systems & Regulators: D.C. Generators, A. C. Generators, Magneto Constant current & voltage systems, Current & voltage regulator, Semi conductor type regulator, Regulator for alternators

Unit-III

Starting Systems: Requirements of Starting system, starting system layout, selection of motor, matching battery, Drive mechanisms, Permanent magnet motors

Ignition systems: Introduction, types, Ignition coil, Distributor, Cam angle & Contact angle gap, Advance mechanisms, Ballast Resistance, Limitations of coil ignition, Transistorized Ignition systems, Spark plugs, types, construction

Unit-IV

Automotive Electronic Systems : Electronic Ignition systems, Electronic injection systems, Antilock brake system circuit, Traction control, Electronic control of automobile transmission, Active suspension, Engine management system, ESP

Electric and hybrid vehicles: Types, Energy sources – batteries, Fuel cells, Solar and Hydrogen, Electric machines and controllers, Design considerations, challenges and recent developments.

Books Recommended:

1. Tom Denton, 'Automobile Electrical & Electronic Systems', SAE International
2. Young, Griffiths, 'Automobile Electrical & Electronic Equipments', The English Language Book Co., London.
3. Bechfold SAE 1998, 'Understanding Automotive Electronics'.
4. V.A.W.Hilliers, 'Fundamentals of Automotive Electronics', Hatchin, London
5. Tomwather J. R., Cland Hunter, 'Automotive Computer & Control System', Prentice Inc. NJ
6. Robert N. Brandy, 'Automotive Computers & Digital Instrumentation', Prentice Hall Eaglewood, Cliffs, NJ

DAM403

VEHICLE DYNAMICS AND AUTOMOTIVE AERODYNAMICS

Unit-I

Turning moment diagrams: coefficient of fluctuation of speed and energy, Flywheels. Governors: centrifugal governors: Watt, Porter, Hartnell ; stability criterion, controlling force, and sensitiveness. Balancing: Dynamics of Rotary and Reciprocating Mass. Rotating mass: single rotating mass, balancing of several masses rotating in same plane Reciprocating mass: Partial balancing of primary force and secondary balancing of multi cylinder inline engines. Vibrations: Introduction: Fundamentals of vibration, Free vibrations: Forced vibration : Damped and undamped, system analysis, Torsional vibration, Critical speed, Vibration isolation and vibration absorber, Vibration model for vehicle.

Unit-II

Gyroscope: Precisional motions and gyroscopic stability, gyroscopic couple, effect on stability of four wheelers, critical speed Stability of vehicle :Analysis of stability when vehicle moving on plane road, inclined road, Traversely inclined road, curved and banked road.. Effect of centrifugal force and subsequent distribution of load.

Unit-III

Forces on suspension: Load on suspension in fore and aft direction. Load on suspension both for rigid suspension and independent suspension system. Effect of braking and accelerating on suspension, Conditions of maximum load on suspension, spring rate, Sprung mass and unsprung mass Vehicle Handling: Slip angle, Over steer and under steer and its relation with slip angle. Steady state and transient cornering, Lateral force developed during cornering.. Cornering stiffness, Ackerman angle Effect of camber. Power consumed by tyre

Unit-IV

Riding characteristic of tire: Effect of inflation pressure on tire, tire life, tire wear. Over loading and wrong loading Driving habit. Wheel wobble and its effect
Effect of braking : Braking torque requirement on surface of tire. Braking torque in side the drum brake and disc brake, Force analysis on master cylinder and wheel cylinder.

References

- 1 .Giri N K Automobile Mechanics, Khanna Publication 8 th edition 2006
- 2 .Giri N K Automotive Technology Khanna Publication 1 st edition 2004
3. Gupta K M Auto Mobile Engineering vol. I & II, Umesh Publication 1st edition Reprint 2006
4. Theory of Machines by S.S.Rattan, TMH 1993
- 5.Theory of Machines by R.K.Bansal , laxmi Publications

DAM404

REFRIGERATION AND AIR CONDITIONING

Unit-I

Review of Thermodynamics:Laws, General equations, Processes, Equations applied to processes, definitions & methods of refrigeration.

Basic Refrigeration Cycles: Carnot cycle, Reversed Carnot cycle, Simple Vapour compression cycle, sub-cooling, superheating, Liquid to suction vapour heat exchanger, Calculations and performance of

above cycles, Actual vapor compression cycle, air standard refrigeration cycles such as Bell Coleman cycle, Air cycles for air crafts refrigeration.

Unit-II

Refrigerants: Classification, requirements of refrigerants like Thermodynamic, physical, & chemical. Comparison among commonly used refrigerants, Selection of Refrigerants, Effect on Ozone depletion and global warming, Alternative Refrigerants.

Refrigeration Equipments: Compressor, Condenser, Evaporator, Expansion devices, Types & performance characteristics, selection, methods of charging and leak testing.

Unit-III

Psychrometry: Moist air as a working substance, Psychrometric properties of air, Use of Psychrometric tables and charts, Processes, Combinations and Calculations, ADP, Coil Condition line, Sensible heat factor, Bypass factor.

Unit-IV

Comfort: Thermal exchange between human body and environment, factors affecting comfort, effective temperature comfort chart, ventilation requirements, outside & inside design conditions.

Heating and Cooling Load Calculation: Representation of actual air conditioning process by layouts and on psychrometric charts, Load analysis RSHF, GSHF, ESHF, Enumeration and brief explanation of the factors forming the load on refrigeration and air conditioning systems, load calculation of automobile vehicle for comfort and transport air conditioning. Energy conservation in air conditioning systems.

Reference Books:

1. Principles of Refrigeration - Roy J. Dossat
2. Refrigeration and Air Conditioning - Stoker
3. Refrigeration and Air Conditioning - C. P. Arora
4. Refrigeration and Air Conditioning - Arora Domkundwar
5. Refrigeration and Air Conditioning - V. K. Jain
6. Air Conditioning Principles and Systems - Pita
7. Air Conditioning Applications and Design - W. P. Jones
8. Air Conditioning Engineering - W. P. Jones

DAM405

MODERN VEHICLE TECHNOLOGY

Unit-I

TRENDS IN POWER PLANTS

Hybrid vehicles - Stratified charged & lean burn engines - Hydrogen engines - Battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

Unit-II

SUSPENSION, BRAKES AND SAFETY

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking – safety cage - air bags - crash resistance - passenger comfort

Unit-III

NOISE & POLLUTION

Reduction of noise - Internal & external pollution control through alternate fuels and power plants – Catalytic converters and filters for particulate emission.

Unit-IV

VEHICLE OPERATION AND CONTROL

Computer Control for pollution and noise control and for fuel economy - Transducers and actuators - Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

Unit-V

VEHICLE AUTOMATED TRACKS

Preparation and maintenance of proper road network - National highway network with automated roads and vehicles - Satellite control of vehicle operation for safe and fast travel.

REFERENCE BOOKS

1. Beranek.L.L. Noise Reduction, McGraw-Hill Book Co., Inc, New York, 1993.
2. Bosch Hand book, 3rd edition, SAE, 1993.
3. ARAI Safety Standards 1990.

DAM406

QUALITY CONTROL AND RELIABILITY ENGINEERING

Unit-I

INTRODUCTION AND PROCESS CONTROL FOR VARIABLES

Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality cost-Variation in process- factors – process capability – process capability studies and simple problems – Theory of control chart- uses of control chart – Control chart for variables – X chart, R chart and e chart.

Unit-II

PROCESS CONTROL FOR ATTRIBUTES

Control chart for attributes –control chart for proportion or fraction defectives – p chart and np chart – control chart for defects – C and U charts, State of control and process out of control identification in charts.

Unit-III

ACCEPTANCE SAMPLING

Lot by lot sampling – types – probability of acceptance in single, double, multiple sampling techniques – O.C. curves – producer's Risk and consumer's Risk. AQL, LTPD, AOQL concepts standard sampling plans for AQL and LTPD- uses of standard sampling plans.

Unit-IV

LIFE TESTING – RELIABILITY

Life testing – Objective – failure data analysis, Mean failure rate, mean time to failure, mean time between failure, hazard rate, system reliability, series, parallel and mixed configuration – simple problems. Maintainability and availability – simple problems. Acceptance sampling based on reliability test – O.C Curves.

Unit-V

QUALITY AND RELIABILITY

Reliability improvements – techniques- use of Pareto analysis – design for reliability – redundancy unit and standby redundancy – Optimization in reliability – Product design – Product analysis – Product development – Product life cycles.

TEXT BOOKS

1. Grant, Eugene .L “Statistical Quality Control”, McGraw-Hill, 1996.
2. L.S.Srinath, “Reliability Engineering”, Affiliated East west press, 1991.
- 3 Grant, Eugene .L “Statistical Quality Control”, McGraw-Hill, 1996.
4. L.S.Srinath, “Reliability Engineering”, Affiliated East west press, 1991.

SEM-5

MICROPROCESSOR APPLICATIONS IN AUTOMOBILE

Unit-I

MICROPROCESSOR FUNDAMENTALS

Architecture, functions and pin details of 8085 Microprocessor. Instruction format - addressing modes - instruction set of 8085 MPU-T-STATE - Machine cycle and instruction cycles - Timing diagrams

Unit-II

ASSEMBLY LANGUAGE PROGRAMMING

Construct of the language programming - Assembly format of 8085 - Assembly Directive - Multiple precision addition and subtraction - BCD to Binary and Binary to BCD, Multiplication, Division, Code conversion using look up tables - Stack and subroutines. DATA TRANSFER SCHEMES Interrupt structure - Programmed I/O - Interrupt driven I/O, DMA - Serial I/O.

Unit-III

INTERFACING DEVICES

Types of interfacing devices - Input / Output ports 8212, 8255, 8251, 8279. Octal latches and tristate buffers - A/D and D/A converters - Switches, LED's ROM and RAM interfacing.

Unit-IV

APPLICATIONS

Data acquisitions - Temperature control - Stepper motor control - Automotive applications Engine control, Suspension system control, Driver information systems, Development of a high speed, high precision learning control system for the engine control.

TEXT BOOK

1. Ramesh, S. Goankar., Microprocessor Architecture, Programming and Applications with 8085, Penram International Publishing (India), New Delhi, 1986.

REFERENCE BOOKS

1. Douglas V.Hall, Microprocessor and Interfacing – Programming and Hardware, Tata McGraw-Hill Publishing Co Ltd., New Delhi, 1991.
2. Aditya.P.Mathur, Introduction to Microprocessors, 3rd Edition, Tata McGraw-Hill Publishing Co Ltd., New Delhi, 1989.
3. Ahson.S.I., Microprocessors with Applications in Process Control, Tata McGraw-Hill, New Delhi, 1986.

INDUSTRIAL PRODUCT DESIGN

Unit-I

Introduction: Approach to industrial design.

- a. Approach to industrial product based on idea generation and innovativeness to meet the needs of the developing society. Design and development process of industrial products, various steps such as creative process involved in idea of marketing, mind criticism, design process, creation.
- b. Ergonomics and aesthetics requirement of product design, quality and maintainability consideration in product design. Use of modeling technique, prototype design, conceptual (conceptional) design.

Unit-II

Industrial Product Design:

- a. General Design situations, setting specifications, requirements and ratings, their importance in design. Study of market requirements and manufacturing aspects of industrial design.
- b. Aspects of ergonomics design of machine tools, testing equipments, instruments, automobiles, process equipments, conventions of style, form & color in industrial design.

Unit-III

Design of consumer product:

- a. Design concepts of consumer product, specification requirements and ratings of their importance in design, functions and use, standard and legal requirements, body/dimensions
- b. Ergonomic considerations, interpretation of information, conventions for style, forms, colors.

Unit-IV

Aesthetics concept:

- a. Concept of unity and order with variety, concept of purpose, style and environment, aesthetic expressions of symmetry, balance, contrast, continuity, proportion, rhythm, radiance.
- b. Form and style of product, visual effect of line and form, mechanics of seeing, psychology of seeing, influence of line and form, component of style, basic factor, house style, effect of color on product appearance, color composition, conversion of colors of engineering products.

Reference Books:

1. Industrial Design for Engineers- W.H. Mayall, London Ilifle Books Ltd.
2. Problems of product Design and development – Hearn Buck, Pergamon Press.
3. Industrial Designs in Engineering- Charles H. Flurscheim, Design Council
4. The generation of Idea for new products- Trevor Sowecy, Kogan Page
5. Engineering Design conceptual stage- M. J. French, Heinman Education Books.

Unit-I

Automotive Petrol Engines Engine Construction and Operation: Constructional details of 4stroke and 2 stroke petrol engine. Comparison of four stroke and two stroke engine operation. Firing order and its significance. Working principle: Otto cycle, actual and real engine cycles.

Unit-II

SI Engine Fuel System: Carburettor and its working principle. Requirements of an automotive carburettor; Starting, idling, acceleration circuits of carburettors. Mechanical and Electrical pumps, fuel feed system. Spark Ignition System: Magneto and Battery ignition systems for S.I. Engines; Ignition timing. Combustion in SI engines: Stages of combustion, flame propagation, rate of pressure rise.

Unit-III

Abnormal combustion: Phenomena of knocking. Effect of engine variables on knock. Combustion Chambers: Combustion chambers- Different types, Factor controlling combustion chamber design. Petrol Injection strategies: M.P.F.I. and Port fuelling techniques. Cooling System: Need for cooling system. Types of cooling system, Liquid and air cooled systems. Thermo syphone and pressurised cooling system. Properties of coolants.

Unit-IV

Lubrication System :Lubrication system, Mist lubrication system, Wet sump and dry sump lubrication Forced feed lubrication system. Scavenging Scavenging methods Scavenging pumps, Scavenging pumps Testing Performance test of 2-stroke and 4- stroke petrol engine. I.H.P , B.H.P Mechanical efficiency, Brake thermal efficiency . Performance curve i.e. Load v.s. efficiency, Speed v.s. efficiency etc

Unit-V

Diesel Engines Engine construction Construction of 2- stroke and 4 - stroke diesel engine Working principle Diesel cycle actual and real cycle., dual fuel cycle, comparison Otto, Diesel and Dual fuel cycles. Diesel fuel:Ignition quality. Cetane number, Stoichometric, equation of combustion of diesel fuel. Diesel Engine Combustion Concepts: Stages, heat release and ignition delay correlations. Abnormal combustion, factors affecting abnormal combustion. Knock in CI engines-comparison of knock in CI & SI engines Fuel air mixing: Importance of air motion-swirl, squish and turbulence-swirl ratio. period, factors affecting delay period. Combustion Chambers- combustion chamber design objectives. Different types of combustion chamber.

TEXT BOOKS

1. Ganesan V, Internal Combustion Engines, 2nd edition, Tata McGraw Hill Book Cop., 2003.
2. Mathur. M. L, and Sharma. R. P., A course in Internal Combustion Engines, Dhanpat Rai Publications Pvt.Ltd., 1998.

REFERENCE BOOKS

1. Ramalingam, K. K. Internal Combustion Engine, Scitech Publication (India) Pvt.Ltd. 2000.
2. Domkundwar, V. M. A course in Internal Combustion engines, Dhanpat Rai and Co., 1999

DAM504

COMPUTER INTEGRATED MANUFACTURING SYSTEM

Unit-I

Introduction: Meaning, Scope, evolution, architecture, elements, benefits, limitations, obstacles in implementation, social aspects of CIM.

CAD/CAM/CAE:Product design and CAD/CAM, role of computers in design and manufacturing, integration of CAD/CAM, Role of CAD/CAM in CIM.

Unit-II

Group Technology: Concept, design and manufacturing attributes, part families, methods of grouping, PFA, different classification and coding systems (OPITZ and MICLASS), relevance of GT in CIM, benefits and limitations.

Unit-III

Computer Integrated Planning: Aggregate planning, master production schedule, capacity planning, MRP-I, computer aided process planning.

Computer Integrated Control: Shop floor control, factory data collection system, inventory management, MRP-II.

Unit-IV

Flexible Manufacturing Systems: Concept, difference between rigid and flexible manufacturing, concept of cellular manufacturing, structure of FMS, components of FMS.

Computer Aided Quality Control: Objectives, contact & non-contact inspection, types of contact and non-contact inspection, scope in CIMS, coordinate measuring machine: types, construction, working principle, working, applications, and scope of CMM in CIMS, flexible inspection system.

Unit-V

Database Management System: Meaning of Data, database, DBMS, design requirements, criteria, comparison of DBMS with conventional file handling, types of DBMS model, scope of DBMS in CIMS.

REFERENCE BOOKS:

1. Automotion, Production systems and Computer Integrated Manufacturing by M.P.Groover (PHI)
2. Computer Integrated Design and Manufacturing by Bedworth, Henderson Wo (McGraw Hill)
3. Performance Modeling of Automated Production System by Narhari and Vishvanandhan (PHI)
4. Principles of Computer Integrated Manufacturing by S. Kant Vajpayee (PHI)

DAM505

SIMULATION OF IC ENGINE PROCESSES

Unit-I

SI ENGINE SIMULATION WITH AIR AS WORKING MEDIUM

Deviation between actual and ideal cycle - Problems, SI engine simulation with adiabatic combustion, temperature drop due to fuel vapourisation, full throttle operation - efficiency calculation, part-throttle operation, super charged operation.

Unit-II

PROGRESSIVE COMBUSTION

SI Engines simulation with progressive combustion with gas exchange process, Heat transfer process, friction calculation, compression of simulated values, validation of the computer code, engine performance simulation, pressure crank angle diagram and other engine performance.

Unit-III

SIMULATION OF 2-STROKE SI ENGINE

Introduction – Air fuel mixture formation – Chemically correct mixture combustion – Scavenging – Exhaust and mixing processes in a two stroke engine.

Unit-IV

DIESEL ENGINE SIMULATION

Multi zone model for combustion, different heat transfer models, equilibrium calculations, simulation of engine performance and simulation for pollution estimation.

TEXT BOOKS

1. Ganesan.V., Computer Simulation of Spark - Ignition Engine Process, Universities Press (I) Ltd, 1996.
2. Ganesan.V., Computer Simulation of Compression - Ignition Engine Process, Universities Press (I) Ltd, 2000.

REFERENCE BOOKS

1. Ramoss.A.L., Modeling of Internal Combustion Engines Processes, McGraw Hill Publishing Co., 1992.
2. Ashley Campbel, Thermodynamic analysis of combustion engines, John Wiley & Sons, New York, 1986.
3. Benson.R.S., Whitehouse.N.D., Internal Combustion Engines, Pergamon Press, Oxford, 1979.

SEM-6

ALTERNATE FUELS

Unit-I

ALCOHOL FUELS

Properties as engine fuels - Performance in S.I. Engines - Alcohol & Gasoline blends - Flexible Fuel Vehicle - Reformed alcohols - Use in C.I. Engines - Emulsions - Dual fuel systems - Spark assisted diesel engines – Surface ignition engines - Ignition accelerators - Combustion and emission characteristics in engines - emission characteristics.

Unit-II

GASEOUS FUELS

Hydrogen - Properties - Use in CI Engines - Use in SI Engines - Storage methods – Safety precautions. Producer gas and biogas - Raw materials - Gasification - Properties - Cleaning up the gas - Use in SI and CI engines, LPG & Natural gas - Properties - Use in SI and CI Engines.

Unit-III

VEGETABLE OILS

Various vegetable oils for engines – Properties - Esterification - Performance in engines - Performance and emission Characteristics

Unit-IV

ELECTRIC AND SOLAR POWERED VEHICLES

Layout of an electric vehicle - Advantage and limitations - Specifications - System component. Electronic control system - High energy and power density batteries - Hybrid vehicle - Solar powered vehicles.

REFERENCE BOOKS:

1. Osamu Hirao and Richard K. Pefley, Present and Future Automotive Fuels, John Wiley and Sons, 1988.
2. Keith Owen and Trevor Eoley, Automotive Fuels Handbook, SAE Publications, 1990.
3. Richard L. Bechtold, Automotive Fuels Guide Book, SAE Publications, 1997.

ENERGY ENGINEERING

Unit-I

Introduction:

Fossil fuel based systems, Impact of fossil fuel based systems, World scenario of Energy Resources, Indian Scenario of Energy Resources - new and renewable energy – sources and features.

Unit-II

Solar Thermal System:

Solar potential, Solar radiation spectrum, Solar radiation geometry, Solar radiation data, Radiation measurement, Technologies of thermal energy collection, Types of Solar Collectors, Collection efficiency, Testing of Solar collectors – IS code, Applications of Solar Energy, Solar Pond, Solar Energy storage & types.

Unit-III

Solar Photovoltaic systems:

Operating Principle, Photovoltaic cell concepts, Photo-cell materials, Cell module array, Series and parallel connections, Applications & applications related to automobiles.

Fuel Cells:

Introduction, Principle and operation of fuel cells, classification and types of fuel. Fuel for fuel cells, performance characteristics of fuel cells, application of fuel cells related to automobiles.

Unit-IV

Wind Energy:

Wind parameters and wind data, Power from wind, Site selection, Wind energy conversion systems and their classification, Construction and working of typical wind mill, characteristics of wind generators, Design considerations for wind mills.

Bioconversion:

Introduction, biological & biochemical conversion, Energy plantation, Combustion and fermentation, anaerobic digester, Biomass gasification, Pyrolysis, various applications of Biomass energy, Bio-fuel – Relevance, types, and applications.

Reference Books:

1. Solar Energy by Dr. S. P. Sukhatme Tata McGraw Hill.
2. Non Conventional Energy Sources by G.D.Rai.- Khanna Publishers.
3. Energy Technology by S. Rao, Dr. B.B.Parulekar Khanna Publishers.
4. Non Conventional Energy Sources by Dr. L. Umanand.
5. Introduction to Non Conventional Energy Resources by Raja, SciTech Publi.

INDUSTRIAL ENGINEERING AND MANAGEMENT

Unit-I

INTRODUCTION

Economics – Scope and Definition – Importance of Economics in Engineering – Economic optimization- Demand and Revenue Analysis – Law of Demand - Demand Forecasting –Methods of Demand Forecasting - Demand curves – Factors affecting Demand – Demand Elasticity - Production Analysis – simple problems.

Unit-II

SUPPLY, COST AND OUTPUT

Supply – Supply schedule – Law of Supply – Elasticity of Supply - Cost and Supply Analysis – Types of Costs - Price and output Determination – Price Fixation – Pricing methods - Pricing Policies – Factors governing Pricing Policies – Break-Even analysis – Estimation of Break-Even Point - Usefulness of BEP – Limitations – simple problems.

Unit-III

MANAGEMENT AND ITS ENVIRONMENT

Management – Definition – Functions – Evolution of Modern Management movement – Different Schools of Management - Types and Forms of Business Organization - Designing effective organizations - Individual ownership – Partnership – Joint stock companies – Cooperative enterprises – Public Sector Undertakings.

Unit-III

MANAGEMENT OF HUMAN AT WORK

Human Resource Development – Motivating individuals and workgroups – Leadership for Managerial Effectiveness – Team working and Creativity – Managerial Communication – Time Management – Performance Appraisal– Career Planning.

Unit-IV

MODERN MANAGEMENT CONCEPTS

Management by Objectives (MBO) – Principles and Steps – Advantages and Disadvantages - Management by Exception (MBE) – Strategic management – SWOT analysis - Enterprise Resource Planning (ERP) – Supply Chain Management (SCM) – Activity Based Management (ABM).

TEXT BOOKS

1. Murphy W. R. and Mc Kay. G., Energy Management, Butterworths, London.
2. Chandran, J. S., Organizational Behaviours, Vikas Publishing House Pvt. Ltd., New Delhi, 1994.
3. Ernest Dale, Management Theory and Practice, International Student Edition, McGraw Hill Publishing Co., New Delhi.

NOISE AND VIBRATION

Unit-I

Introduction to Vibration:

Introduction, Causes and effects of vibration, vibration terminology, Equation of motion Energy method, Rayleigh's method etc., Harmonic and periodic motions, Vibration standards, Single-DOF Free Vibrations

Unit-II

Multi Degree of Freedom Vibrations:

Matrix formulation, eigen values and eigen formulation, matrix iteration techniques – normal modes and orthogonality, transient response of multi degree freedom system, mode superposition technique, torsional oscillations of multirotor systems

Unit-III

Torsional vibrations:

Simple systems with one or two rotor masses Multi-DOF systems-transfer matrix method Geared system Branched system

Unit-IV

Vibration Instrumentation:

Vibration measurements – Vibration measurement parameters (displacement, velocity & acceleration), instrumentation – electrodynamic exciters – impact hammers, piezoelectric accelerometers, signal conditioning and amplification, filters, preamplifiers and power amplifiers, real time analysis, FFT analysis, structural frequency response measurement, modal testing of beams, Modal parameter (natural frequency, mode shape and damping) estimation techniques.

Unit-V

Noise measurement:

Sound and Noise parameters, propagation of sound & noise in various machinery's, noise measuring parameters, noise level measurement techniques, Noise level interpolation and mapping, noise measuring instruments

Unit-VI

Noise Control:

Mechanization of noise generation, noise control methodologies, noise control measures, environmental noise management, Road vehicle noise standards, Sound absorption by porous materials, silencer and suppression systems, Sound absorption, sound insulation, acceptance noise levels.

Text Books:

1. N. L. Meirovitch, Elements of vibration Analysis, Mc Graw Hill New York, 1986.
2. J.P. Den Hartog, Mechanical Vibration, 4th edition, Mc Graw Hill, New York 1985.
3. Irwin & Garf, Industrial Noise & Vibration Control.
4. Mechanical Vibration – S. S. Rao, New Age International (P) Ltd., New Delhi
5. Mechanical Vibration Analysis, P. Srinivasan, Tata McGraw Hill Pub. New Delhi

DAM605

METROLOGY AND QUALITY CONTROL

UNIT I

INTRODUCTION TO METROLOGY

Basic Concepts - Legal Metrology - Precision - Accuracy - Types of errors –least square fit- Linear and Angular Measurements - Standards of Measurements - Calibration - Interchangeability and selective assembly- Gauges for inspection types-Gauge design-Taylor's principle- Introduction to Comparators - Types of Comparators - Mechanical, Mechanical - Optical, Electrical and Electronic, pneumatic- flow type-differential pressure type.

UNIT II

MEASUREMENTS OF SCREW THREAD - GEAR ELEMENTS – SURFACE FINISH

Internal and External screw threads: Measurements of various elements of thread - Best size wire - Two and three wire method. Gear: Measurements of various elements - Constant chord method - Base tangent method. Surface Finish: Surface topography definitions - Measurement of Surface Texture - Methods - Evaluation of Surface finish.

UNIT III

OPTICAL METROLOGY and NON CONTACT MEASUREMENT TECHNIQUES

Principle of light wave interference - Light sources –Measurement with optical flats- Types of Interferometers - Michelson, Twyman Green Specialisation of Michelson, NPL flatness Interferometers, The Pitter NPL gauge – laser interferometer- laser micrometer- surface roughness measurement using laser. Machine vision -Image processing techniques-edge detection-feature extraction- applications

UNIT IV

COORDINATE METROLOGY AND FORM MEASUREMENT

Coordinate Measuring Machine-components of CMM-types-measuring head - types of probe-alignment error-causes of error -measuring accuracy-calibration of CMM-performance of CMM-applications-measurement integration, Measurement of straightness - Flatness - squareness - parallelism - circularity – roundness and runout.

UNIT V

THEORY OF CONTROL CHARTS & ACCEPTANCE SAMPLING

Introduction - Definition of Quality - Chance Causes and assignable Causes – SQC Benefits and Limitations-Theory of Control Charts: Control Charts for Variables - \bar{X} - σ charts - run up - run down - Process capability studies. Control Charts for attributes – P chart, nP chart, C and U chart. acceptance sampling- OC curve - AQL - LTPD - AOQL - Sampling Plans - Simple - Double - Multiple and sequential sampling plans –simple problems

TEXT BOOKS

1. Jain R. K, “Engineering Metrology”, Khanna Publishers, New Delhi, 2012.
2. Gupta R. C, “Statistical Quality Control”, Khanna Publishers, New Delhi, 1994.

REFERENCES

1. Kevin Harding, “Handbook of Optical Dimensional Metrology”, CRC Press, A Taylor & Francis group, 2013.
2. Robert J. Hocken, Paulo H. “Pereira, Coordinate Measuring Machines And Systems”, CRC Press, Taylor & Francis Group, 2011.
3. Connie Dotson, Roger Harlow and Richard L. Thompson, “Fundamentals of Dimensional Metrology”, Thomson Delmar Learning, 4 th edition, 2005